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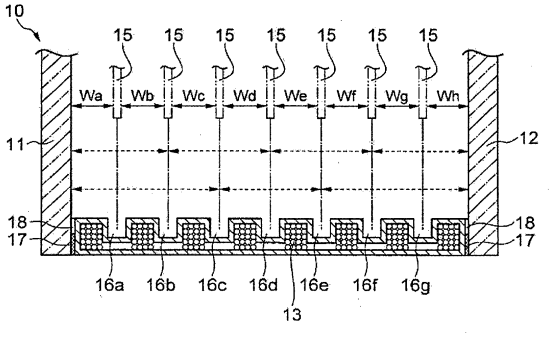
(54) MULTIPLEX GLAZED SASH AND METHOD FOR MANUFACTURING SAME, AND MEMBER AND PRODUCT RELATING TO MULTIPLEX GLAZED SASH

(57) To provide a multiple glazing sash, which is a multiple type multiple glazing sash having a total number of glass plates and an intermediate plate of at least 3, having two glass plates and at least one intermediate plate disposed to be spaced apart, which can reduce the number of members, which can reduce the assembling steps and which can meet various specifications.

A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

Fig. 11



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Description

TECHNICAL FIELD

[0001] The present invention relates to a multiple glazing sash, a frame body for a multiple glazing sash, a corner block for a double glazing, a double glazing, a double glazing sash, a process for producing a multiple glazing sash, and an edge face protecting cover for a multiple glazing sash.

BACKGROUND ART

[0002] A double glazing comprising two glass plates spaced apart via a spacer to form an air space, is excellent in the heat insulating property and sound insulation property and is widely used for windows for residences and other various buildings.

[0003] A triple glazing of a type comprising three glass plates spaced apart via a spacer to form two air spaces, having further improved heat insulating property and sound insulation property as compared with the above double glazing, is known in Patent Document 1.

[0004] Further, as a triple glazing of the above type having two air spaces formed, a triple glazing having two outermost glass plates bonded to both sides of one spacer, and another glass plate fitted to a strip groove provided on the inner side of the spacer and held between the two glass plates, is known in Patent Document 2.

[0005] The triple glazing having three glass plates and two air spaces disclosed in Patent Document 1 has drawbacks such that in its production a step of disposing spaces respectively between the three glass plates and sealing them by means of a sealing material, is required, thus increasing the number of members and the assembling steps and increasing the entire thickness of the triple glazing. For example, in production of a triple glazing of such a type, as shown in Fig. 121, spacers 93, 93 are disposed on a peripheral edge part of three glass plates 91, 91, 91 to form air spaces 92, 92, and a butyl rubber type adhesive 94 is applied to between the glass plates 91, 91, 91 and the spacers 93, 93 and further, a sealing medium such as a polysulfide type adhesive or a silicone type adhesive is filled in groove parts 95 on the outside between the glass plates 91, 91, 91 and the spacers 93, 93, followed by a curing treatment. If a multiple glazing of a multilayer structure having three or more air spaces with the above structure of the triple glazing having two air spaces disclosed in Patent Document 1 is to be produced by the above-mentioned production process, the number of members and the assembling steps will further be increased. Further, to the triple glazing using three glass plates as disclosed in Patent Document 1, stiles and rails can hardly be provided for interior decoration in design and production aspects because of the structure of the triple glazing, and it is very difficult to improve the lighting performance, design property and the open feeling.

[0006] Further, the triple glazing disclosed in Patent Document 2 also has problems in that a multiple glazing of a multilayer structure having three or more air spaces with the above structure of the triple glazing having two air spaces disclosed in Patent Document 2 is to be produced, the number of members and the assembling steps will further be increased.

[0007] Either of triple glazings (multilayer glazings) of the structures disclosed in Patent Documents 1 and 2 has problems such that if a multiple glazing having a multilayer structure having three or more air spaces is to be produced, the number of members and the assembling steps are increased, such being troublesome. However, both Patent Documents 1 and 2 failed to disclose an object to solve such a problem.

[0008] On the other hand, a double glazing sash of a type having one air space formed therein, having upper and lower rails and stiles provided for interior decoration between two glass plates disposed to be spaced apart, is known in Patent Document 3. The double glazing sash as disclosed in Patent Document 3 has upper and lower rails and stiles provided for interior decoration between two glass plates, whereby a wide space is easily formed between the two glass plates, its heat insulating property and sound insulation property can be increased, and it has an excellent outer appearance by increasing the glass area in a transparent region of the glass plates on the front and rear sides.

[0009] Further, as a double glazing sash structure employing a double glazing, a double glazing sash structure having a double glazing comprising two glass plates, an internal spacer disposed on the inner side of a peripheral edge part between the glass plates to form a concave part on the inner of the peripheral edge part between the glass plates, and an air space being formed between the two glass plates, and a holding frame being disposed in the concave part of the peripheral edge part of the double glazing, is known in Patent Document 4. The double glazing sash as disclosed in Patent Document 4 has a small area of stiles and rails, has improved lighting property and design property, is excellent in the open feeling, has a reduced heat loss due to a small area of stiles and rails, and it is considered that the problem of dew condensation at the stiles and rails is improved.

[0010] In recent years, along with a further increase in demands for heat insulating property at a window opening in energy-saving residences and buildings, demands for a highly heat insulating multiple glazing having four or more glass plates disposed to be spaced apart via a spacer to form three or more air spaces are increasing, and such a highly heat insulating multiple glazing having a structure with which the number of members is reduced, assembling steps are rationalized, and the production cost can be reduced, has been required.

[0011] Further, it has also been proposed to seal a gas having more excellent heat insulating property in a plurality of air spaces in such a highly heat insulating multiple glazing to increase the heat insulating property. Thus, it

has been required to select an optimum filler gas and to optimize the thickness of a gas layer of the filler gas, so as to further increase the heat insulating property.

[0012] Further, in a case where a window sash is to be prepared using a conventional double glazing, its process comprises a double glazing preparing step and of preparing a double glazing by disposing two glass plates to be spaced apart by means of a spacer to form an air space between the glass plates, and a stile-and-rail assembling step of assembling stiles and rails to a peripheral edge part of the double glazing to prepare a double glazing sash. Thus, such a production process has drawbacks such that the number of members is large, and the number of assembling steps is large.

[0013] Further, to the triple glazing using three glass plates as disclosed in Patent Document 1 stiles and rails can hardly be provided for interior decoration to its peripheral part in the design and production aspects because of the structure of the triple glazing, and it is very difficult to increase the lighting performance, the design property and the open feeling.

[0014] Further, not only as a highly heat insulating multiple glazing for an outside window of a residence or a building, in a case where on the interior side of an outside window of an existing residence, building or the like, another inside window is disposed to form a double window so as to increase the sound insulation property, the heat insulating property and the security, for a sash to be used for such an inside window, a more reduced entire thickness and weight saving are required.

[0015] Along with increased demands for resource saving, a demand is developing such that when a residence, a building or the like is broken, from a multiple glazing sash of the above type removed from its window, a glass plate disposed in the air space can easily be removed, and the removed glass plate can be recycled.

[0016] Further, in recent years, along with diversification of the design of windows of residences and other various buildings, a double glazing sash structure with more excellent lighting performance, design property and open feeling and with reduced heat loss, has been desired. Particularly as a double glazing sash to be used for an inside window, a double glazing sash which is downsized and which has high design property and open feeling has been desired.

[0017] Further, in a case where in the interior side of a window of an existing residence, building or the like, another inside window is disposed to form a double window to increase the sound insulation property, the heat insulating property and the security, a sash to be used for such an inside window is required to be thinner, to have a wide opening and thereby have open feeling, and to be excellent in the design property.

[0018] Further, JP-A-5-113079 (Patent Document 5) discloses to fill a filler gas into an air space of a double glazing utilizing a gas inlet provided in a corner block of the double glazing.

[0019] In the above triple glazing of a three glass plate type using three glass plates and two air spaces formed, in the air spaces 91, 91, a heat-insulating inert gas such as dry air or argon is filled. However, the filling operation is carried out by a method of providing a gas supply port to a corner block disposed at joints of corner parts of spacers 93, 93 on four sides constituting the air spaces 91, 91, and filling the inert gas into the respective air spaces 91, 91 utilizing such gas supply ports. Thus, the gas filling operation is troublesome, and simplification and cost reduction of the process for producing such a triple glazing can hardly be achieved.

[0020] In the above triple glazing as disclosed in Patent Document 1, a glass plate disposed in the middle between an outside glass plate and an inside glass plate is sealed to a spacer by an adhesive, and the respective inside and outside compartmentalized intermediate layers compartmentalized by the glass plate disposed in the middle are independent enclosed spaces and are thereby susceptible to pressure variation and temperature variation. Further, the compartmentalized intermediate layers are separate layers, and in a case where a filler gas is to be filled in the intermediate layers, the filling operation should be carried out separately, and the number of steps and the number of members in production of a multiple glazing having a multilayer structure tend to increase.

[0021] A window glass to be used for an outer wall of a building is required to have a predetermined insulation efficiency (thermal transmittance: U values (JIS R3107: 1998), unit: $W/m^2 \cdot K$) so as to increase the efficiency of heating and cooling in a room. Accordingly, in recent years, a double glazing having a high insulation efficiency (a low U value) as compared with a single glass plate tends to be used in many cases as a glass plate of a window glass, and demands for a higher insulation efficiency are increasing.

[0022] The above triple glazing disclosed in Patent Document 1, which has two air spaces formed by three glass plates, is advantageous in having a high insulation efficiency as compared with the double glazing sash having only one air space disclosed in Patent Documents 3 and 4.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0023]

Patent Document 1: JP2010-6684A

Patent Document 2: JPU61-124589

Patent Document 3: JPU60-89394

Patent Document 4: JP2000-356075A

Patent Document 5: JP5-113079A

DISCLOSURE OF INVENTION

TECHNICAL PROBLEM

[0024] To meet the above various demands, the object of the present invention is to provide a multiple glazing sash of a multiple type having two glass plates and at least one, preferably at least two intermediate plates spaced apart, with a total number of glass plates and intermediate plates of at least 3, preferably at least 4, which has a novel structure with which the number of members and the number of assembling steps can be reduced.

[0025] Further, another object of the present invention is to provide a multiple glazing sash, with which the number of intermediate plates to be disposed in an air space formed between outside two glass plates can optionally be selected within a predetermined range, the insulation efficiency can be optimized by selecting the thicknesses of a plurality of compartmentalized air spaces formed by an intermediate plate disposed in an air space formed between the outside two glass plates, the insulation efficiency can properly be achieved in accordance with the level required by a client, the intermediate plate (for example, a glass plate) disposed in the air space of the multiple glazing sash can easily be removed from a window when a residence, a building or the like is broken, and the removed intermediate plate can be recycled.

[0026] Further, another object of the present invention is to provide a highly heat insulating multiple glazing, which can meet demands for selection of an optimum filler gas and selection of the thickness of a gas layer specific to the filler gas, and filling of a plural types of gases into a plurality of compartmentalized air spaces, so as to further increase the heat insulating property.

[0027] Further, another object of the present invention is to provide a multiple glazing sash of the above type particularly with a total number of glass plates and intermediate plates of at least 4, which has the entire thickness suppressed and which is light in weight.

[0028] Further, to meet the above various demands, the object of the present invention is to provide a multiple glazing sash of a type having two glass plates and further at least one intermediate plate spaced apart, with a total number of glass plates and an intermediate plate of at least 3, which has a projecting leg part provided for interior decoration at a peripheral part of the multiple glazing, which is downsized, which has high design property and open feeling, and of which the number of members and the number of assembling steps can be reduced.

[0029] Further, to meet the above various demands, the object of the present invention is to provide a multiple glazing sash which can be downsized, which has high design property and open feeling, and of which the number of members and the number of assembling step can be reduced, and a frame body for such a multiple glazing sash.

[0030] Further, to solve the above problems, the object of the present invention is to provide a corner block of a spacer of a double glazing, consisting of members assembled into one piece, by which installation of a supply port of a filler gas into an air space can be simplified and the fillers gas filling operation can be simplified even when the number of air spaces is 2, 3 or more in a double glazing having at least two air spaces; and a double glazing and a double glazing sash employing such a corner block.

[0031] Further, another object of the present invention is to provide a multiple glazing sash which has further improved performance of the multiple glazing sash of the present invention.

[0032] Further, another object of the present invention is to provide a process for producing the multiple glazing sash of the present invention, by which formation of bubbles in an adhesive layer is prevented and an adhesive layer with a favorable boundary line can be obtained.

[0033] Further, another object of the present invention is to provide an edge face protecting cover suitable for the multiple glazing sash of the present invention and a multiple glazing sash employing the edge face protecting cover.

[0034] Further, to meet the above various demands, the object of the present invention is to provide a multiple glazing sash of a multiple glazing type having two glass plates and further at least one intermediate plate spaced apart, with a total number of glass plates and an intermediate plate of at least 3, which has a stable quality and durability and the production of which is simplified.

[0035] Further, the double glazing as disclosed in Patent Documents 3 has problems such that in its production, a step of disposing spacers respectively between the three glass plates and sealing the respective spacers to the glass plates by a known sealing material (primary sealing, secondary sealing) is necessary, whereby the number of members and the number of assembling steps are large, and further, the entire thickness of the double glazing is thick.

[0036] Whereas, a multiple glazing comprising at least 4 glass plates and at least 3 air spaces formed, prepared based on the double glazing in Patent Document 3, has improved insulation efficiency as compared with the double glazing in Patent Document 3. However, production of the multiple glazing by at least 4 glass plates is difficult, and even if such a triple glazing can be produced, such a multiple glazing is unnecessarily thick and is thereby heavy, and such a multiple glazing is hardly applicable.

[0037] Under these circumstances, the object of the present invention is to provide a multiple glazing sash which can easily be assembled, which can exhibit maximum insulation efficiency, and which is thin and is light in weight.

[0038] Further, production of a multiple glazing becomes difficult as the number of the air spaces increases. That is, as the number of the air spaces increases, the number of glass plates used increases, and it is difficult

to assemble the respective glass plates without position gap. Further, as the number of the air spaces increases, it is difficult to control the entire thickness.

[0039] Under these circumstances, the object of the present invention is to provide a multiple glazing sash which can easily be produced and which has excellent insulation efficiency.

SOLUTION TO PROBLEM

[0040] The present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glazing sash having the following constitutions (1) to (10). Hereinafter an embodiment of the multiple glazing sash having the constitutions (1) to (10) will sometimes be referred to as an embodiment 1.

[0041] The multiple glazing sash having the following constitutions (1) to (10) is based upon Japanese Patent Application No. 2014-38959 which the present application is based upon and claims the benefit of priority from.

[0042] The multiple glazing sash according to the embodiment 1 of the present invention has inside and outside two glass plates spaced apart by a frame member to form an air space, and at least one intermediate plate being disposed in the air space, to be used for a window of a residence or another building, and has a projecting leg depending upon an embodiment, and in this specification, it is referred to as a multiple glazing sash, not a double glazing or a double glazing sash. Accordingly, the multiple glazing sash of the present invention includes a so-called double glazing, a multiple glazing, a multilayer glass, etc.

(1) A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

(2) A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, an intermediate plate-holding part in which the intermediate plate is to be disposed is selected from among the plurality of intermediate plate-holding parts, and the intermediate plate is disposed in the selected intermediate plate-holding part to adjust the thicknesses of a plurality of compartmentalized air spaces to be formed, or the number of the intermediate plate to be disposed in the air space.

(3) A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, a space part in which a drying agent is contained is provided to at least a part on the air space side of the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

(4) A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, the intermediate plate is disposed in the intermediate plate-holding part, and projecting legs are provided to at least a part on the first glass plate side and the second glass plate side of the frame member.

(5) A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and at least one intermediate plate made of a chemically tempered glass plate is disposed in the intermediate plate-holding part.

(6) The multiple glazing sash according to the above (5), wherein the thickness of the chemically tempered glass plate is at most 2 mm.

(7) A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding

at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, the intermediate plate is disposed in the intermediate plate-holding part, and projecting legs are provided to at least a part on the first glass plate side and the second glass plate side of the frame member, and a spacer part having a space part in which a drying agent is contained is provided to at least a part on the air space side of the frame member.

(8) The multiple glazing sash according to any one of the above (1) to (7), wherein at least two intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and at least one intermediate plate is disposed in the air space by the at least two intermediate plate-holding parts to compartmentalize the air space into at least two compartmentalized air spaces.

(9) The multiple glazing sash according to any one of the above (1) to (8), wherein the frame member comprises a spacer part having an inner surface part and an outer surface part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer surface part and facing the inner side of the first and second glass plates, and a space part in which a drying agent is contained, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and

a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to a middle part of the inner surface part on the air space side of the spacer part of the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

(10) The multiple glazing sash according to any one of the above (1) to (9), wherein the frame member is composed of at least two separate members, and the two members are integrated via an interjacent moisture-proof layer.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glass glazing having the following constitutions (11) to (22). Hereinafter an embodiment of the multiple glazing sash having the constitutions (11) to (20) will sometimes be referred to as an embodiment 2. The sash according to the embodiment 2 of the present invention is constituted by a plurality of glass plates spaced apart by a frame body having a spacer part and a projecting leg part integrally formed, and is called a multiple glazing sash, not a double glazing sash.

The multiple glazing sash having the following constitutions (11) to (22) is based upon Japanese Patent Application No. 2013-271909 (which is based upon and claims the benefit of priority from Japanese Patent Application No. 2013-069834) which the present application is based upon and claims the benefit of priority from.

(11) A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, an air space being formed, and at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates,

wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and

an intermediate plate-holding part is provided to a middle part of the inner surface part of the spacer part, and the intermediate plate is disposed in the intermediate plate-holding part to be spaced apart from the first and second glass plates.

(12) A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, an air space being formed, and at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates,

wherein the frame member comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and

a groove part is provided to a middle part of the inner surface part of the spacer part, and by inserting the edge part of the intermediate plate into the groove part, the intermediate plate is disposed to be spaced apart from the first and second glass plates.

(13) The multiple glazing sash according to the above (11) or (12), wherein the projecting leg part of the frame body has projecting legs facing the inner side of the peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the glass plates.

(14) The multiple glazing sash according to any one of the above (11) to (13), wherein the air space formed to be spaced apart from the first and second glass plates at their periphery by the frame body, is divided into a plurality of air spaces by the at least

one intermediate plate.

(15) The multiple glazing sash according to any one of the above (11) to (14), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

(16) The multiple glazing sash according to any one of the above (11) to (15), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a thermoplastic synthetic resin material.

(17) The multiple glazing sash according to any one of the above (11) to (16), wherein a lip part is provided to at least one inner surface of the groove part provided on the air space side of the inner surface part of the spacer part.

(18) The multiple glazing sash according to any one of the above (11) to (17), wherein the intermediate plate is a chemically tempered glass plate having a thickness of at most 2 mm.

(19) The multiple glazing sash according to any one of the above (11) to (18), wherein the side part of the spacer part and the projecting leg of the projecting leg part form a continuous face.

(20) The multiple glazing sash according to any one of the above (11) to (19), wherein the projecting leg of the projecting leg part and the side part of the spacer part, and the glass plate, are bonded at a portion where they face each other, by an adhesive.

(21) The multiple glazing sash according to any one of the above (11) to (20), wherein the projecting leg of the projecting leg part and the side part of the spacer part form a design face of the multiple glazing sash at a peripheral part of the glass plate.

(22) The multiple glazing sash according to any one of the above (11) to (21), wherein the first glass plate and the second glass plate are rectangular, and the first glass plate and the second glass plate are spaced apart at their four peripheral edge sides, by the frame body.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glazing sash and a frame body for a multiple glazing sash having the following constitutions (23) to (47). Hereinafter an embodiment of the multiple glazing sash and the frame body for a multiple glazing sash having the constitutions (23) to (47) will sometimes be referred to as an embodiment 3. The sash according to the embodiment 3 of the present invention is constituted by a plurality of glass plates spaced apart by a frame body having a spacer part and a projecting leg part integrally formed, and is called a multiple glazing sash, not a double glazing sash.

The multiple glazing sash and the like having the following constitutions (23) to (47) are based upon Japanese Patent Application No. 2014-018548 (which is based upon and claims the benefit of priority from Japanese Patent Application No. 2013-069833) which the present application is based upon and claims the benefit of priority from.

(23) A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, and an air space being provided between the first and second glass plates, wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the first and second glass plates, and a space part in which a drying agent can be contained, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and

the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

(24) A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, and an air space being provided between the first and second glass plates, wherein the frame body comprises a spacer part keeping a space between the first and second glass plates, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, located outside the spacer part opposite from the air space, and

the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

(25) The multiple glazing sash according to the above (23) or (24), wherein the projecting leg part of the frame body has projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the first and second glass plates.

(26) The multiple glazing sash according to any one of the above (23) to (25), wherein the cross sectional shape of the projecting leg part of the frame body is a substantially U-shape.

(27) The multiple glazing sash according to any one of the above (23) to (26), wherein the projecting leg of the projecting leg part and the side part of the spacer part, and each of the first and second glass plates, are bonded at a portion where they face each other, by an adhesive.

(28) The multiple glazing sash according to any one of the above (23) to (27), wherein the frame body-forming material is a synthetic resin.

(29) The multiple glazing sash according to the above (28), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a thermoplastic synthetic resin material by an ex-

trusion method or a co-extrusion method.

(30) The multiple glazing sash according to any one of the above (23) to (29), wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section.

(31) The multiple glazing sash according to any one of the above (23) to (30), wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section, has a pair of projecting legs and bent projecting legs on both sides, and has a groove part formed between the pair of projecting legs on both sides.

(32) The multiple glazing sash according to the above (31), wherein an edge part protecting cover is provided to the groove part.

(33) The multiple glazing sash according to any one of the above (23) to (32), wherein the projecting leg of the projecting leg part and the side part of the spacer part form a design face of the multiple glazing sash at a peripheral part of the first or second glass plate.

(34) The multiple glazing sash according to any one of the above (23) to (33), wherein the first and second glass plates are rectangular, and the first and second glass plates are spaced apart at their four peripheral edge sides, by the frame body.

(35) The multiple glazing sash according to any one of the above (23) to (34), wherein each of the first and second glass plates is a glass plate having an allowable stress in its plane of at least 47 MPa.

(36) The multiple glazing sash according to any one of the above (23) to (35), wherein each of the first and second glass plates is a glass plate having a thickness of from 2 mm to 3 mm.

(37) The multiple glazing sash according to any one of the above (23) to (36), wherein the gas filled in the air space is an argon gas, and the thickness of the air space is from 13 mm to 17 mm.

(38) The multiple glazing sash according to any one of the above (23) to (37), wherein at least one of the first and second glass plates has a low emissivity film.

(39) The multiple glazing sash according to any one of the above (23) to (38), wherein at least one intermediate plate is disposed to be spaced apart in the air space, and the frame body has an intermediate plate-holding part for holding the intermediate plate on the inner surface part of the spacer part.

(40) A frame body for a multiple glazing sash to space a first glass plate and a second glass plate apart at their periphery,

which comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the first and second glass plates, and a space part in which a drying agent can be contained, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and

wherein the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

(41) A frame body for a multiple glazing sash to space a first glass plate and a second glass plate apart at their periphery,

which comprises a spacer part for keeping a space between the first and second glass plates, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, located outside the spacer part opposite from the air space, and

wherein the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

(42) The frame body for a multiple glazing sash according to the above (40) or (41), wherein the projecting leg part of the frame body has projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the first and second glass plates.

(43) The frame body for a multiple glazing sash according to any one of the above (40) to (42), wherein the cross sectional shape of the projecting leg part of the frame body is a substantially U-shape.

(44) The frame body for a multiple glazing sash according to any one of the above (40) to (43), wherein the frame body-forming material is a synthetic resin.

(45) The frame body for a multiple glazing sash according to the above (44), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a thermoplastic synthetic resin material by an extrusion method or a co-extrusion method.

(46) The frame body for a multiple glazing sash according to any one of the above (40) to (45), wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section.

(47) The frame body for a multiple glazing sash according to any one of the above (40) to (46), wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section, has a pair of projecting legs and bent projecting legs on both sides, and has a groove part formed between the pair of projecting legs on both sides.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a corner block of a spacer of a double glazing, and a double glazing and a dou-

ble glazing sash employing the corner block, having the following constitutions (48) to (58). Hereinafter an embodiment of the corner block of a spacer of a double glazing, and the double glazing and the double glazing sash employing the corner block having the following constitutions (48) to (58) will sometimes be referred to as an embodiment 4.

The corner block of a spacer of a double glazing, and the like, having the following constitutions (48) to (58) are based upon Japanese Patent Application No. 2013-073369 which the present application is based upon and claims the benefit of priority from.

(48) A corner block for a multiple glazing having a first glass plate and a second glass plate being spaced apart at their periphery by a spacer part, an air space being formed, at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates, and at least two air spaces being formed, said corner block to be disposed at a corner part where the spacer parts are butted,

wherein the corner block is provided with connecting parts for being connected to edge parts of the respective spacer parts, a plurality of gas inlets for injecting a filler gas into the at least two air spaces to be communicated with the corresponding at least two air spaces, and a gas feed opening for introducing a filler gas into the gas inlets.

(49) The corner block for a multiple glazing according to the above (48), wherein a gas feed pipe part and the gas feed opening are provided as being communicated with each of the plurality of gas inlets, and a filler gas supplied from the gas feed opening is filled into each air space via the gas feed pipe part and the gas inlet.

(50) The corner block for a multiple glazing according to the above (48), wherein a gas feed pipe part is provided as being communicated with each of the plurality of gas inlets, a branched gas passage is provided to the middle of each gas feed pipe, a converged gas feed pipe as being communicated with the branched gas passage, and the gas feed opening as being communicated with the gas feed pipe, are provided, and a filler gas supplied from the gas feed opening is filled into each air space via the gas feed pipe part on the gas feed opening side, the branched gas passage, the gas feed pipe on the gas inlet side and the gas inlet.

(51) The corner block for a multiple glazing according to any one of the above (48) to (50), which has side face parts facing the first glass plate and the second glass plate of the multiple glazing and extending toward tip directions of joint parts of the corner part where the spacer parts are butted, on its side faces.

(52) The corner block for a multiple glazing according to any one of the above (48) to (51), which is integrally formed of a synthetic resin.

(53) The corner block for a multiple glazing according to any one of the above (48) to (52), the multiple glazing having a first glass plate and a second glass plate being spaced apart at their periphery by a spacer part, an air space being formed, at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates, and at least two air spaces being formed, said corner block to be disposed at a corner part where the spacer parts are butted,

wherein the corner block for a multiple glazing has a void part communicated with the respective air spaces at a portion where the corner part of the intermediate plate is located, the corner block is provided with connecting parts for being connected to edge parts of the respective spacer parts, gas inlets for injecting a filler gas into the at least two air spaces, and a gas feed opening for introducing a filler gas into the gas inlets, and a filler gas is filled into each of the at least two air spaces via the gas inlet and the void part.

(54) A multiple glazing having an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by spacer parts, at least one intermediate plate being disposed in the air space to be spaced apart from the first glass plate and the second glass plate, and at least two air spaces being formed, wherein on at least one of corner parts where the spacer parts are butted, the joint parts of the spacer parts are connected by the corner block for a multiple glazing as defined in any one of the above (48) to (53).

(55) The multiple glazing according to the above (54), wherein the first glass plate, the second glass plate and the intermediate plate are rectangular, the first glass plate, the second glass plate and the intermediate plate are spaced apart at their four peripheral edge sides by the spacer parts, and the corner block for a multiple glazing as defined in any one of the above (48) to (53) is disposed on at least one corner part where the spacer parts are butted.

(56) The multiple glazing according to the above (54) or (55), wherein the side parts on both sides of the corner block for a multiple glazing and the first glass plate and the second glass plate, are bonded at a portion where they face each other by an adhesive.

(57) A multiple glazing sash having an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by a frame body, and at least one intermediate plate being disposed in the air space to be spaced apart from the first glass plate and the second glass plate, wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first glass plate and the second glass plate, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and

a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and

a groove part is provided to a middle part of the inner surface part of the spacer part, and the edge part of the intermediate plate is inserted into the groove part thereby to dispose the intermediate plate to be spaced apart from the first and second glass plates, and

on at least one of corner parts where the spacer parts are butted, the joint parts of the spacer parts are connected by the corner block for a multiple glazing as defined in any one of the above (48) to (53).

(58) The multiple glazing sash according to the above (57), wherein the projecting leg part has projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the glass plates.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glazing sash having the following constitutions (59) to (73). Hereinafter an embodiment of the multiple glazing sash having the constitutions (59) to (73) will sometimes be referred to as an embodiment 5. Further, the sash according to the embodiment 5 of the present invention is constituted by a plurality of glass plates spaced apart by a frame body having a spacer part and a projecting leg part integrally formed, and is called a multiple glazing sash, not a double glazing sash.

The multiple glazing sash having the following constitutions (59) to (73) is based upon Japanese Patent Application No. 2013-073370 which the present application is based upon and claims the benefit of priority from.

(59) A multiple glazing sash having a first glass plate and a second glass plate to be spaced apart at their periphery by a frame body, and an air space being formed,

wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and

a projecting leg part having a pair of projecting legs facing the inner side of a peripheral edge part of the first and second glass plates on both sides, and

a moisture-proof layer is formed on at least a part of an inner surface of a groove part formed of the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part of the frame body.

(60) The multiple glazing sash according to the above (59), wherein the moisture-proof layer is a layer obtained by applying a moisture-proof coating and curing it.

(61) The multiple glazing sash according to the above (60), wherein the moisture-proof coating is a fluorinated resin coating.

(62) The multiple glazing sash according to the above (59), wherein the moisture-proof layer is a layer obtained by bonding a moisture-proof film-form body.

(63) The multiple glazing sash according to the above (62), wherein the moisture-proof film-form body is a metal-coated film, a ceramic-coated film, a metal and ceramic composite-coated film, a metal tape, a moisture-proof resin film or a moisture-proof resin-coated film.

(64) The multiple glazing sash according to the above (63), wherein the metal-coated film is an aluminum-coated film.

(65) The multiple glazing sash according to the above (63), wherein the metal tape is an aluminum metal tape or a stainless steel metal tape.

(66) The multiple glazing sash according to any one of the above (59) to (65), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material.

(67) The multiple glazing sash according to any one of the above (59) to (66), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a rigid polyvinyl chloride material or an acrylonitrile/styrene resin material.

(68) The multiple glazing sash according to any one of the above (59) to (67), wherein the cross sectional shape of the groove part is a substantially U-shape.

(69) The multiple glazing sash according to any one of the above (59) to (68), wherein the moisture-proof layer is formed on a region of the pair of projecting legs on both sides of the projecting leg part and a region of the outer side part of the spacer part, on the inner surface of the groove part.

(70) The multiple glazing sash according to any one of the above (59) to (69), wherein the projecting leg of the projecting leg part and the side part of the spacer part, and the glass plate, are bonded at a portion where they face each other, by an adhesive.

(71) The multiple glazing sash according to any one of the above (59) to (70), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material by an extrusion method or a co-extrusion method.

(72) The multiple glazing sash according to any one of the above (59) to (71), wherein the plurality of glass plates are rectangular, and the plurality of glass plates are spaced apart at their four peripheral edge sides by the frame body.

(73) The multiple glazing sash according to any one of the above (59) to (72), having an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by

a frame body, and at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates,
wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having a pair of projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
a moisture-proof layer is formed on at least a part of an inner surface of a groove part formed of the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part of the frame body.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a process for producing a multiple glazing sash having the following constitutions (74) to (83). Hereinafter an embodiment of the process for producing a multiple glazing sash having the constitutions (74) to (83) will sometimes be referred to as an embodiment 5. Further, the sash according the embodiment 6 of the present invention is constituted by a plurality of glass plates spaced apart by a frame body having a spacer part and a projecting leg part integrally formed, and is called a multiple glazing sash, not a double glazing sash.

The multiple glazing sash having the following constitutions (74) to (83) is based upon Japanese Patent Application No. 2013-073371 which the present application is based upon and claims the benefit of priority from.

(74) A process for producing a multiple glazing sash, which comprises a bonding step of disposing a first glass plate and a second glass plate, and a frame body having a spacer part and a projecting leg part, at a periphery of the glass plates so that an air space is formed between the first glass plate and the second glass plate, and applying an adhesive to at least a part of a region where the frame body faces the first glass plate and the second glass plate and bonding them to seal the air space,
wherein the bonding step comprises:

a step of covering at least a part of a region in which the frame body is to be disposed of the first glass plate to form a first adhesive layer having a predetermined width,
a step of covering at least a part of a region in which the frame body is to be disposed of the second glass plate to form a first adhesive layer having a predetermined width,
a step of forming a second adhesive layer narrower than the first adhesive layer having a predetermined width on a region facing the first glass plate of the frame body,
a step of forming a second adhesive layer narrower than the first adhesive layer having a predetermined width on a region facing the second glass plate of the frame body,
a step of contacting the first adhesive layer and the second adhesive layer to bond the first glass plate and the frame body, and
a step of contacting the first adhesive layer and the second adhesive layer to bond the second glass plate and the frame body.

(75) A process for producing a multiple glazing sash, which comprises a bonding step of disposing a first glass plate and a second glass plate, and a frame body having a spacer part and a projecting leg part, at a periphery of the glass plates so that an air space is formed between the first glass plate and the second glass plate, and applying an adhesive to at least a part of a region where the frame body faces the first glass plate and the second glass plate and bonding them to seal the air space,
wherein the bonding step comprises:

a step of covering at least a part of a region in which the frame body is to be disposed of the first glass plate to form a first adhesive layer having a predetermined width,
a step of covering at least a part of a region in which the frame body is to be disposed of the second glass plate to form a first adhesive layer having a predetermined width,
a step of covering at least a part of the first adhesive layer surface formed on the first glass plate to form a second adhesive layer having a predetermined width,
a step of covering at least a part of the first adhesive layer surface formed on the second glass plate to form a second adhesive layer having a predetermined width,
a step of bonding the first glass plate and the frame body by means of the first adhesive layer and the second adhesive layer, and
a step of bonding the second glass plate and the frame body by means of the first adhesive layer and the second adhesive layer.

(76) The process for producing a multiple glazing sash according to the above (74), wherein the first adhesive layer is formed on the first and second glass plate, and the second adhesive layer is formed on a side face part of the spacer part and a projecting leg of the projecting leg part of the frame body, so that the second adhesive layer is located within a predetermined width of the first adhesive layer, and when the first glass plate and the second glass plate,

and the frame body, are bonded, the second adhesive layer is covered with the first adhesive layer.

(77) The process for producing a multiple glazing sash according to any one of the above (74) to (76), wherein the first adhesive layer is formed with a predetermined width from an edge part on the air space side of the frame body toward an edge face direction around the glass plate, on the first glass plate and the second glass plate.

(78) The process for producing a multiple glazing sash according to any one of the above (74) to (77), wherein the width of the first adhesive layer and the width of the second adhesive layer are determined so that $(m+n) \geqq a > b$ is satisfied, where m is the height of a side part of the spacer part of the frame body, n is the height of a projecting leg of the projecting leg part, (m+n) is the total height, "a" is the width of the first adhesive layer, and b is the width of the second adhesive layer.

(79) The process for producing a multiple glazing sash according to any one of the above (74) to (78), wherein the second adhesive layer is a layer formed of a double-coated adhesive tape.

(80) The process for producing a multiple glazing sash according to any one of the above (74) to (79), wherein the first adhesive layer is formed on a peripheral part of the first and second glass plates, stepping over the spacer part and the projecting leg part of the frame body.

(81) The process for producing a multiple glazing sash according to any one of the above (74) to (80), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material.

(82) The process for producing a multiple glazing sash according to any one of the above (74) to (81), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a rigid polyvinyl chloride material or an acrylonitrile/styrene resin material.

(83) A multiple glazing sash produced by the process as defined in any one of the above (74) to (82).

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides an edge face protecting cover for a multiple glazing sash, and a multiple glazing sash, having the following constitutions (84) to (95). Hereinafter an embodiment of the edge face protecting cover for a multiple glazing sash, and the multiple glazing sash, having the constitutions (84) to (95) will sometimes be referred to as an embodiment 7. Further, the sash according the embodiment 7 of the present invention is constituted by a plurality of glass plates spaced apart by a frame body having a spacer part and a projecting leg part integrally formed, and is called a multiple glazing sash, not a double glazing sash.

The multiple glazing sash having the following constitutions (85) to (95) is based upon Japanese Patent Application No. 2013-073372 which the present application is based upon and claims the benefit of priority from.

(84) An edge face protecting cover for a multiple glazing sash having a first glass plate and a second glass plate, a frame body having a groove part on an inner side of its peripheral edge part being disposed, and an air space being formed between the first glass plate and the second glass plate, said edge face protecting cover having a bottom part for clogging the bottom of the groove part of the frame body, lib parts to be engaged with locking parts provided in the groove part of the frame body, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate.

(85) The edge face protecting cover for a multiple glazing sash according to the above (84), wherein each of the closely fitting parts has a curved part in contact with an edge part of the first glass plate or the second glass plate.

(86) The edge face protecting cover for a multiple glazing sash according to the above (84) or (85), which has a bottom part for clogging the bottom of the groove part of the frame body, a pair of lib parts standing on the bottom part, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate on both edge sides of the bottom part.

(87) The edge face protecting cover for a multiple glazing sash according to any one of the above (84) to (86), wherein the tips of the curved parts of the closely fitting parts are bent toward surface directions of the first glass plate and the second glass plate, to elastically press the surfaces of the first glass plate and the second glass plate.

(88) The edge face protecting cover for a multiple glazing sash according to any one of the above (84) to (87), which is made of a rigid synthetic resin material.

(89) A multiple glazing sash having a first glass plate and a second glass plate, a frame body having a groove part on an inner side of its peripheral edge part being disposed, and an air space being formed between the first glass plate and the second glass plate, wherein locking parts to which an edge face protecting cover is attached, are provided to the groove part of the frame body, and to the groove part, an edge face protecting cover having a bottom part for clogging the bottom of the groove part, lib parts to be engaged with the locking parts provided to the groove part, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate, is attached.

(90) The multiple glazing sash according to the above (89), wherein the frame body comprises a spacer part having an inner surface part and an outer

side part keeping a space between the first glass plate and the second glass plate, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained,
a projecting leg part having a pair of projecting legs facing the inner side of a peripheral edge part of the first and second glass plates on both sides, and
a groove part formed of the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part.

(91) The multiple glazing sash according to the above (89) or (90), wherein the closely fitting parts of the edge face protecting cover have curved parts in contact with edge parts of the first glass plate and the second glass plate.

(92) The multiple glazing sash according to any one of the above (89) to (91), wherein the edge face protecting cover has a bottom part for clogging the bottom of the groove part of the frame body, a pair of lib parts standing on the bottom part, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate on both edge sides of the bottom part.

(93) The multiple glazing sash according to any one of the above (89) to (92), wherein the tips of the curved parts of the closely fitting parts of the edge face protecting cover are curved toward surface directions of the first glass plate and the second glass plate, to elastically press the surfaces of the first glass plate and the second glass plate.

(94) The multiple glazing sash according to any one of the above (89) to (93), wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material.

(95) The multiple glazing sash according to any one of the above (89) to (94), wherein the edge face protecting cover is made of a rigid synthetic resin material.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glazing sash having the following constitutions (96) to (102). Hereinafter an embodiment of the multiple glazing sash having the constitutions (96) to (102) will sometimes be referred to as an embodiment 8.

The multiple glazing sash having the following constitutions (96) to (102) is based upon Japanese Patent Application No. 2013-271908 which the present application is based upon and claims the benefit of priority from.

(96) A multiple glazing sash having a first glass plate and a second glass plate, a frame body being disposed on a periphery between the glass plates to space apart the glass plates, a space layer being formed, and the space layer being sealed at the periphery of the glass plates, wherein at least one intermediate plate is disposed in the space layer to form a plurality of compartmentalized space layers, and at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated by a communicating structure provided to the frame body.

(97) The multiple glazing sash according to the above (96), wherein the plurality of compartmentalized space layers are communicated by the communicating structure provided to the frame body, and the pressures in the plurality of compartmentalized space layers are equalized.

(98) The multiple glazing sash according to the above (96) or (97), wherein a spacer part having a space part in which a drying agent is contained is provided to at least a part of the frame body, an intermediate plate-holding part for holding at least a part of a peripheral part of the intermediate plate is provided to the spacer part, and the intermediate plate-holding part has a communicating structure by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated.

(99) The multiple glazing sash according to any one of the above (96) to (98), wherein a spacer part having a space part in which a drying agent is contained is provided to at least a part of the frame body, and the spacer part has a communicating structure consisting of a flow path or a shared space part by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated.

(100) The multiple glazing sash according to any one of the above (96) to (99), wherein the frame body has a corner part connecting a vertical frame body part and a horizontal frame body part disposed on peripheral parts on four sides of the first glass plate and the second glass plate which are rectangular, and has a communicating structure by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated at the corner part.

(101) The multiple glazing sash according to any one of the above (96) to (100), wherein the frame body has a corner part connecting an upper frame body part, a lower frame body part and left and right frame body parts disposed on peripheral parts on four sides of the first glass plate and the second glass plate which are rectangular, and has a communicating structure by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated by a notch formed on at least one corner of the intermediate plate, located on the corner part of the intermediate plate.

(102) The multiple glazing sash according to any one of the above (96) to (101), wherein in the space layer, at least one intermediate plate is disposed to form a

plurality of compartmentalized space layers, and the plurality of compartmentalized space layers are communicated by the communicating structure provided to the frame body.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glazing sash having the following constitutions (103) to (105). Hereinafter an embodiment of the multiple glazing sash having the constitutions (103) to (105) will sometimes be referred to as an embodiment 9. The multiple glazing sash according the embodiment 9 of the present invention is constituted by five glass plates spaced apart by a frame body having a spacer part and a projecting leg part integrally formed. Accordingly, the sash according to the embodiment 9 of the present invention is called a multiple glazing sash (or a quintuple glazing sash), not a double glazing sash.

The multiple glazing sash having the following constitutions (103) to (105) is based upon Japanese Patent Application No. 2014-016654 which the present application is based upon and claims the benefit of priority from.

(103) A multiple glazing sash having a first glass plate and a second glass plate spaced apart at their periphery by a frame body, an air space being formed, the air space being sealed to the frame body at the periphery of the glass plates, three intermediate glass plates being disposed in the air space to be spaced apart, and the air space being divided into four divided air spaces,

wherein three holding parts for holding at least a part of a peripheral part of the three intermediate glass plates are provided in rows with a distance from one another to the frame body, and

each of the first glass plate and the second glass plate is chemically tempered glass having a thickness of from 2 mm to 3 mm, each of the three intermediate glass plates is chemically tempered glass having a thickness of from 1 mm to 2 mm, each of the four divided air spaces has a thickness of from 13 mm to 17 mm, and an argon gas is sealed in the four divided air spaces.

(104) The multiple glazing sash according to the above (103), wherein at least one of the first glass plate and the second glass plate has a low emissivity film.

(105)The multiple glazing sash according to the above (103) or (104), wherein a containing part in which a drying agent is contained is provided to at least a part on the air space side of the frame body.

Further, the present inventors have conducted extensive studies to achieve the above objects and as a result, accomplished the present invention. The present invention provides a multiple glazing sash having the following constitutions (106) to (113). Hereinafter an embodiment of the multiple glazing sash having the constitutions (106) to (113) will sometimes be referred to as an embodiment 10.

The multiple glazing sash having the following constitutions (106) to (113) is based upon Japanese Patent Application No. 2014-018458 which the present application is based upon and claims the benefit of priority from.

(106)A multiple glazing sash having a first glass plate consisting of a multiple glazing,

a second glass plate consisting of a multiple glazing or a single glass plate, and

a frame body for holding the first glass plate and the second glass plate with a distance therebetween in parallel with each other.

(107) The multiple glazing sash according to the above (106), wherein the frame body comprises a projecting leg part, and

a spacer part for spacing the first glass plate and the second glass plate apart, provide on an inner peripheral part of the projecting leg part.

(108) The multiple glazing sash according to the above (107), which further has a sealing member for sealing a gap between the frame body, and the first glass plate and the second glass plate.

(109)The multiple glazing sash according to the above (107) or (108), wherein lip parts made of an elastic material are provided to facing wall surfaces of adjacent spacer parts, and the first glass plate or the second glass plate disposed between the spacer parts is sandwiched between the lip parts and held.

(110) The multiple glazing sash according to any one of the above (107) to (109), wherein the projecting leg part has a concave strip part into which the first glass plate or the second glass plate is inserted, on an inner peripheral part, and the spacer part is disposed in the concave strip part.

(111) The multiple glazing sash according to the above (110), wherein lip parts made of an elastic material are provided to an inner wall surface of the concave strip part and a wall surface of the spacer part facing the inner wall surface of the concave strip part, and the first glass plate or the second glass plate disposed between the spacer part and the inner wall surface of the concave strip part is sandwiched between the lip parts and held.

(112) The multiple glazing sash according to any one of the above (107) to (111), wherein the spacer part further has a space part in which a drying agent is contained, and an air hole communicated with the space part.

(113) The multiple glazing sash according to any one of the above (106) to (112), wherein the frame body further has a screw hole.

ADVANTAGEOUS EFFECTS OF INVENTION

[0043] According to the above (1) of the present inven-

tion, a plurality of intermediate plate-holding parts having a structure such as a groove part, a gripping part, a fitting part or a locking part for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and by disposing a peripheral part of the intermediate plate in the intermediate plate-holding part, the air space between the first glass plate and the second glass plate spaced apart can be formed into a plurality of compartmentalized air spaces, thus increasing the heat insulating property of the multiple glazing sash. Particularly, even when two or more intermediate plates are disposed in the air space, production of the multiple glazing sash can be simplified by a disposition means such as insertion, fitting or locking of the intermediate plate.

[0044] Further, since a plurality of intermediate plate-holding parts are provided, it is easy to increase or reduce the number of intermediate plates disposed in the air space in accordance with the level required for the multiple glazing sash by a client.

[0045] Further, when many intermediate plate-holding parts with a predetermined unit width are provided in rows to the frame member, by selecting an intermediate plate-holding part to which an intermediate plate is to be disposed from among the many intermediate plate-holding parts having the unit width, an optimum thickness of the gas layer depending upon the type of the gas filled into the compartmentalized space layer or a thickness of the compartmentalized space layer which satisfies required insulation efficiency can be obtained.

[0046] According to the above (2) of the present invention, a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate, having the above structure, are provided in rows to the frame member, and accordingly it is easy to increase or reduce the number of intermediate plates disposed in the air space in accordance with the level required for the multiple glazing sash by a client, and the air space between the first glass plate and the second glass plate can be formed into a plurality of compartmentalized air spaces in accordance with the level required by a client. Further, since a plurality of intermediate plate-holding parts are provided, by selecting an intermediate plate-holding part in which the intermediate plate is to be disposed from among the plurality of intermediate plate-holding parts, the thicknesses of the compartmentalized air spaces can be selected.

[0047] According to the above (3) of the present invention, a frame member having a plurality of the above intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate provided in rows, and comprising a spacer part having a space part in which a drying agent is contained provided on the air space side of the frame member, is used, and accordingly formation of the plurality of intermediate plate-holding parts on the air space side of the spacer part is easily carried out, and by utilizing the plurality of intermediate plate-holding parts provided to a part of the spacer part, an operation of disposing the intermediate plate in the air space is easily carried out, and a plurality of compartmentalized air spaces can easily be formed in the air space.

[0048] According to the above (4) of the present invention, a frame member having a plurality of the above intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate provided in rows, and having projecting legs provided to at least a part on the first glass plate side and the second glass plate side of the frame member, is used, and accordingly a multiple glazing sash utilizing the projecting legs provided on a peripheral part of the first glass plate and the second glass plate spaced apart can be obtained. That is, the spacer and the stile for a frame member used for a conventional multiple glazing sash are separate members, and for assembling them, bonding of the spacer and a glass plate by a sealing material and assembling of the stile and the glass plate by a sealing material should be separately carried out, however, according to (4) of the present invention, the first glass plate and the second glass plate are formed into a multiple glazing sash using a frame member having projecting legs, and accordingly the number of members and the number of assembling steps in formation of a sash can be reduced, assembling of the multiple glazing sash can be simplified, and the cost can further be reduced.

[0049] According to the above (5) and (6) of the present invention, a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and at least one intermediate plate consisting of a chemically tempered glass plate, preferably a chemically tempered glass plate having a thickness of at most 2 mm is disposed in the intermediate plate-holding part. Accordingly, by use of such a thin chemically tempered glass plate, weight saving of the multiple glazing sash can be achieved, and the entire thickness of the multiple glazing sash can be reduced. Further, since a chemically tempered glass plate has sufficient strength, breakage of the intermediate plate can be prevented at the time of an operation of disposing the intermediate plate in the intermediate plate-holding part.

[0050] According to the above (7) of the present invention, as the frame member, a frame member having a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate provided in rows, and having projecting legs provided to at least a part on the first glass plate side and the second glass plate side and a spacer part having a space part in which a drying agent is contained provided to at least a part on the air space side, is used. Thus, both the effects of the above (3) and (4) of the present invention can be achieved.

[0051] According to the above (8) of the present invention, at least two intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and at

least one intermediate plate is disposed in the air space by the at least two intermediate plate-holding parts to compartmentalize the air space into at least two compartmentalized air spaces, and accordingly a multiple glazing sash excellent in the heat insulating property by multiplication can easily be produced.

[0052] According to the above (9) of the present invention, the frame member comprises a spacer part having an inner surface part and an outer surface part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer surface part and facing the inner side of the first and second glass plates, and a space part in which a drying agent is contained, and a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to a middle part of the inner surface part on the air space side of the spacer part of the frame member. Accordingly, the number of members and the number of assembling steps can be reduced at the time of formation of a sash, assembling of the multiple glazing sash can be simplified, and the cost can further be reduced. Further, the apparent size of the frame member can be further reduced, and thus the area of the projecting leg part and the spacer part in the multiple glazing sash can be reduced, and accordingly the area of the glass plate in a transparent region can be increased and as a result, the lighting performance, the open feeling, the viewability and the heat insulating property can be improved. Further, by use of such a frame member having a spacer part and a projecting leg part integrated, since the first glass plate and the second glass plate are spaced apart in the interior of the frame member, the multiple glazing sash can be downsized, and an improvement in the design property can be achieved.

[0053] According to the above (10) of the present invention, since a moisture-proof layer is interposed between the spacer part and the projecting leg part, infiltration of moisture from the outside of the multiple glazing sash into the air space can be blocked by the moisture-proof layer. Thus, dew condensation in the air space can be prevented, and a multiple glazing sash excellent in the moisture resistance can be provided.

[0054] According to the above (11) to (22) of the present invention, a multiple glazing sash comprising a multiple glazing having at least two glass plates and at least one intermediate plate, which has a structure such that the projecting leg part is easily provided for interior decoration to a peripheral part of the multiple glazing, can be provided. That is, a spacer and a stile used for a conventional multiple glazing sash are separate members, and for assembling them, bonding of the spacer and a glass plate by a sealing material and assembling of the stile and the glass plate by a sealing material should be separately carried out. However, in the multiple glazing sash of the present invention, a plurality of glass plates are spaced apart to form a multiple glazing by using a frame body having a spacer part and a projecting leg part integrally formed, and accordingly the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, and the cost can further be reduced.

[0055] Further, the frame body can be downsized by integrating the spacer part and the projecting leg part, and thus the area of the projecting leg part and the spacer part in the multiple glazing sash can be reduced, and accordingly the area of the glass plate in a transparent region can be increased and as a result, the lighting performance, the open feeling, the viewability and the heat insulating property can be improved. Further, since a plurality of glass plates are spaced apart at their periphery by a frame body having a spacer part and a projecting leg part integrated, the multiple glazing sash can be downsized, and an improvement in the design property can be achieved.

[0056] A spacer and a stile used for a conventional multiple glazing sash are separate members, and for assembling them, bonding of the spacer and a glass plate by a sealing material and assembling of the stile and the glass plate by a sealing material should be separately carried out. However, according to the multiple glazing sash and the frame body for a multiple glazing sash of the above (23) to (47) of the present invention, the first glass plate and the second glass plate are spaced apart to form a multiple glazing sash by using a frame body having a spacer part and a projecting leg part integrally formed, and accordingly the number of members and the number of assembling steps can be reduced. Thus, assembling of the multiple glazing sash can be simplified, and a cost reduction can be achieved.

[0057] Further, by the frame body having an intermediate plate-holding part, an intermediate plate can be disposed in the air space, and a multilayer multiple glazing sash can easily be constituted.

[0058] Further, by integrating the spacer part and the projecting leg part, the frame body can be downsized, and the area of the projecting leg part and the spacer part in the multiple glazing sash can be reduced. Thus, the area of the glass plate in a transparent region can be increased, and the viewability and the open feeling can be improved.

[0059] Further, since the first glass plate and the second glass plate are spaced apart at their periphery by the frame body having a spacer part and a projecting leg part integrated, the multiple glazing sash can be downsized, and an improvement in the design property can be achieved.

[0060] Further, by using a glass plate having an allowable stress in its plane of at least 47 MPa for the first and second glass plates, breakage of the glass plate can be prevented even when the air space expands or shrinks by a temperature change.

[0061] According to the corner block for a multiple glazing of the above (48) to (58) of the present invention,

even when a multiple glazing having a first glass plate and a second glass plate being spaced apart at their periphery by a spacer, an air space being formed, at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates, and at least two air spaces being formed, has two air spaces, three air spaces or even more, installation of gas feed openings of a filler gas into the air spaces is simplified by a corner block consisting of members formed into one piece, filling of a filler gas into two or more air spaces can be carried out simultaneously, and the process for producing a gas-containing multiple glazing can be simplified.

[0062] Further, in a multiple glazing sash in which two front and rear glass plates are disposed via a spacer part on the inner side of a peripheral edge part of the glass plates so that a concave part is formed on the inner side of the peripheral edge part between the glass plates, to form an air space between the two glass plates thereby to constitute a multiple glazing, and a projecting leg part is provided for interior decoration to the concave part on the peripheral edge part of the multiple glazing, by using the corner block for a multiple glazing of the present invention, projecting leg parts butted at corner parts can be connected and integrated to obtain a projecting leg part assembly, whereby the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, and a cost reduction can be achieved.

[0063] Further, by using, as the corner block for a multiple glazing, one having a void part communicated with the respective air spaces formed at a portion where a corner part of the intermediate plate is located, so that a filler gas is filled into the respective two or more air spaces via a gas inlet and the void part, the pressures of the filler gas filled into the respective air spaces can be equalized, deformation of the glass plate in the multiple glazing due to a variation in the air pressure can be prevented, and the durability of the multiple glazing can be improved.

[0064] According to the above (59) to (73) of the present invention, a moisture-proof layer is formed on at least a part of an inner surface of a groove part formed by a pair of projecting legs on both sides of a projecting leg part and an outer side part of a spacer part, and accordingly dew condensation in an air space in the multiple glazing sash can be prevented, and a multiple glazing sash excellent in the moisture resistance can be provided.

[0065] Further, a spacer and a stile used for a conventional multiple glazing sash are separate members, and for assembling, bonding of the spacer and a glass plate by a sealing material and bonding of the stile and the glass plate by a sealing material should be separately carried out, however, according to the multiple glazing sash of one embodiment of the present invention, a plurality of glass plates are spaced apart to form a multiple glazing by using a frame body having a spacer part and a projecting leg part integrally formed of a synthetic resin material, and accordingly the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, and a cost reduction can be achieved.

[0066] Further, by integrating the spacer and the projecting leg part, the frame body can be downsized, and thus the area of the projecting leg part and the spacer in the multiple glazing sash can be reduced, and accordingly the area of the glass plate in a transparent region can be increased and as a result, the viewability and the open feeling can be improved. Further, since a plurality of glass plates are spaced apart at their periphery by the frame body having the spacer and the projecting leg part integrated, the multiple glazing sash can be downsized, and an improvement in the design property can be achieved.

[0067] According to the above (74) to (83) of the present invention, in production of the multiple glazing sash, an operation of bonding first and second glass plates to a frame body can smoothly and simply carried out, and further, a multiple glazing sash having a good-looking and desired line-shape boundary line can be produced by virtue of the linearity of the edge of the first adhesive layer, regardless of formation of bubbles and looking of the boundary line in the second adhesive layer.

[0068] Further, a spacer and a stile used for a conventional multiple glazing sash are separate members, and for assembling them, bonding of the spacer and a glass plate by a sealing material and bonding of the stile and the glass plate by a sealing material should be separately carried out, however, according to the process for producing a multiple glazing sash of the present invention, a plurality of glass plates are spaced apart to form a multiple glazing by using a frame body having a spacer part and a projecting leg part integrated, and accordingly the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, and a cost reduction can be achieved.

[0069] Further, by integrating the spacer and the projecting leg part, the frame body can be downsized, and thus the area of the projecting leg part and the spacer in the multiple glazing sash can be reduced, and accordingly the area of the glass plate in a transparent region can be increased and as a result, the viewability and the open feeling can be improved. Further, since a plurality of glass plates are spaced apart at their periphery by the frame body having the spacer and the projecting leg part integrated, the multiple glazing sash can be downsized, and an improvement in the design property can be achieved.

[0070] According to the above (84) to (95) of the present invention, in a multiple glazing sash using a frame body having the above structure, an edge part of glass plates on both sides can be protected and further, even if the adhesion strength of the adhesive layer on the glass plates on both sides bonded to the frame body is weak by any chance, the glass plates can be held so that they will not fall down. Further, the edge face protecting cover

is fitted by utilizing a groove part formed on an inner side of a peripheral edge part of the frame body disposed between the first glass plate and the second glass plate, whereby the edge of the multiple glazing sash looks good, and the design of the front face can be refined.

[0071] Further, in the case of a multiple glazing sash having a frame body having a spacer part and a projecting leg part integrally formed of a synthetic resin material and using the above edge face protecting cover, the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified and a cost reduction can be achieved.

[0072] According to the above (96), (97), (100) and (101) of the present invention, in a space layer formed by disposing a first glass plate and a second glass plate to be spaced apart by a frame body, at least one intermediate plate is disposed to form a plurality of compartmentalized space layers, and at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated by a communicating structure provided to the frame body, whereby the pressures in such compartmentalized space layers can be equalized, warpage and displacement of the intermediate plate by a variation in the air pressure, a temperature change, a variation in the window pressure, etc. can be prevented, and long term durability can be improved. Further, since the respective compartmentalized space layers are communicated, it is not necessary to separately fill a filler gas into the respective compartmentalized space layers, and the operation of filling the filler gas may be carried out from one portion.

[0073] According to the above (98) of the present invention, an intermediate plate-holding part for holding at least a part of a peripheral part of the intermediate plate, having a structure such as a groove part, a gripping part, a fitting part or a locking part is provided to a spacer part of the frame body, and by disposing a peripheral edge part of at least one intermediate plate in the intermediate plate-holding part, a plurality of compartmentalized space layers can be formed in the air space formed between the first glass plate and the second glass plate spaced apart, and further, since a communicating structure by which the plurality of compartmentalized space layers are communicated is provided to the intermediate plate-holding part, the pressures in the respective compartmentalized space layers can be equalized, warpage and displacement of the intermediate plate by a variation in the air pressure, a temperature change, a variation in the window pressure, etc. can be prevented, and long term durability can be improved.

[0074] According to the above (99) of the present invention, a spacer part having a space part in which a drying agent is contained is provided to at least a part of the frame body, and a communicating structure consisting of a flow path or a shared space part by which at least two compartmentalized space layers are communicated is provided to the spacer part, and accordingly, in the same manner as the above (96) to (98), the pressures in such compartmentalized space layers can be equalized, warpage and displacement of the intermediate plate by a variation in the air pressure, a temperature change, a variation in the window pressure, etc. can be prevented, and long term durability can be improved.

[0075] According to the above (102) of the present invention, the plurality of compartmentalized space layers are communicated by a communicating structure provided to the frame body, and accordingly the pressures in the respective compartmentalized space layers can be equalized, warpage and displacement of the intermediate plate by a variation in the air pressure, a temperature change, a variation in the window pressure, etc. can be prevented, and long term durability can be improved. Further, since the respective compartmentalized space layers are communicated, it is not necessary to separately fill a filler gas into the respective compartmentalized space layers, and the operation of filling the filler gas may be carried out from one portion, and assembling of the multiple glazing sash can be simplified.

[0076] The multiple glazing sash of one embodiment of the above (103) of the present invention is a multiple glazing sash having five glass plates disposed to be spaced apart, assumed to exhibit maximum insulation efficiency, and an argon gas having a lower thermal conductivity than air is filled into four divided air spaces to further improve the insulation efficiency.

[0077] Further, the multiple glazing sash of one embodiment of the above (103) of the present invention has a constitution such that a first glass plate and a second glass plate are spaced apart at their periphery by a frame body, and three intermediate glass plates are held by three holding parts provided in rows to the frame body, and accordingly the number of members is small and the number of assembling steps is small, and such a multiple glazing sash can easily be produced, as compared with a multiple glazing having a spacer and a sealing material (primary sealing, secondary sealing).

[0078] Further, according to the multiple glazing sash of one embodiment of the above (103) of the present invention, each of the first glass plate and the second glass plate is chemically tempered glass having a thickness of from 2 mm to 3 mm, each of the three intermediate glass plates is chemically tempered glass having a thickness of from 1 mm to 2 mm, and the thickness of each of the four divided air spaces is from 13 mm to 17 mm, and chemically tempered glass is used for all the glass plates, and accordingly the strength of each of the glass plates is maintained to be at the same level as thick non-tempered glass even though it is thin. Further, since the thickness of each of the four divided air spaces is from 13 mm to 17 mm, sufficient insulation efficiency can be achieved.

[0079] As mentioned above, the multiple glazing sash of one embodiment of the above (103) of the present invention, has a total thickness suppressed to be from 59 mm to 80 mm although it has five glass plates, since thin chemically tempered glass is used, and the thick-

nesses of the four divided air spaces are set so that sufficient insulation efficiency can be obtained. Accordingly, weight saving can be achieved as compared with a multiple glazing having five non-tempered glass plates.

[0080] According to the multiple glazing sash of the above (104) of the present invention, the insulation efficiency can further be increased by the low emissivity film.

[0081] Further, according to the multiple glazing sash of the above (105) of the present invention, an argon gas filled into the air space can be maintained always in a dry state by a drying agent, whereby dew condensation on the five glass plates constituting the multiple glazing sash can be prevented, and the life of the multiple glazing sash can be extended.

[0082] According to the above (106) of the present invention, a multiple glazing sash having a first glass plate consisting of a multiple glazing and a second glass plate consisting of a multiple glazing or a single glass plate held by a frame body to be spaced apart (disposed in parallel with each other with a distance) is constituted. A multilayer structure sash is constituted by a plurality of multiple glazings or a multiple glazing and a single glass plate in combination, and such a sash can easily be produced as compared with a case where multiple glazings having the same constitution are prepared and assembled to constitute a sash (a case where multiple glazings having the same number of glass plates are prepared, and a projecting leg part is attached to the multiple glazings to constitute a sash).

[0083] Further, according to the above (107) of the present invention, the frame body comprises a projecting leg part and a spacer part, and the first glass plate and the second glass plate are spaced apart by the spacer part. Thus, the first glass plate and the second glass plate can be spaced apart with high accuracy.

[0084] Further, according to the above (108) of the present invention, a sealing member for sealing a gap between the frame body, and the first glass plate and the second glass plate, is provided, whereby airtightness of a space between the first glass plate and the second glass plate (corresponding to an air space in a multiple glazing) will improve.

[0085] Further, according to the above (109) of the present invention, lip parts made of an elastic material are provided to facing wall surfaces of adjacent spacer parts, the first glass plate or the second glass plate disposed between the spacer parts is sandwiched between the lip parts and held by the frame body, and the first glass plate and the second glass plate can be attached to the frame body only by inserting them between the spacer parts, and accordingly the multiple glazing sash can easily be prepared. Further, since the lip parts function also as a sealing member, airtightness can be improved while the number of members is reduced.

[0086] Further, according to the above (110) of the present invention, a concave strip part into which the first glass plate or the second glass plate is inserted, is provided on an inner peripheral part of the projecting leg part, and the first glass plate and the second glass plate are held by the frame body by being fitted to the concave strip part. Thus, the first glass plate and the second glass plate can securely be held.

[0087] Further, according to the above (111) of the present invention, lip parts made of an elastic material are provided to an inner wall surface of the concave strip part and a wall surface of the spacer part facing the inner wall surface of the concave strip part. The first glass plate or the second glass plate to be disposed between the spacer part and the inner wall surface of the concave strip part is sandwiched between the lip parts and held by the frame body. The first glass plate or the second glass plate can be attached to the frame body only by inserting it between the spacer part and the inner wall surface of the concave strip part, and accordingly the multiple glazing sash can easily be assembled. Further, since the lip parts function also as a sealing member, the sealing property can be improved while the number of members is reduced.

[0088] Further, according to the above (112) of the present invention, the spacer part has a space part in which a drying agent is contained, and an air hole communicated with the space part. Accordingly, a dry state in a space (air space) between the first glass plate and the second glass plate can be maintained for a long period of time.

[0089] Further, according to the above (113) of the present invention, the frame body has a screw hole, whereby the multiple glazing sash can easily be assembled.

BRIEF DESCRIPTION OF DRAWINGS

[0090]

Fig. 1 is a schematic front view illustrating the multiple glazing sash of the embodiment 1 according to one embodiment of the present invention.

Fig. 2 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 1 of the present invention.

Fig. 3 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 4 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 5 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 6 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 7 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 8 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 9 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 10 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 11 is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using the frame member according to the embodiment 1 of the present invention.

Fig. 12 is views illustrating the structure of an intermediate plate-holding part formed in a frame member of the embodiment 1 of the present invention.

Fig. 13 is a partial schematic cross-sectional view illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 1 of the present invention.

Fig. 14 is a partial schematic cross-sectional view illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 1 of the present invention.

Fig. 15 is a schematic cross-sectional view illustrating a sliding window employing the multiple glazing sash having an upper side frame body and a lower side frame body of the embodiment 1 of the present invention.

Fig. 16 is a schematic cross-sectional view illustrating a sliding window employing the multiple glazing sash having side frame bodies of the embodiment 1 of the present invention.

Fig. 17 is a cross-sectional view illustrating the frame member as shown in Fig. 13, separated into a spacer part and a projecting leg part.

Fig. 18 is an assembling cross-sectional view illustrating the frame member shown in Fig. 17.

Fig. 19 is a cross-sectional view illustrating the frame member shown in Fig. 14, in a separate form.

Fig. 20 is a schematic front view illustrating the multiple glazing sash of the embodiment 2 according to one embodiment of the present invention.

Fig. 21 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 2 of the present invention.

Fig. 22 is a longitudinal sectional view illustrating a scheme of the portion of the circle A in Fig. 21.

Fig. 23 is a schematic cross-sectional view illustrating one embodiment of a frame body to be used for the multiple glazing sash according to the embodiment 2 of the present invention.

Fig. 24 is partial enlarged cross-sectional views illustrating another embodiment of a portion where an intermediate plate is attached to a spacer part of a frame body of the multiple glazing sash according to the embodiment 2 of the present invention.

Fig. 25 is partial schematic cross-sectional views illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 2 of the present invention.

Fig. 26 is a schematic cross-sectional view illustrating another embodiment of a frame to be used for the double glazing sash according to the embodiment 2 of the present invention.

Fig. 27 is a schematic cross-sectional view illustrating another embodiment of a frame body to be used for the double glazing sash of the embodiment 2 of the present invention.

Fig. 28 is a schematic cross-sectional view illustrating a sliding window employing the multiple glazing sash having an upper side frame body and a lower side frame body of the embodiment 2 of the present invention.

Fig. 29 is a schematic cross-sectional view illustrating a sliding window employing the multiple glazing sash having side frame bodies of the embodiment 2 of the present invention.

Fig. 30 is views illustrating the structure of an intermediate plate-holding part formed in the frame member of the embodiment 2 of the present invention.

Fig. 31 is a schematic front view illustrating the multiple glazing sash of the embodiment 3 according to one embodiment of the present invention.

Fig. 32 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 3 of the present invention.

Fig. 33 is a longitudinal sectional view illustrating a scheme of the portion of the circle A in Fig. 32.

Fig. 34 is a schematic vertical sectional view illustrating one embodiment of a frame body to be used for the multiple glazing sash of the embodiment 3 of the present invention.

Fig. 35 is a schematic vertical sectional view illustrating another embodiment of a frame body to be used for the multiple glazing sash of the embodiment 3 of the present invention.

Fig. 36 is a schematic vertical sectional view illustrating another embodiment of a frame body to be used for the multiple glazing sash of the embodiment 3 of the present invention.

Fig. 37 is a schematic longitudinal sectional view illustrating a sliding window employing the multiple glazing sash having an upper side frame body and a lower side frame body of the embodiment 3 of the present invention.

Fig. 38 is a schematic cross-sectional view illustrat-

ing a sliding window employing the multiple glazing sash having side frame bodies of the embodiment 3 of the present invention.

Fig. 39 is a schematic longitudinal sectional view illustrating another embodiment of a frame body to be used for the multiple glazing sash of the embodiment 3 of the present invention.

Fig. 40 is a table illustrating results of analysis of a stress (in-plane) formed in two glass plates when the internal pressure of the air space is changed by a temperature change.

Fig. 41 is tables illustrating results of analysis of a stress (in-plane) formed in two glass plates when the adhesion thickness and the adhesion width are changed.

Fig. 42 is a schematic front view illustrating a double glazing of the embodiment 4 according to one embodiment of the present invention.

Fig. 43 is a partial cross-sectional schematic perspective view illustrating a double glazing 1 as an example of a two-layer type employing the corner block for a double glazing of the embodiment 4 of the present invention.

Fig. 44 is a partial cross-sectional schematic perspective view illustrating another example of a double glazing 1 of a three-layer type employing the corner block for a double glazing of the embodiment 4 of the present invention.

Fig. 45 is a schematic longitudinal sectional view illustrating in further detail the portion of the circle A in Fig. 43.

Fig. 46 is views illustrating assembling of the double glazing sash of the embodiment 4 of the present invention using the corner block for a double glazing of the present invention.

Fig. 47 is a front view illustrating the corner block for a double glazing according to one example of the embodiment 4 of the present invention.

Fig. 48 is a schematic perspective view illustrating a part of a substantial part of a corner part in a state where adjacent frame bodies are assembled using the corner block for a double glazing of the embodiment 4 of the present invention.

Fig. 49 is a perspective view illustrating the corner block for a double glazing according to one example of the embodiment 4 of the present invention as observed from the right side.

Fig. 50 is a perspective view illustrating the corner block for a double glazing according to one example of the embodiment 4 of the present invention as observed from the bottom left side.

Fig. 51 is a perspective view illustrating the corner block for a double glazing according to one example of the embodiment 4 of the present invention as observed from the upper right side.

Fig. 52 is a perspective view illustrating the corner block for a double glazing according to one example of the embodiment 4 of the present invention as observed from above.

Fig. 53 is views schematically illustrating 3 examples of a flow path of a filler gas from a gas supply port to a gas inlet in the corner block for a double glazing of the embodiment 4 of the present invention.

Fig. 54 is a schematic cross-sectional view illustrating a state where the corner block for a double glazing according to one embodiment of the embodiment 4 of the present invention is applied to a corner part of a double glazing, as observed from the surface of an intermediate plate.

Fig. 55 is a partially abbreviated view illustrating a state where a packing material is fitted to a neck at the bottom of a connecting part of the corner block for a double glazing according to one embodiment of the embodiment 4 of the present invention.

Fig. 56 is a perspective view illustrating the corner block for a double glazing according to another example of the embodiment 4 of the present invention as observed from the right side.

Fig. 57 is a perspective view illustrating a scheme of a corner portion of a double glazing sash assembled by using the corner block for a double glazing shown in Fig. 56.

Fig. 58 is a perspective view illustrating a corner portion of a double glazing sash assembled by using the corner block for a double glazing according to another example of the embodiment 4 of the present invention.

Fig. 59 is a perspective view illustrating the corner block used for a corner portion of the double glazing sash shown in Fig. 58.

Fig. 60 is a schematic front view illustrating the multiple glazing sash of the embodiment 5 according to one embodiment of the present invention.

Fig. 61 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 5 of the present invention.

Fig. 62 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 63 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 64 is a longitudinal sectional view illustrating a scheme of the portion of the circle A in Fig. 61.

Fig. 65 is a longitudinal sectional view illustrating a scheme of the portion of the circle A in Fig. 62.

Fig. 66 is a schematic longitudinal sectional view illustrating one embodiment of a frame body to be used for the multiple glazing sash of the embodiment 5 of the present invention.

Fig. 67 is a schematic longitudinal sectional view illustrating another embodiment of a frame body to be used for the multiple glazing sash of the embodiment

5 of the present invention.

Fig. 68 is partial schematic cross-sectional views illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 69 is a partial schematic cross-sectional view illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 70 is a partial schematic cross-sectional view illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 71 is a partial schematic cross-sectional view illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 72 is a partial schematic cross-sectional view illustrating a substantial part of the multiple glazing sash according to another embodiment of the embodiment 5 of the present invention.

Fig. 73 is a schematic cross-sectional view illustrating a sliding window employing the multiple glazing sash having an upper side frame body and a lower side frame body of the embodiment 5 of the present invention.

Fig. 74 is a schematic cross-sectional view illustrating a sliding window employing the multiple glazing sash having side frame bodies of the embodiment 5 of the present invention.

Fig. 75 is a schematic front view illustrating the multiple glazing sash of the embodiment 6 according to one embodiment of the present invention.

Fig. 76 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 6 of the present invention.

Fig. 77 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to another embodiment of the embodiment 6 of the present invention.

Fig. 78 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to another embodiment of the embodiment 6 of the present invention.

Fig. 79 is a longitudinal sectional view illustrating a scheme of a periphery of a frame body at the portion of the circle A in Fig. 76.

Fig. 80 is a longitudinal sectional view illustrating a scheme of a periphery of a frame body at the portion of the circle A in Fig. 77.

Fig. 81 is longitudinal sectional views illustrating a scheme of a periphery of a frame body of the multiple glazing sash according to another embodiment of the embodiment 6 of the present invention.

Fig. 82 is schematic views illustrating the process for producing a multiple glazing sash according to a first embodiment of the embodiment 6 of the present invention.

Fig. 83 is schematic views illustrating the process for producing a multiple glazing sash according to a first embodiment of the embodiment 6 of the present invention.

Fig. 84 is a schematic longitudinal sectional view illustrating another embodiment of a frame body to be used in the process for producing a multiple glazing sash of the embodiment 6 of the present invention.

Fig. 85 is a schematic longitudinal sectional view illustrating another embodiment of a frame body to be used in the process for producing a multiple glazing sash of the embodiment 6 of the present invention.

Fig. 86 is a schematic front view illustrating the multiple glazing sash of the embodiment 7 according to one embodiment of the present invention.

Fig. 87 is a partially abbreviated schematic perspective view illustrating the multiple glazing sash according to the embodiment 7 of the present invention.

Fig. 88 is a partially abbreviated schematic perspective view illustrating the multiple glazing sash according to another embodiment of the embodiment 7 of the present invention.

Fig. 89 is partially exploded cross-sectional views illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to the embodiment 7 of the present invention.

Fig. 90 is partially exploded cross-sectional views illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to another embodiment of the embodiment 7 of the present invention.

Fig. 91 is a partially exploded cross-sectional view illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to another embodiment of the present invention.

Fig. 92 is a partially exploded cross-sectional view illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to another embodiment of the embodiment 7 of the present invention.

Fig. 93 is a partially exploded cross-sectional view illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to another embodiment of the embodiment 7 of the present invention.

Fig. 94 is a partially exploded cross-sectional view illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to another embodiment of the embodiment 7 of the present invention.

Fig. 95 is a partially exploded cross-sectional view illustrating a multiple glazing sash provided with the edge face protecting cover for a multiple glazing sash according to another embodiment of the embodiment 7 of the present invention.

Fig. 96 is a schematic front view illustrating the multiple glazing sash of the embodiment 8 according to one embodiment of the present invention.
Fig. 97 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to one embodiment of the embodiment 8 of the present invention.
Fig. 98 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 8 of the present invention.
Fig. 99(a) is a partial schematic cross-sectional view illustrating a lower side part of the multiple glazing sash using a frame body according to the embodiment 8 of the present invention, and Fig. 99(b) is a schematic cross-sectional view illustrating the multiple glazing sash in a longitudinal direction as observed from the arrow direction of the line C-C.
Fig. 100 is a partial schematic cross-sectional view illustrating the lower side part of the multiple glazing sash using a frame body according to the embodiment 8 of the present invention.
Fig. 101 is a partial schematic cross-sectional view illustrating the lower side part of the multiple glazing sash using a frame body according to the embodiment 8 of the present invention.
Fig. 102 is a partial schematic cross-sectional view illustrating the lower side part of the multiple glazing sash using a frame body according to the embodiment 8 of the present invention.
Fig. 103 is a partial schematic cross-sectional view illustrating the lower side part of the multiple glazing sash using a frame body according to the embodiment 8 of the present invention.
Fig. 104 is partial schematic plan views illustrating a portion connecting the lower side part and the left side part of the multiple glazing sash according to the embodiment 8 of the present invention.
Fig. 105 is a schematic front view illustrating the multiple glazing sash of the embodiment 9 according to one embodiment of the present invention.
Fig. 106 is a schematic perspective view including a partial cross section illustrating the multiple glazing sash shown in Fig. 105.
Fig. 107 is a longitudinal sectional view illustrating a scheme of the portion of the circle A in Fig. 106.
Fig. 108 is a schematic longitudinal sectional view illustrating a frame body to be used for the multiple glazing sash according to the embodiment 9 of the present invention.
Fig. 109 is a longitudinal sectional view illustrating the multiple glazing sash according to the embodiment 9 of the present invention used for a sliding window.
Fig. 110 is a transverse sectional view illustrating the multiple glazing sash in the sliding window shown in Fig. 109.
Fig. 111 is a longitudinal sectional view illustrating the sliding window shown in Fig. 109 attached to an opening of a wall a residence.
Fig. 112 is a transverse sectional view of Fig. 111.
Fig. 113 is a front view illustrating the multiple glazing sash of a first aspect of the embodiment 10 of the present invention.
Fig. 114 is a 2-2 cross-sectional view illustrating the multiple glazing sash shown in Fig. 113.
Fig. 115 is an enlarged view illustrating a portion surrounded by the circle A in Fig. 114.
Fig. 116 is an enlarged view illustrating a substantial part of the multiple glazing sash according to the embodiment 10 of the present invention when assembled.
Fig. 117 is an enlarged cross-sectional view illustrating a substantial part of the multiple glazing sash of a second aspect of the embodiment 10 of the present invention.
Fig. 118 is an enlarged cross-sectional view illustrating a substantial part of the multiple glazing sash of a third aspect the embodiment 10 of the present invention.
Fig. 119 is a cross-sectional view illustrating a modified example of a frame body of the multiple glazing sash of a third aspect of the embodiment 10 of the present invention.
Fig. 120 is a cross-sectional view illustrating another aspect of a sealing member of the multiple glazing sash according to the embodiment 10 of the present invention.
Fig. 121 is a partial cutaway longitudinal sectional view illustrating a conventional triple type triple glazing.

DESCRIPTION OF EMBODIMENTS

[0091] Now, the respective embodiments of the present invention will be described in detail with reference to drawings. Drawings exemplify the respective preferred embodiments of the present invention, and the present invention is not limited to such specific drawings and descriptions.

(Description of embodiment 1)

[0092] The multiple glazing sash of the embodiment 1 of the present invention will be described in detail with reference to Figs. 1 to 14. The multiple glazing sash having the constitutions of Figs. 1 to 14 is based upon Japanese Patent Application No. 2014-038959, which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 1.
[0093] Fig. 1 is a front view illustrating the multiple glazing sash according to the embodiment 1 of the present invention, and Fig. 2 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 1 of the present invention.

In Figs. 1 and 2, the reference symbol 1 represents a multiple glazing sash, 2 a glass plate, 3a a lower side frame body of the multiple glazing sash, 3b a right or left side frame body of the multiple glazing sash, 3c an upper side frame body of the multiple glazing sash (hereinafter the upper side frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to as a frame body 3), 4 an intermediate plate disposed to be spaced apart from the glass plates 2 and 2 between the glass plates 2 and 2 spaced apart by the frame body 3, 5 an air space formed between the glass plates 2, 2, and 6 a corner member connecting the respective frames bodies 3a, 3b and 3c at corner parts.

[0094] Figs. 3 to 14 are partial schematic cross-sectional views illustrating a substantial part of the multiple glazing sash according to the embodiment 1 of the present invention. The drawings are views illustrating specific examples of a portion at a lower side of the multiple glazing sash, and are schematic cross-sectional views illustrating a portion at a lower side of the multiple glazing sash as observed from the arrow direction of the line B-B in Fig. 2. The multiple glazing sash 10 has a structure as follows. A first glass plate 11 and a second glass plate 12 are spaced apart by a frame member 13 disposed on a periphery between the first and second glass plates to form an air space 14, the air space 14 is sealed at the periphery of the first and second-glass plates by a sealing material such as an adhesive or a pressure-sensitive adhesive, a plurality of intermediate plate-holding parts 16 for holding an edge part of an intermediate plate 15 to be disposed in the air space 14, are provided in rows to the frame member 13, and at least one intermediate plate 15 is disposed in the air space 14 by the plurality of intermediate plate-holding parts 16 provided in rows to the frame member 13, and the air space 14 is divided by the intermediate plate 15 into a plurality of compartmentalized air spaces. In the drawings, the reference symbol 17 represents a first sealing material sealing the gap between the side part of the frame member 13 and the first glass plate 11 or the second glass plate 12 at a periphery of the side part of the frame member 13 and the glass plate, and 18 a second sealing material for sealing in the same manner.

[0095] The intermediate layer formed between the first glass plate 11 and the second glass plate 12, and a plurality of compartmentalized intermediate layers formed between the first glass plate 11 and the second glass plate 12 by the intermediate plate as mentioned above, are referred to as an air space in the description for the embodiment 1 of the present invention, and in such an air space, a filler gas such as dry air or an inert gas such as an argon gas, a krypton gas or a helium gas is filled, thereby to increase the heat insulating property and/or sound insulation property, and further, a dew condensation preventing function is imparted to the multiple glazing sash by a drying agent contained in a space part of a spacer part of the frame member. Such an air space may be called an air layer, a gas layer, an intermediate layer or a space layer, and the air space is synonymous with the air layer, the gas layer, the intermediate layer, the space layer or the like. The same applies to the other embodiments of the present invention.

[0096] The shape and the thickness of the first glass plate 11 and the second glass plate 12 are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash, and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, the thicknesses are within a range of from 0.7 mm to 10 mm, and it is preferred that the sizes of the first and second glass plates 11 and 12 are the same or substantially the same. The first and second glass plates may be different in the thickness or the type. Further, as the type of the glass plate, a float glass plate, a common glass plate, a heat-absorbing glass plate, an ultraviolet-absorbing glass plate, a heat reflecting glass plate, a low-emissivity glass plate (a low-E glass plate), a figured glass, a laminated glass, a wire or wire mesh glass plate, an air-cooled tempered glass plate, a chemically tempered glass plate, or a glass plate having functions of such glass plates combined may, for example, be properly used depending upon the aimed specifications required.

[0097] The one or two or more intermediate plates 15 disposed between the glass plates 11 and 12 to be spaced apart from the first and second glass plates 11 and 12 with a predetermined distance in parallel with the glass plates 11 and 12, are to reduce the convection of the gas in a space of the air space 14 between the first and second glass plates 11 and 12 thereby to increase the heat insulating property, and to increase the sound insulation performance.

[0098] The intermediate plate 15 is preferably in a rectangular shape similar to and smaller than the glass plates 11 and 12 so that the intermediate plate 15 can be disposed by a disposition method such as insertion, fitting or locking, to the intermediate plate-holding part 16 provided on the inner face side i.e. on the air space side of the frame member 13. In a case where the first and second glass plates 11 and 12 are in a substantially rectangular shape, the first and second glass plates 11 and 12 are preferably spaced apart at their peripheral four edge sides by the frame member 13 to constitute the multiple glazing sash.

[0099] Since the intermediate plate 15 is disposed between the first and second glass plates 11 and 12 and is not exposed to the outside, its strength may be low as compared with the first and second glass plates, and a thin material may be used. Therefore, even a multiple glazing sash of a multiple type of triple or more, can have a small entire thickness. Such an intermediate plate 15 may, for example, be a glass plate, a plastic plate or a plastic film. The intermediate plate 15 may be a transparent plate, may be a colored plate, may be a plate with a pattern, or a combination thereof. The intermediate plate is properly selected depending upon the location

where the sash is used, the region, the design property, etc. In a case where a glass plate is used as the intermediate plate, since it is disposed between the first and second glass plates 11 and 12, a glass plate having a thickness of at most 2 mm is preferred, whereby the entire thickness can be made thin. In a case where the intermediate plate 15 is a glass plate, since it has high rigidity even when it is thin, a disposition operation such as insertion, fitting or locking to the intermediate plate-holding part 16 is easily carried out, and further a glass plate has high transparency and durability and is thereby favorable as an intermediate plate for the multiple glazing sash.

[0100] Particularly, as the intermediate plate 15, a chemically tempered glass plate having sufficient strength even when it is made thin can be preferably used. A chemically tempered glass plate is a glass plate produced by a chemical tempering technique of dipping a glass plate containing a Na component and a Li component such as soda lime silicate glass in a molten salt of e.g. potassium nitrate to replace Na ions and/or Li ions having a small atomic size present on the surface of the glass plate with K ions having a large atomic size present in the molten salt by ion exchange to form a compression stress layer on the surface layer of the glass plate thereby to increase the strength, and has a sufficiently high breaking strength even when the thickness is at most 2 mm. For example, as compared with a common glass plate made of conventional soda lime silicate glass, having a thickness of 2 mm, a chemically tempered glass plate obtained by tempering a common glass plate having the same thickness by the above ion exchange method has a breaking strength of from about 2 to about 10 times. Accordingly, by use of a chemically tempered glass plate as the intermediate plate 15, weight saving can be achieved by reduction in thickness of the intermediate plate in the multiple glazing sash of the present invention, and at the time of preparation of the multiple glazing sash, breakage of the intermediate plate can be prevented, such being particularly favorable. In the case of a chemically tempered glass plate, it can be post-cut by selecting a cutting means or by controlling the degree of the chemical tempering treatment, and accordingly the produced chemically tempered glass plate may be cut to be fitted to the predetermined dimensions of the intermediate plate 15.

[0101] The frame member 13 has a structure having a function as a spacer part to space apart the first and second glass plates 11 and 12 with a predetermined distance. In the case of a rectangular multiple glazing sash in a planar view, the frame member 13 is disposed on four sides i.e. the upper side, the lower side, the left side and the right side of the multiple glazing sash. The frame member on each side is preferably basically made of a single member. That is, the frame member on each side is preferably one basically formed of one member. Further, at butting parts of the frame members on the four sides of the upper side, the lower side, the left side and the right side, usually a corner member is disposed to connect the frame members on the four sides of the upper side, the lower side, the left side and the right side to form them into a frame shape.

[0102] The frame member 13 is preferably provided with a spacer part having a space part in which a drying agent is contained, on at least a part of the air space side. The frame member is provided with a spacer part preferably on four sides of the upper side, the lower side, the left side and the right side, or may be provided on at least one of the four sides of the upper side, the lower side, the left side and the right side.

[0103] Further, the frame member 13 may have a projecting leg on both or either one of the first glass plate side and the second glass plate side of the frame member.

[0104] Further, the frame member 13 may have a structure having a function to merely space the first and the second glass plates 11 and 12 apart, without the above spacer part or projecting leg.

[0105] In the case of a rectangular multiple glazing sash in a planar view, the frame members to be disposed on the four sides of the upper side, the lower side, the left side and the right side of the multiple glazing sash are preferably frame members having the same structure, whereby the number of members in assembling of the multiple glazing sash can be reduced, and further, the outer appearances and the designs at a peripheral part on the four sides of the multiple glazing sash can be coordinated, however, needless to say, the lower side frame member, the upper side frame member, the left side frame member and the right side frame member of the multiple glazing sash may have different structures so as to fulfill the functions required for the respective sides. Further, in a case where the frame members disposed on the four sides of the upper side, the lower side, the left side and the right side have the same structure and have a structure provided with a spacer part, in preparation of the multiple glazing sash using such frame members, a drying agent may be contained in a space part in a spacer part of the frame member 13 in a required side or in a required portion.

[0106] In the multiple glazing sash of the embodiment 1 of the present invention, as shown in Figs. 3 to 14, a plurality of intermediate plate-holding parts 16 for holding an edge part of the intermediate plate 15 disposed in the air space 14 are provided in rows on the inner face side on the air space 14 side of the frame member 13 in a longitudinal direction. The intermediate-holding parts 16 are provided in plural rows, for example, in two or more rows, with a predetermined distance in the width direction of the frame member 13. In the case of a rectangular multiple glazing sash in a planar view, such intermediate plate-holding parts may be provided symmetrically on at least opposite sides among the four sides of the upper side, the lower side, the left side and the right side of the multiple glazing sash, and are preferably provided symmetrically on the three sides of the lower side, the left side and the right side, on the three sides of the upper

side, the left side and the right side, or on the four sides of the upper side, the lower side, the left side and the right side.

[0107] The shape of each intermediate plate-holding part provided to the frame member may be a shape by which compartmentalized air spaces are formed by holding the edge part of the intermediate plate, and for example, a groove part or a fitting part into which the edge part of the intermediate plate is inserted, or a gripping part or a locking part into which the edge part of the intermediate plate is locked, or a combination thereof, may be mentioned as a typical example. Further, the plurality of intermediate plate-holding parts may have the same structure or may have different structures. Needless to say, the intermediate plate-holding part is not limited to such specific structures, and may have another structure having a function to hold the peripheral edge part of the intermediate plate.

[0108] For example, as the shape of the intermediate plate-holding part, as shown in Fig. 12(a), the intermediate plate-holding part 16 may have a groove part 34 into which the peripheral edge part of the intermediate plate 15 is inserted or fitted to hold the intermediate plate 15, on the air space side A of the multiple glazing sash of the frame member 13; as shown in Fig. 12(b), it may have lip parts 35, 35 made of an elastic material sandwiching the peripheral part of the intermediate plate 15 formed on both sides of the groove part 34; as shown in Fig. 12(c), it may have a locking part 36 (for example, a locking lip part) for locking or gripping the edge part of the intermediate plate 15 to hold the intermediate plate 15, formed on the air space side A of the multiple glazing sash of the frame member 13; or as shown in Fig. 12(d), it may have a notch part 37 for insertion of the edge part of the intermediate plate formed in a cushioning or elastic member 38, on the air space side A of the multiple glazing sash of the frame member 13, so that the edge part of the intermediate plate 15 is inserted and locked into the notch part thereby to hold the intermediate plate 15.

[0109] To the groove part or fitting part, a base member or a backup material for holding a peripheral edge part of the intermediate plate may be disposed, a sealing material may be disposed, or a glazing channel for supporting an edge part of the intermediate plate may be disposed. Here, in the multiple glazing sash of the present invention, the peripheral edge part of the intermediate plate is preferably not bonded to the intermediate plate-holding part, in the intermediate plate-holding part, so that the intermediate plate such as a glass plate disposed in the air space can easily be removed from the multiple glazing sash removed from a window at the time of breakage of a residence, a building or the like.

[0110] The multiple glazing sash 10 shown in Figs. 3 to 8 has a frame member 13 formed of a single member, and in the longitudinal direction of the frame member 13, three intermediate plate-holding parts 16 each having a groove part extending in parallel with the plane direction of the first glass plate 11 and the second glass plate 12 are provided in rows. The three intermediate plate-holding parts 16 are provided with a predetermined distance in the width direction of the frame member 13 i.e. in the width direction of the distance between the first and second glass plates 11 and 12. And, an edge part of an intermediate plate 15 such as a glass plate is inserted to the groove part of each of the three intermediate plate-holding parts 16, and the air space between the first and second glass plates 11 and 12 is compartmentalized into four layers by the three intermediate plates 15.

[0111] In the multiple glazing sash 10 shown in Fig. 3, at the bottom of the groove part of each intermediate plate-holding part 16, the edge part of the intermediate plate 15 is supported by a base member 21 made of a cushioning material, an elastic material or the like, and further at both sides on the upper part of the groove part of each intermediate plate-holding part 16, the peripheral part of the intermediate plate 15 is supported by lip parts 22 made of an elastic material, a cushioning material or the like.

[0112] As the frame member 13 shown in Fig. 3, a member formed of a rigid vinyl chloride resin material or another synthetic resin material, a member formed of an aluminum material, or a single member formed of a composite material of a synthetic resin material and an aluminum material is preferably selected. Particularly, a multiple glazing sash using a frame member made of a rigid vinyl chloride resin material or another synthetic resin material is more preferred, in that such a multiple glazing sash has a high heat insulation effect, is less likely to have dew condensation and is excellent in the sound insulation property.

[0113] In a case where the frame member 13 is formed of a rigid vinyl chloride resin material or another synthetic resin material, a moisture-proof film such as an aluminum foil may be bonded to the outer side part S of the frame member 13 so as to further increase the moisture resistance of the frame member 13 from the outside.

[0114] The example shown in the drawings is to illustrate the structure of the frame member on the lower side of the multiple glazing sash, and it is more preferred that the upper side frame member, the left side frame member and the right side frame member of the multiple glazing sash basically have the same structure as the lower side frame member, whereby the entire frame members can easily be assembled, and the number of members can be reduced.

[0115] In the multiple glazing sash 10 shown in Fig. 4, separate space parts 23 in which a drying agent is to be contained, corresponding to the respective four compartmentalized air spaces, are provided to the frame member 13. A communicating part 24 such as a hole or a slit communicated with the air space is formed on the upper wall on the air space side among walls constituting each space part 23, and a drying agent (in the drawing, small approximate circles in the space part 23 represent a drying agent, the same applies hereinafter) contained in the space part 23 absorbs moisture in the air space 14

through the communicating part 24 of the space part 23 to maintain a dry state in the air space 14.

[0116] In the example shown in Fig. 4, at the bottom of the groove part of each intermediate plate-holding part 16, the edge part of the intermediate plate 15 is supported by a base member 21 made of a cushioning material, an elastic material or the like, and further on both sides on the upper part of the groove part of each intermediate plate-holding part 16, the peripheral part of the intermediate plate 15 is supported by a backup material 25 made of an elastic material, a cushioning material or the like.

[0117] In the multiple glazing sash 10 shown in Fig. 5, a space part 23 in which a drying agent is contained is provided to the frame member 13, and this space part 23 has a shared space part communicating at the lower parts of the respective intermediate plate-holding parts 16 each having a groove part into which the intermediate plate is inserted. That is, in the frame member 13 shown in Fig. 4, four space parts 23 are separately formed, whereas, in the example shown in Fig. 5, the four space parts 23 in Fig. 4 have a communicating shared space part on the opposite side of the frame member 13 from the air space side. In Fig. 5 also, in the upper wall on the air space side of the space part 23, the above communicating parts 24 are provided.

[0118] In the example shown in Fig. 5, at the bottom of the groove part of each intermediate plate-holding parts 16, the edge part of the intermediate plate 15 is supported by a base member 21 made of a cushioning material, an elastic material or the like, and further on both sides on the upper part of the groove part of each intermediate plate-holding part 16, the peripheral part of the intermediate plate 15 is supported by a caulking compound 26.

[0119] In the multiple glazing sash 10 shown in Fig. 6, separate space parts 23 in which a drying agent is contained corresponding to the respective four compartmentalized air spaces are provided to the frame member 13, and a projecting leg 23 is provided to at least a part on the first glass plate 11 side and the second glass plate 12 side of the frame member 13. The projecting leg 27 extends from the side of the frame member 13, that is, a portion in contact with the peripheral part of the first glass plate 11 or the second glass plate 12, toward the opposite side from the air space 14 (the lower side in Fig. 6), and extends to the edge face of the first or second glass plate, whereby a concave part 28 of which the cross-sectional shape is a substantially U-shape is formed at a peripheral edge part between the first glass plate 11 and the second glass plate 12 on the outer side of the frame member 13. It is possible to provide a sash roller, a sash roller-bearing member, a latch member, a reinforcing material or another sash functional member by selecting a predetermined height of the projecting leg 27 and utilizing the resulting concave part 28. By providing the above sash functional member utilizing the space in the concave part 28, the sash functional member may be shielded from the outside by the projecting leg of the frame member.

[0120] Also in the example shown in Fig. 6, in the same manner as in Fig. 4, at the bottom of the groove part of each intermediate plate-holding part 16, the edge part of the intermediate plate 15 is supported by the same base member 21, and further on both sides on the upper part of the groove part of each intermediate plate-holding part 16, the peripheral part of the intermediate plate 15 is supported by the same backup material 25.

[0121] Also in the multiple glazing sash 10 shown in Fig. 7, in the same manner as in Fig. 6, separate space parts 23 in which a drying agent is contained corresponding to the respective four compartmentalized air spaces are provided to the frame member 13, and a projecting leg 27 is provided to at least a part on the first glass plate 11 side and the second glass plate 12 side of the frame member 13. In the example shown in Fig. 7, the projecting leg 27 as shown in Fig. 6 has a bent projecting leg 29 bent at a terminal part of the projecting leg 27 to an edge face direction of the first or second glass plate 11 or 12 and extending in a lateral direction, and the edge face parts of the first and second glass plates 11 and 12 are protected by such bent projecting legs 29, and the first and second glass plates 11 and 12 can more securely be supported. Also in the example shown in Fig. 7, in the same manner as in Fig. 6, a concave part 28 of which the cross-sectional shape is a substantially U-shape may be formed at a peripheral edge part between the first glass plate 11 and the second glass plate 12 of the frame member 13.

[0122] The inserting and supporting structures of the intermediate plate 15 into the groove part of each intermediate plate-holding part 16 in the example shown in Fig. 7 are the same as in Fig. 3.

[0123] The multiple glazing sash 10 shown in Fig. 8 is a modified example of the multiple glazing sash having the structure shown in Fig. 5, and it has a structure such that a communicating first shared space part 30 in which a drying agent is contained is separately provided below the respective intermediate plate-holding parts 16 each having a groove part into which an intermediate plate is inserted. In this example also, four space parts 23 are formed in the frame member 13, and a communicating second shared space part 31 is provided under the respective space parts 23. The first shared space part 30 and the second shared space part 31 are compartmentalized by a wall body 33. In Fig. 8 also, the above-described communicating part 24 is provided to the upper wall on the air space side of each space part 23, a communicating part 32 is provided also on the first shared space part 30 side of the second shared space part 31, and a drying agent contained in the first shared space part 30 absorbs moisture in the respective compartmentalized air spaces 14.

[0124] The inserting and supporting structures of the intermediate plate 15 into the groove part of each intermediate plate-holding part 16 in the example shown in Fig. 8 are the same as in Fig. 3.

[0125] In the multiple glazing sash 10 of the embodi-

ment 1 of the present invention, a plurality of intermediate plate-holding parts 16 are provided in rows on the air space 14 side of the frame member 13, and which intermediate plate-holding part 16 is used to dispose an intermediate plate among such a plurality of intermediate plate-holding parts 16 in rows, is properly determined depending upon the insulation efficiency required, and the type of a filler gas filled in the air space.

[0126] The example shown in Fig 9 is an example in which four intermediate plate-holding parts 16a, 16b, 16c and 16d are provided in rows on the air space side of the frame member 13, and among such intermediate plate-holding parts, three intermediate plate-holding parts 16b, 16c and 16d are utilized to dispose intermediate plates 15, 15, 15 to the respective groove parts, thereby to form four compartmentalized air spaces 14a, 14b, 14c and 14d. This example is an example of a multiple glazing sash used so that the first glass plate 11 is located on the window exterior side, and the first air space 14a to be disposed on the exterior side has about twice the thickness of the other air spaces 14b, 14c and 14d.

[0127] The example shown in Fig. 10 is an example in which three intermediate plate-holding parts 16a, 16b and 16c are provided in rows on the air space 14 side of the frame member 13, and among such intermediate plate-holding parts, the two intermediate plate-holding parts 16a and 16c are utilized to dispose intermediate plates 15, 15 to the respective groove parts, thereby to form three compartmentalized air spaces 14a, 14b and 14c. This example is an example of a multiple glazing sash to be used so that the first glass plate 11 is located on the window exterior side, and the air space 14b in the meddle has about twice the thickness of the other air spaces 14a and 14c.

[0128] The examples shown in Figs. 9 and 10 are two examples in which three or four intermediate plate-holding parts are provided in rows to the frame member 13, and among such a plurality of intermediate plate-holding parts 16, the intermediate plate-holding parts to which an intermediate plate is disposed is selected. However, more intermediate plate-holding parts, for example, about 5 to about 10 rows, may be provided to the frame member 13, and the number of the intermediate plate-holding part to which an intermediate plate is disposed is not limited to the above examples, and various selection is possible. In the examples shown in Figs. 9 and 10, three among the four intermediate plate-holding parts, and two among the three intermediate plate-holding parts are used to dispose an intermediate plate, however, needless to say, an intermediate plate may be disposed to all the intermediate plate-holding parts. Further, in Fig. 9, three among the four intermediate plate-holding parts are used to dispose an intermediate plate, however, two among the four intermediate plate-holding parts may be used to dispose an intermediate plate. Such an embodiment is the same even when the number of the intermediate plate-holding parts is further increased.

[0129] Further, in a case where a large number of intermediate plate-holding parts are to be formed in the frame member, it is preferred to increase the range of selection of the intermediate plate-holding parts used to dispose an intermediate plate, so that the distance between the intermediate plate-holding parts is narrow and a larger number of the intermediate plate-holding parts are provided, whereby compartmentalized space layers having an aimed thickness can selectively be formed.

[0130] The example shown in Fig. 11 is an example in which a larger number of intermediate plate-holding parts are provided in rows to the frame member so as to increase the range of selection of the intermediate plate-holding parts used to dispose an intermediate plate. In the drawing, 7 intermediate plate-holding parts 16a, 16b, 16c, 16d, 16e, 16f and 16g are formed in rows in the frame member 13.

[0131] In Fig. 11, as the positions of groove parts of the intermediate plate-holding parts 16a to 16g to be provided to the frame member 13, the distances Wa, Wb, Wc, Wd, We, Wf, Wg and Wh are determined so as to obtain aimed compartmentalized air spaces. The distances Wa to Wh may respectively have a constant standard width i.e. unit length, or may have predetermined optional widths. For example, in a case where a filler gas such as dry air or an inert gas such as an argon gas, a krypton gas or a helium gas is filled in the compartmentalized air spaces, the optimum range of the thickness of a filler gas layer with which a maximum heat insulation effect is obtained varies depending upon the type of the filler gas, and it is preferred to determine the positions of the intermediate plate-holding parts to be formed in the frame member 13 so as to obtain a plurality of filler gas layers within such an optimum range. In such a case, as described above, the position is preferably determined based on the position at a center part of the groove part of each of the intermediate plate-holding parts 16a to 16g.

[0132] For example, in a case where the distances Wa to Wh are the same unit length, and if a maximum heat insulation effect is obtained with thicknesses of the gas layers of (Wa+Wb), (Wc+Wd), (We+Wf) and (Wg+Wh), three intermediate plates 15 are disposed using groove parts of the intermediate plate-holding parts 16b, 16d and 16f. Further, in a case where two types of filler gases are used, and in a case where a maximum heat insulation effect is obtained with thicknesses of gas layers of (Wa+Wb+Wc) and (Wf+Wg+Wh) for one filler gas and (Wd+We) for the other filler gas, two intermediate plates 15 are disposed using groove parts of the intermediate plate-holding parts 16c and 16e.

[0133] The distance between the center positions of the groove parts of the intermediate plate-holding parts is preferably a predetermined unit length, so that the intermediate plate-holding parts can be properly selected depending upon the filler gas to be used. For example, this unit length is a certain value within a range of from about 5 mm to 10 mm, whereby the intermediate plate-holding parts can be selected depending upon the filler

gas to be used.

[0134] By using a frame member having a predetermined number of groove parts preliminarily provided in rows in the intermediate plate-holding parts, intermediate plate-holding parts are selectively used among the plurality of intermediate plate-holding parts in rows so that an optimum thickness of the filler gas layer can be obtained, depending upon the type of the filler gas, whereby a multiple glazing sash excellent in the heat insulating property and sound insulation property can be obtained.

[0135] For the frame member 13 shown in Figs. 4 to 11 also, in the same manner as the example shown in Fig. 3, a synthetic resin material or an aluminum material is preferably used. As a synthetic resin material for forming the frame member, a rigid vinyl chloride resin material, an acrylonitrile/styrene resin material or such a resin material containing a glass fiber material may be mentioned as a preferred example, and needless to say, the material is not limited to such a thermoplastic synthetic resin material, and various thermoplastic synthetic resin materials can be used.

[0136] Further, as the frame member-forming material, it is preferred that a frame member consisting of a single member is obtained using one material, however, the member is not limited thereto, and a single member made of a composite material using a plural types of materials may also be used. For example, the member may be a frame member having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different resin materials, or may be a frame member having a composite structure made of the above synthetic resin material and aluminum material. Such a composite structure may be obtained by integrally forming desired frame member-forming materials. Particularly a frame member having a spacer part, or a frame member having a spacer part and a projecting leg of the frame member 18 integrally formed, made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, is more preferred, since when it is used for a sash, a multiple glazing sash which is excellent in the heat insulating property and the durability, which is produced at a low cost, which has a high heat insulation effect, which is less likely to have dew condensation, and which is excellent in the sound insulation property will be obtained.

[0137] Further, in a case where the frame member 13 is formed of a rigid vinyl chloride resin material or another synthetic resin material, a moisture-proof film such as an aluminum foil may be bonded to the outer side part S of the frame member 13 so as to prevent moisture permeation of the frame member 13 from the outside, in the same manner as in the example shown in Fig. 3.

[0138] Further, the examples shown in Figs. 4 to 11 are to illustrate the structure of the lower side frame member of the multiple glazing sash, and it is preferred that the upper side frame member, the left side frame member and the right side frame member of the multiple glazing sash basically have the same structure as the lower side frame member, in the same manner as in the example shown in Fig. 3. Needless to say, the upper side, left side and right side frame members of the multiple glazing sash may have a properly changed structure depending upon the specifications.

[0139] Further, in a case where a space part 23 is formed in the frame members on the four sides of the multiple glazing sash, a drying agent is contained only in the frame member on the required side among the four sides or only in a necessary portion, in the same manner as in the case of Fig. 3.

[0140] As an adhesive (a first sealing material and a second sealing material) to be used to bond a glass plate and the side part of the frame member at a portion where they are contacted with each other, used in the multiple glazing sash of the embodiment 1 of the present invention, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate and the side part of the frame member, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate and the frame member. For example, in a case where the side part of the frame member is made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. Further, in a case where the frame member has a projecting leg, also as an adhesive to be used to bond the glass plate and the projecting leg, in the same manner as above, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate and the projecting leg, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate and the projecting leg. For example, in a case where the projecting leg is made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, in the same manner as the above example, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. For the adhesive, as the case requires, a primer may be used for the purpose of improving the adhesive strength.

[0141] Now, another specific example of the embodiment 1 of the present invention will be described.

[0142] In a frame body 45 to be disposed to space a first glass plate 41 and a second glass plate 42 apart shown in Figs. 13 and 14, two or three groove parts 55 which are groove-shaped concave parts, as intermediate plate-holding parts, are provided in rows in a middle part on an inner surface part 47 side of a spacer part 46, whereby two intermediate plates 43a and 43b or three intermediate plates 43a, 43b and 43c can be disposed. The positions on the inner surface part where the groove

parts 55 (intermediate plate-holding parts) are provided are properly selected depending upon the positions where the two or three intermediate plates 43 are to be disposed, that is, compartmentalized air spaces 44a, 44b and 44c or air spaces 44a, 44b, 44c and 44d each having a predetermined width. Further, on both sides on an inner surface of each groove part 55, lip parts 56, 56 made of an elastic material are provided so as to support a peripheral edge part of the intermediate plate 43 disposed to the groove part 55, and at the bottom of each groove part 55, a base member 57 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 43 to be disposed to the groove part 55 and to secure positioning. In the example shown in the drawing, the lip parts 56 and 56 are provided at the same level, however, they may be provided at different levels. The positions of forming the lip parts 56, 56 on both sides may properly be set so that the intermediate plate 43 to be disposed to the middle part is easily inserted. In this example, a space part 48 in which a drying agent is contained of the spacer part 46 is divided into three or four by formation of a plurality of groove parts 55 in rows.

[0143] A projecting leg part 53 having a projecting leg 51 provided to the frame body 45 of the multiple glazing sash of the present invention shown in Figs. 13 and 14, is provided for interior decoration to a peripheral edge part of the first glass plate 41 and the second glass plate 42 spaced apart. Further, bent projecting legs 52, 52 of the projecting leg part 53 are bent from terminal parts on the opposite side of the projecting legs 51, 51 from side parts 49, 49 of the spacer part 46, to the glass plates 41 and 42 side, extend toward the lateral direction, and protect and support edge face parts of the glass plates, and further as the case requires, prevent dropping of the glass plates, and the lengths of tips of the bent portions of the bent projecting legs 52, 52 are about the thicknesses of the glass plates or lengths such that the bent projecting legs slightly protrude outside the glass plates. As described above, in a preferred embodiment of the embodiment 1 of the present invention, since the projecting leg 51 of the projecting leg part 53 and the side parts 49, 49 of the spacer part 46 integrally formed of the frame body 45 form a continuous face, the projecting leg of the projecting leg part and the side part of the spacer part may be a design face at a peripheral part of the multiple glazing sash, by considering the color tone, the plane conditions, etc. of the projecting leg 51 of the projecting leg part 53 and the side parts 49, 49 of the spacer part 46 of the frame body 45.

[0144] In the above embodiment of the multiple glazing sash of the present invention, the side parts 49, 49 of the spacer part 46 and the projecting legs 51, 51 of the projecting leg part 53 of the frame body 45 are bonded to the first and second glass plates 41 and 42, at portions where they face the glass plate 41 and 42, by an adhesive layer 54 having excellent sealing property, to maintain airtightness of the air space 44 formed between the first and second glass plates 41 and 42.

[0145] Further, it is preferred to provide a thin plate part 58 on the inner surface part 47 of the spacer part 46 as shown in Figs. 13 and 14. This thin plate part 58 is formed so that an air hole to allow air permeation between the space part 48 and the air space 44 is easily formed, and by the air hole formed, the dry state of the air space 44 is maintained by a drying agent, and dew condensation can be prevented.

[0146] In Figs. 13 and 14, the structure of the frame body of the multiple glazing sash is specifically described with reference to the lower side frame body 45 as an example, however, the structures of the upper side frame body 3c and the right and left side frame bodies 3b may be basically the same as the structure of the lower side frame body 5.

[0147] Now, an example in which the multiple glazing sash of the embodiment 1 of the present invention is applied to a window of a residence or a building will be described.

[0148] As shown in Fig. 15, in a groove part 62 of a frame body 61 on the lower side of each of multiple glazing sashes 60a and 60b according to the embodiment 1 of the present invention, applied to a sliding window, a sash roller 63 is rotatably attached via a sash roller-attaching member 64, and each of the multiple glazing sashes 60a and 60b is constituted so that it can move along a moving rail 66 provided on the upper side of a window frame 65. Here, an edge part protecting cover 69 is disposed between a lower edge part 67 on both sides of the sash roller-attaching member 64 and a lower edge of a projecting leg 68, and a fin part 70 in contact with the moving rail 66 is provided on the moving rail 66 side of the edge part protecting cover 69.

[0149] In Fig. 15, as the sash roller-attaching members 64 for the multiple glazing sashes 60a and 60b on both sides, members having different structures are exemplified.

[0150] Further, to a groove part 72 of an upper side frame body 71 of each multiple glazing sash, a moving rail 74 provided on a lower side of a window frame 73 is fitted, and an edge part protecting cover 77 having a concave part 76 having fin parts 75, 75 is attached so that each of the multiple glazing sashes 60a and 60b can move as guided along the moving rail 74.

[0151] Fig. 16 is a view illustrating a meeting portion of the multiple glazing sash applied to the sliding window shown in Fig. 15. To an edge part protecting cover 82 attached to a groove part 81 of a side frame body 80 of the multiple glazing sash, a meeting part airtight material 83 which contacts with a meeting part airtight material of the other multiple glazing sash at a meeting portion of the multiple glazing sashes 60a and 60b, is provided, and a jamb airtight material 85 is provided to a portion where the side edge part of the multiple glazing sash 60a or 60b meets a window frame 65. In Fig. 16, the same members as in Fig. 15 are represented by the same symbols.

[0152] Figs. 17 to 19 illustrate a frame body 45 comprising a spacer part 46 and a projecting leg part 53 separately constituted and integrally formed by an adhesive via an interjacent moisture-proof layer 86. That is, a frame body 45 shown in Figs. 17 and 18 corresponds to the frame body 45 shown in Fig. 13, and a frame body 45 shown in Fig. 19 corresponds to the frame body 45 shown in Fig. 14.

[0153] The frame body 45 in a separate form shown in Figs. 17 to 19 has a moisture-proof layer 86 interposed between the spacer part 46 and the projecting leg 53. And, the moisture-proof layer 86 are contacted on the whole area of the facing surfaces 45A and 53A of the spacer part 46 and the projecting leg part 53. Thus, moisture which is to infiltrate from the outside of the multiple glazing sash into air spaces 44a, 44b, 44c and 44d can be blocked by the moisture-proof layer 86. Thus, dew condensation in the air spaces 44a, 44b, 44c and 44d can be prevented, and a multiple glazing sash excellent in the moisture resistance can be provided.

[0154] Further, since the moisture-proof layer 86 is interposed between the spacer part 46 and the projecting leg part 53 without being exposed from the surface of the multiple glazing sash, the moisture-proof layer 86 can be protected by the spacer part 46 and the projecting leg part 53, whereby the moisture resistance of the multiple glazing sash can be maintained for a long period of time.

[0155] The moisture-proof layer 86 is preferably a layer obtained by applying a moisture-proof coating and curing it, or a layer obtained by bonding a moisture-proof film-form body.

[0156] The moisture-proof coating may be a fluorinated resin coating or a polyvinylidene chloride resin coating as representative examples.

[0157] Further, the moisture-proof film-form body may be a metal-coated film, a ceramic-coated film, a metal and ceramic composite-coated film, a metal tape, each having a moisture-proof function, a moisture-proof resin film which itself is made of a resin having a moisture-proof function, or a moisture-proof resin-coated film. For example, the metal-coated film may be an aluminum-coated film obtained by coating a plastic film carrier with aluminum having a moisture-proof function by means of a vacuum deposition method, a sputtering method or the like, as a representative example. Further, the ceramic-coated film may be a ceramic-coated film obtained by coating a plastic film carrier with a metal oxide (for example, SiO_2) having a moisture-proof function by means of a vacuum deposition method, a sputtering method or the like, as a representative example. Further, the metal tape may be an aluminum metal tape or a stainless steel metal tape as representative examples. The moisture-proof resin film may be a fluorinated resin film or a polyvinylidene chloride film as representative examples.

[0158] Further, in the embodiments shown in Figs. 17 to 19, the spacer part 46 and the projecting leg part 53 are separated, and the spacer part 46 and the projecting leg part may be constituted in a separate form. In a case where the spacer part 46 is constituted in a separate form, the glass plates may be spaced apart by means of a plurality of rigid sponges.

(Description of embodiment 2)

[0159] Now, the multiple glazing sash according to the embodiment 2 of the present invention will be described in detail with reference to Figs. 20 to 30. The multiple glazing sash having the constitutions of Figs. 20 to 30 is based upon Japanese Patent Application No. 2013-271909 (which is based upon and claims the benefit of priority from Japanese Patent Application No. 2013-069834) which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 2.

[0160] Fig. 20 is a front view illustrating the multiple glazing sash according to the embodiment 2 of the present invention, Fig. 21 is a partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 2 of the present invention, Fig. 22 is a cross-sectional view illustrating a scheme of the portion of the circle A in Fig. 21, and Fig. 23 illustrates an example of a frame body to be used for the multiple glazing sash according to the embodiment 2 of the present invention. In Figs. 20 and 21, the reference symbol 101 represents a multiple glazing sash, 102 a glass plate, 103 an upper side frame body of the multiple glazing sash, 104 a side frame body of the multiple glazing sash, 105 a lower side frame body of the multiple glazing sash (in the description of the embodiment 2, hereinafter the upper side frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to simply as a frame body, and they may sometimes be generally referred to as a frame body 113), 112 an intermediate plate disposed to be spaced apart from the glass plates 102 and 102 between the glass plates 102 and 102 spaced apart by the frame body 105.

[0161] Figs. 22 and 23 illustrate a frame body 113 (frame body 105) to be used on the lower edge side of a multiple glazing sash as an example of a frame body to be used for a triple type multiple glazing sash (a multiple glazing sash having two air spaces 125 and 125) having totally three plates of two glass plates and one intermediate plate, configured to have a first glass plate 110 and a second glass plate 111 spaced apart and one intermediate plate 112 disposed between the first glass plate 110 and the second glass plate 111. As shown in these drawings, the frame body 113 (frame body 105) comprises a spacer part 118 having an inner surface part 114 and an outer side part 115 keeping a space between the first glass plate 110 and the second glass plate 111, side parts 116, 116 connected to the inner surface part 114 and the outer side part 115 and facing the inner side of the first glass plate 110 and the second glass plate 111, and a space part 117, 117 in which a drying agent is

contained, and a projecting leg part 121 having projecting legs 119, 119 facing the inner side of a peripheral edge part of the first glass plate 110 and the second glass plate 111, and bent projecting legs 120, 120 connected to the projecting leg 119, 119 and facing an edge face part of the glass plates, and the spacer part 118 and the projecting leg part 121 of the frame body are integrally formed of a frame body-forming material. In the embodiment 2 of the present invention, "integrally formed" means that a frame body-forming material is formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method. This applies to the other embodiments of the present invention.

[0162] The frame body-forming material is preferably a synthetic resin material or an aluminum material. The synthetic resin material for forming a frame body may, for example, be preferably a rigid vinyl chloride resin material, an acrylonitrile/styrene resin material or such a resin material containing a glass fiber material, however, needless to say, the synthetic resin material is not limited to such a thermoplastic synthetic resin material, and various thermoplastic synthetic resin materials may be used.

[0163] Further, the frame body-forming material is not limited to one type, and a plural types of materials may be used to form a composite structure. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different resin materials, or may be a frame body having a composite structure made of the above synthetic resin material and aluminum material. In the case of such a composite structure, the frame body may be obtained by integrally forming any one type of frame member-forming materials. A different synthetic resin material and/or metal material may be partially or entirely bonded to the integrally formed frame body. Particularly, a frame body 113 comprising the spacer part 118 and the projecting leg part 121 integrally formed of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material is excellent in the heat-insulating property when used for a sash, its integral forming is easy, it is excellent in the durability and it is available at a low cost.

[0164] In the multiple glazing sash of the embodiment 2 of the present invention, the two glass plates on both sides, and one or more intermediate plates between the two glass plates, are spaced apart at their peripheral part by the above frame body, and two or more layers of space portions are provided between the two glass plates.

[0165] The space portions formed by the two glass plates and at least one intermediate plate disposed to be spaced apart at their peripheral part by the frame body, are called air spaces in the description of the embodiment 2 of the present invention, and in the air spaces, a gas such as dry air or an inert gas is filled to increase the heat insulating property and/or sound insulation property, and a dew condensation preventing function is imparted to the multiple glazing sash by a drying agent contained in a space part of the spacer part. Such air spaces may sometimes be called an air layer or a gas layer.

[0166] In the frame body 113 shown in Figs. 22 and 23, a groove part 122 which is a groove-form concave part is provided in a middle part on an inner surface part 114 of the spacer part 118 so that one intermediate plate 112 can be disposed. The position of the middle part on the inner surface part to which the groove part 122 is to be formed may properly be selected depending upon the position to which one intermediate plate 112 is to be disposed. Further, on both sides on an inner surface of the groove part 122, lip parts 123, 123 made of an elastic material are provided so as to support an edge part of the intermediate plate to be disposed to the groove part 122, and at the bottom of the groove part 122, a base part 129 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate to be disposed to the groove part 122 and to secure positioning. In the example shown in the drawings, the lip parts 123 and 123 are provided at different levels so that the intermediate plate 112 to be disposed to the middle part will easily be inserted, however, they may be provided at the same level. Further, in this example, the space part 117 in which a drying agent is contained of the spacer part 118 is divided into two halves by the groove part 122. Here, the space parts 117, 117 may be communicated with each other at the lower part of the spacer part 118, not form two compartments as shown in Figs. 22 and 23.

[0167] In the example shown in Figs. 22 and 23, the intermediate plate 112 disposed to the groove part 122 is sandwiched between and supported by the lip parts 123 and 123, however, as shown in Fig. 24(a), a glazing channel 131 may be disposed in the groove part 122 to support the edge part of the intermediate plate 112 in the groove part 122, or as shown in Fig. 24(b), the edge part of the intermediate plate 112 may be supported in the groove part 122 by sealing materials 132, 132 and backup materials 133, 133 or by sealing materials 132, 132 disposed in the groove part 122.

[0168] The shape of the groove part 122 provided so that one intermediate plate 112 can be disposed in the middle part on the inner surface part 114 of the spacer part 118, that is, the shape of an intermediate plate-holding part provided to the frame body may be a shape by which compartmentalized air spaces are formed by holding an edge part of an intermediate plate, and for example, a groove part or a fitting part into which the edge part of the intermediate plate is inserted, or a gripping part or a locking part into which the edge part of the intermediate plate is locked, or a combination thereof, may be mentioned as a typical example. Further, a plurality of intermediate plate-holding parts may have the same structure or may have different structures. Needless to say, the intermediate plate-holding part is not limited to such specific structures, and may have another structure having a function to hold the peripheral edge part of the intermediate plate.

[0169] For example, as the shape of the groove part 122 i.e. the shape of the intermediate plate-holding part, as shown in Fig. 30(a), the intermediate plate-holding part may have a groove part 155 into which the peripheral edge part of the intermediate plate 112 is inserted or fitted to hold the intermediate plate 112, on the air space side A of the multiple glazing sash of the frame member 113 (i.e. on the inner surface part 114 of the spacer part); as shown in Fig. 30(b), it may have lip parts 156, 156 made of an elastic material sandwiching the peripheral part of the intermediate plate 112 formed on both sides of the groove part 155; as shown in Fig. 30(c), it may have a locking part 157 (for example, a locking lip part) for locking or gripping the edge part of the intermediate plate 112 to hold the intermediate plate 112, formed on the air space side A of the multiple glazing sash of the frame member 113; or as shown in Fig. 30(d), it may have a notch part 158 for insertion of the edge part of the intermediate plate formed in a cushioning or elastic member 159, on the air space side A of the multiple glazing sash of the frame body 113, so that the edge part of the intermediate plate 112 is inserted and locked into the notch part thereby to hold the intermediate plate 112.

[0170] To the groove part or fitting part, a base member or a backup material for holding a peripheral edge part of the intermediate plate may be disposed, a sealing material may be disposed, or a glazing channel for supporting an edge part of the intermediate plate may be disposed.

[0171] In the example shown in Figs. 22 and 23, one groove part 122 is provided so that one intermediate plate can be disposed in the middle part of the inner surface part 114 of the spacer part 118, however, two groove parts 122 may be provided in rows so that two intermediate plates can be disposed. Otherwise, three or more groove parts 122 may be provided in rows so that three or more intermediate plates can be disposed. The above groove part 122 is preferably provided extending in the longitudinal direction of the spacer part so that one or more intermediate plates can be disposed between the first glass plate 110 and the second glass plate 111 in parallel with such glass plates.

[0172] Fig. 25(a) illustrates an example of a quadruple type multiple glazing sash (a multiple glazing sash having three air spaces 125, 125 and 125) having totally four plates of two glass plates and two intermediate plates, having two groove parts 122 and 122 in rows provided in a middle part of an inner surface part of the spacer part 118 and two intermediate plates 112a and 112b disposed, and Fig. 25(b) illustrates an example of a quintuple type multiple glazing sash (a multiple glazing sash having four air spaces 125, 125, 125 and 125) having totally five plates of two glass plates and three intermediate plates having three groove parts 122, 122 and 122 provided in rows in a middle part of an inner surface part 114 of the spacer part 118 and three intermediate plates 112a, 112b and 112c disposed.

[0173] A projecting leg 119 of a projecting leg part 121 of the frame body 113 of the embodiment 2 of the present invention is provided for interior decoration to a peripheral edge part of a first glass plate 110 and a second glass plate 111 spaced apart. Further, bent projecting legs 120, 120 are bent from terminal parts on the opposite side of the projecting legs 119, 119 from side parts 116, 116 of the spacer part 118 to the glass plates 110 and 111 side, extend toward the lateral direction, and protect and support edge face parts of the glass plates, and further as the case requires, prevent dropping of the glass plates, and the lengths of tips of the bent portions of the bent projecting legs 52 and 52 are about the thicknesses of the glass plates or lengths such that the bent projecting legs slightly protrude outside the glass plates. As described above, in a preferred embodiment of the embodiment 1 of the present invention, since the projecting leg 119 of the projecting leg part 121 and the side parts 116, 116 of the spacer part 118 integrally formed of the frame body 113 form a continuous face, the projecting leg of the projecting leg part and the side part of the spacer part may be a design face at a peripheral part of the multiple glazing sash, by considering the color tone, the plane conditions, etc. of the projecting leg 119 of the projecting leg part 121 and the side parts 116, 116 of the spacer part 118 of the frame body 113.

[0174] It is preferred to provide a thin plate part 135 on the inner surface part 114 of the spacer part 118 as shown in Figs. 22 and 23. This thin plate part 135 is formed so that an air hole to allow air permeation between the space part 117 and the air space 125 is easily formed, and by the air hole formed, the dry state of the air space is maintained by a drying agent, and dew condensation can be prevented.

[0175] In Figs. 22 and 23, the structure of the frame body of the multiple glazing sash is specifically described with reference to the lower side frame body 113 (105) as an example, however, the structures of the upper side frame body 103 and the side frame bodies 104 may be basically the same as the structure of the lower side frame body 105.

[0176] The shape and the thickness of the first glass plate 110 and the second glass plate 111 are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash, and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, the thicknesses are within a range of from 0.7 mm to 10 mm, and it is preferred that the sizes of the first and second glass plates 110 and 111 are the same or substantially the same. The first and second glass plates may be different in the thickness or the type. Further, as the type of the glass plate, a float glass plate, a common glass plate, a heat-absorbing glass plate, an ultraviolet-absorbing glass plate, a heat reflecting glass plate, a low-emissivity glass plate (a low-E glass plate), a figured glass, a laminated glass, a wire or wire mesh glass plate, an air-cooled tempered glass plate, a chemically tempered glass plate, or a glass plate having func-

tions of such glass plates combined may, for example, be properly used depending upon the aimed specifications required.

[0177] Whereas, the intermediate plate 112 preferably has a rectangular shape which is similar to and smaller than the glass plates 110 and 111 so that it can be inserted to the groove part 122 of the inner surface part 114 of the frame body 113. In a case where the first and second glass plates 110 and 111 are rectangular, the first and second glass plates 110 and 111 are preferably spaced apart at their peripheral four edge sides by the frame body 113 to constitute a multiple glazing sash. Use of frame bodies having the same shape for four sides of the multiple glazing sash is preferred, whereby the number of members in assembling of the multiple glazing sash can be reduced, and the outer appearances and the designs of the peripheral parts of the multiple glazing sash can be coordinated. In a case where the multiple glazing sash is prepared by using the above frame bodies, a drying agent may be contained in the space part 117 of the spacer part 118 of the frame body 113, in a required side or in a necessary portion.

[0178] In the multiple glazing sash according to the embodiment 2 of the present invention, the side part 116 of the spacer part 118 and the projecting leg 119 of the projecting leg part 121 of the frame body 113 are bonded to the glass plate 110 or 111 at a portion where they face the first or second glass plate 110 or 111, by an adhesive layer 130, and sealed so that airtightness of an air space formed between the first and second glass plates 110 and 111 is maintained.

[0179] Fig. 23 is a partial abbreviated cross-sectional view illustrating a state where one intermediate plate is disposed using the frame body in Fig. 22. The reference symbols for the respective members are the same as in Fig. 22. As shown in Figs. 22 and 23, the side part 116 of the spacer part 118 and the projecting leg 119 of the projecting leg part 121 of the frame body 113 are connected to each other and form a continuous face. Excluding concave parts 126 and 127 as described hereinafter, in the plane direction in parallel with the plane of the glass plates 110 and 111 facing each other, the side part 116 of the spacer part 118 and the projecting leg 119 of the projecting leg part 121 of the frame body form a substantially flat plane.

[0180] As the structure of a portion where the frame body 113 having the side part 116 of the spacer part 118 and the projecting leg 119 of the projecting leg part 121 connected to each other faces the glass plate 110 or 111, as shown in Fig. 26, a concave part 134 may be formed on the surface of the side part 116 of the spacer part 118 and/or the projecting leg 119 of the projecting leg part 121 of the frame body 113 facing the glass plate 110 or 111. When such a concave part 134 is formed, the adhesive layer 130 may be thicker in the region of the concave part 134, thus increasing the adhesion property and the sealing property.

[0181] Further, as shown in Fig. 23, the projecting leg part 121 of the frame body 113 has a substantially bilaterally symmetrical structure relative to the center line B-B in the longitudinal cross section in the multiple glazing sash thickness direction, has a pair of projecting legs 119 and 119 and bent projecting legs 120 and 120 on both sides, and has a groove part 124 formed between the pair of projecting legs 119 and 119 on both sides, and the shape of the longitudinal cross section of the projecting leg part 121 in the frame body length direction is a substantially U-shape. To the groove part 124, a sash roller, a sash roller-bearing member, a latch member or another sash functional member may be provided. Such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash. Here, the heights of the projecting legs 119 and 119 of the projecting leg part 121 are preferably the same or substantially the same.

[0182] Further, the structure of the projecting leg part 121 of the frame body 113 may be, as shown in Fig. 27, such that an edge portion of the projecting leg 119 (that is, a portion opposite from the outer side part 115 of the spacer part 118) is bent toward the inner side direction of the groove part 124 and extends toward the tip direction of the glass plate 110 or 111. By such a structure of the projecting leg 119 having a bent tip part 136, a concave part 137 is formed at a peripheral edge part of the glass plate 110 or 111, and accordingly by filling the concave part 137 with a sealing medium having a low water permeability and an excellent adhesion property, the adhesion property and the sealing property of the multiple glazing sash can be further increased. Otherwise, a bent tip part is not provided to the tip part of the projecting leg 119 of the projecting leg part 121, and the tip of the projecting leg 119 may be linear. Such a shape is an example in which no bent projecting leg 120 is formed on the tip of the projecting leg 119 of the projecting leg part 121 in the frame body shown in Figs. 21 to 26.

[0183] Further, the heights of the side parts 116, 116 on both sides of the spacer part 118 of the frame body (that is, substantially corresponding to the thickness of the spacer part) are also preferably the same or substantially the same.

[0184] The heights of the side parts 116, 116 of the spacer part 118 of the frame body 113 are selected considering the adhesion strength between the glass plate 110 or 111 and the side part 116, 116 of the spacer part 118 by an adhesive, the moisture-proof property and the design property, and the heights of the projecting legs 119 of the projecting leg part 121 are also selected so that the above sash functional member can be contained and shielded, and considering the adhesion strength between the glass plate 110 or 111 and the projecting leg 119 of the projecting leg part 121 by an adhesive, the moisture-proof property and the design property. Specifically, the height of the side part 116 of the spacer part 118 of the frame body is preferably within a range of from 5 mm to 15 mm, and the height of the projecting leg 119 of the projecting leg part 121 is preferably within a range

of from 15 mm to 50 mm.

[0185] On a part of a plane on the glass plate side of the side part 116, 116 of the spacer part 118 of the frame body, as shown in Fig. 23, a concave part 126 is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 110 or 111 and the side part 116 of the spacer part 118 will not protrude to the air space 125 side of the side part 116 and that a predetermined thickness of the adhesive layer 130 can be secured. Further, also on a part of a plane on the glass plate side of the projecting leg 119 of the projecting leg part 121, a concave part 127 is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 102 and the projecting leg 119 of the projecting leg part 121 will not protrude outside the projecting leg 119 (that is, the edge face side of the glass plate 110 or 111) and that a predetermined thickness of the adhesive layer 130 can be secured.

[0186] As shown in Fig. 23, an edge part protecting cover 140 may be disposed to the groove part 124 formed between the pair of projecting legs 119 and 119 on both sides of the projecting leg part 121. The edge part protecting cover 140 may have any structure so long as the groove part 124 can be clogged at the edge face of the multiple glazing sash. Further, the edge part protecting cover 140 may have a structural part to support the edge faces of the glass plates 110 and 111.

[0187] The edge part protecting cover 140 shown in the drawing has a bottom part 141 to clog the bottom of the groove part 124 in the longitudinal direction of the edge face of the multiple glazing sash, guide rib parts 142, 142 the tip of which is bent in a L-shape, provided so that they can be attached to guide convex strips 128, 128 provided on the lower side on the groove part 124 side of the projecting legs 119 and 119, as sliding from the lateral direction, and bent parts 143, 143 in contact with outside edge face parts of the glass plates 110 and 111. The example shown in the drawing illustrates an edge part protecting cover of a slide attaching type, but the edge part protecting cover is not limited thereto, and an edge part protecting cover of a structure such that it can be attached by a fitting method from bottom in Fig. 23 to the groove part 24, or of a structure such that it can be attached by another attaching method, may be used.

[0188] On the lower side of the multiple glazing sash, in the case of a sliding door, usually a sash roller for a sash is attached, and thus an edge face protecting cover may be provided on a portion excluding the sash roller. Further, on the upper side and on the sides of the multiple glazing sash, an edge part protecting cover 140 is preferably provided. Even when frame bodies having the same shape as above are used for four sides of a multiple glazing sash in which the glass plates are rectangular, by disposing an edge part protecting cover 140 to a groove part of each of frame bodies on the upper side and on the sides, the groove part 124 can be clogged, and such a multiple glazing sash can be practically used, and such is effective to reduce the number of members in assembling of the multiple glazing sash.

[0189] In a case where the edge part protecting cover 140 is disposed to the groove part 124 on the upper side, the left side or the right side of the multiple glazing sash, the structure of the edge part protecting cover 140 may be changed depending upon the function required in the upper side, the left side or the right side.

[0190] In a case where the multiple glazing sash is used for a swing window, since a roller sash is not necessary, the structure change of the edge face protecting cover on the left side, the right side and the upper side in conformity with the sash roller is unnecessary, and the covers for the lower side, the upper side, the left side and the right side may have the same structure.

[0191] As shown in Fig. 28, in a groove part 124a of a frame body 105 on the lower side of each of multiple glazing sashes 101 a and 101b of the present invention, applied to a sliding window, a sash roller 144 is rotatably attached via a sash roller-attaching member 145, and each of the multiple glazing sashes 101 a and 101b is constituted so that it can move along a moving rail 147 provided on the lower side of a window frame 146. Here, an edge part protecting cover 140a is disposed between a lower edge part 148 on both sides of the sash roller-attaching member 145 and a lower edge of a projecting leg 119, and a fin part 149 in contact with the moving rail 147 is provided on the moving rail 147 side of the edge part protecting cover 140.

[0192] In Fig. 28, as the sash roller-attaching members 145 for the multiple glazing sashes 101 a and 101 b on both sides, members having different structures are exemplified.

[0193] Further, to a groove part 124b of an upper side frame body 103 of each multiple glazing sash, a moving rail 150 provided on an upper side of a window frame 146 is fitted, and an edge part protecting cover 140b having a concave part 152 having fin parts 151, 151 is attached so that each of the multiple glazing sashes 101 a and 101 b can move as guided along the moving rail 150.

[0194] Fig. 29 is a view illustrating a meeting portion of the multiple glazing sash applied to the sliding window shown in Fig. 28. To an edge part protecting cover 140c attached to a groove part 124c of a side frame body 4 of the multiple glazing sash, a meeting part airtight material 153 which contacts with a meeting part airtight material of the other multiple glazing sash at a meeting portion of the multiple glazing sashes 101 a and 101b, is provided, and a jamb airtight material 154 is provided to a portion where the side edge part of the multiple glazing sash 101 a or 101 b meets a window frame 146. In Fig. 29, the same members as in Fig. 28 are represented by the same symbols.

[0195] In the multiple glazing sash, the intermediate plate 112 disposed between the first and second glass plates 110 and 111 to be spaced apart from the glass plates 110 and 111 in parallel with the glass plates 110 and 111, is to reduce the convection of the gas in a space

between the first and second glass plates 110 and 111 thereby to increase the heat insulating property, and to increase the sound insulation performance. And, since 110 the intermediate plate 112 is disposed between the first and second glass plates 110 and 111 and is not exposed to the outside, its strength may be low as compared with the first and second glass plates, and a thin material may be used. Therefore, even a triple or more multiple glazing sash can have a small entire thickness. Such an intermediate plate 112 may, for example, be a glass plate, a plastic plate or a plastic film. The intermediate plate 112 may be a transparent plate, may be a colored plate, may be a plate with a pattern, or a combination thereof. The intermediate plate is properly selected depending upon the location where the sash is used, the region, the design property, etc. As a glass plate used as the intermediate plate, since it is disposed between the first and second glass plates 110 and 111, a glass plate having a thickness of at most 2 mm is preferred, whereby the entire thickness can be made thin. A glass plate having such a thickness is preferred, since it has high transparency and durability and high rigidity, whereby a disposition operation of inserting the intermediate plate to the groove part 122 of the spacer part 118 of the frame body is easily carried out.

[0196] Particularly, as the intermediate plate 112, a chemically tempered glass plate having sufficient strength even when it is made thin can be preferably used. A chemically tempered glass plate is a glass plate produced by a chemical tempering technique of dipping a glass plate containing a Na component and a Li component such as soda lime silicate glass in a molten salt of e.g. potassium nitrate to replace Na ions and/or Li ions having a small atomic size present on the surface of the glass plate with K ions having a large atomic size present in the molten salt to form a compression stress layer on the surface layer of the glass plate thereby to increase the strength, and has a sufficiently high breaking strength even when the thickness is at most 2 mm. Accordingly, by use of a chemically tempered glass plate as the intermediate plate 112, at the time of preparation of the multiple glazing sash, breakage of the intermediate plate can be prevented, such being particularly favorable.

[0197] The thicknesses of the respective parts of the frame body used for the multiple glazing sash according to the embodiment 2 of the present invention, the distance between the first glass plate and the intermediate plate, the distance between the second glass plate and the intermediate plate, and the like are determined considering the moisture-proof property, a variation in the internal pressure of the air space of the multiple glazing sash, and the strength, durability, sound insulation property, heat insulating property, etc. of the multiple glazing sash, and in a case where the frame body is integrally formed of a synthetic resin material such as a rigid vinyl chloride resin or an acrylonitrile/styrene resin and in a case where the multiple glazing sash has a structure and a shape as shown in Figs. 22 and 23, they are preferably as follows. Further, the distance between the first glass plate 110 and the intermediate plate 112 and the distance between the second glass plate 111 and the intermediate plate 112 may be the same on both sides or may be different.

- ·The height of the side part 116 of the spacer part 118 of the frame body: 5 mm to 15 mm.
- ·The thickness of the side part 116 of the spacer part 118 of the frame body: 0.7 mm to 3.0 mm.
- ·The thickness of the inner surface part 114 and the outer side part 115 of the spacer part 118 of the frame body: 0.7 mm to 3.0 mm.
- ·The width of the inner surface part 114 and the outer side part 115 of the spacer part 118 of the frame body: 4 mm to 50 mm.
- ·The height of the projecting leg 119 of the projecting leg part 121 of the frame body: 15 mm to 50 mm.
- ·The thickness of the projecting leg 119 and the bent projecting leg of the projecting leg part 121 of the frame body: 0.7 mm to 3.0 mm.
- ·The distance between the first glass plate and the second glass plate (that is, the width of the spacer part): 10 mm to 50 mm.
- ·The distance between the first glass plate 110 and the intermediate plate 112: 4 mm to 25 mm.
- ·The distance between the second glass plate 111 and the intermediate plate 112: 4 mm to 25 mm.

[0198] As the adhesive to be used to bond the glass plate 110, 111 and the side part 116, 116 of the spacer part 118 to be used for the multiple glazing sash according to the embodiment 2 of the present invention, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate 110, 111 and the side part 116, 116 of the spacer part, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 110, 111 and the spacer part 118. For example, in a case where the side parts 116 and 116 of the spacer part 118 of the frame body are made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. Also as the adhesive to be used to bond the glass plate 110, 111 and the projecting leg 119, 119 of the projecting leg part 121, in the same manner as above, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate 110, 111 and the projecting leg 119, 119 of the projecting leg part 121, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 110, 111 and the projecting leg 119, 119. For example, in a case where the projecting legs 119, 119 of the projecting leg part 121 are made of a rigid vinyl chloride resin material

or an acrylonitrile/styrene resin material, in the same manner as above, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape.

[0199] The adhesive to be used to bond the glass plate 110, 111 and the side part 116 of the spacer part 118, and the adhesive to be used to bond the glass plate 110, 111 and the projecting leg 119 of the projecting leg part 121, are preferably the same, whereby the number of the bonding steps in the above assembling steps is reduced, however, depending upon the performance required for the multiple glazing sash, different adhesives may be used to function differently depending upon the performance required for the respective adhesive layers. Further, the adhesive to be used may be a transparent adhesive, or may be a black or another properly colored adhesive. By using a transparent adhesive, the projecting leg of the projecting leg part and the side part of the spacer part of the frame body may form a design face of the multiple glazing sash at the peripheral part of the glass plate. Further, by using a black or another properly colored adhesive, the resulting adhesive layer may form a design face of the multiple glazing sash.

[Description of embodiment 3]

[0200] Now, the multiple glazing sash and the frame body for a multiple glazing sash according to the embodiment 3 of the present invention will be described in detail with reference to Figs. 31 to 41. The multiple glazing sash and the frame body for a multiple glazing sash having the constitutions of Figs. 31 to 41 are based upon Japanese Patent Application No. 2014-018548 (which is based upon and claims the benefit of priority from Japanese Patent Application No. 2013-069833) which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 3.

<Multiple glazing sash and frame body for multiple glazing sash>

[0201] Fig. 31 is a front view illustrating the multiple glazing sash according to the embodiment 3 of the present invention, Fig. 32 is a partial cross sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 3 of the present invention, and Fig. 33 is a longitudinal sectional view illustrating a scheme of the part of the circle A in Fig. 32.

[0202] In Fig. 31, the reference symbol 201 represents a multiple glazing sash, 202 a glass plate, 203 an upper side frame body of the multiple glazing sash, 204 a side frame body of the multiple glazing sash, 205 a lower side frame body of the multiple glazing sash (in this specification, hereinafter the upper side frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to simply as a frame body 205).

[0203] Fig. 33 illustrates an example of the structure of a frame body to be used for a double type multiple glazing sash (a type having two glass plates) having two glass plates spaced apart. As shown in this drawing, the lower side frame body 205 comprises a spacer part 210 having an inner surface part 206 and an outer side part 207 keeping a space between the two glass plates (a first glass plate and a second glass plate) 202, 202, side parts 208, 208 connected to the inner surface part 206 and the outer side part 207 and facing the inner side of the glass plates 202, 202, and a spacer part 209 in which a drying agent can be contained, and a projecting leg part 213 having projecting legs 211 facing the inner side of a peripheral edge part of the two glass plates 202, 202, and bent projecting legs 212 facing an edge face part of the glass plats 202, 202, and the spacer part 210 and the projecting leg part 213 of the frame body 205 are integrally formed of a frame body-forming material. In the present invention, "integrally formed" means that a frame body-forming material is formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method.

[0204] The frame body-forming material is preferably a synthetic resin material or an aluminum material. The synthetic resin material for forming a frame body may, for example, be preferably a thermoplastic synthetic resin material such as a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material or such a resin material containing a glass fiber material, however, needless to say, the material is not limited to such a thermoplastic synthetic resin material, and various thermoplastic synthetic resin materials may be used.

[0205] Further, the frame body-forming material is not limited to one type, and a plural types of materials may be used to form a composite structure. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different synthetic resin materials, or may be a frame body having a composite structure made of the above synthetic resin material and aluminum material. In the case of such a composite structure frame body, the frame body may be obtained by integrally forming any one type of frame member-forming materials. A different synthetic resin material and/or metal material may be partially or entirely bonded to the integrally formed frame body. Particularly, a frame body comprising the spacer part 210 and the projecting leg part 213 integrally formed of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material is excellent in the heat insulating property when used for a sash, its integral forming is easy, it is excellent in the durability and it is available at a low cost.

[0206] In the multiple glazing sash according to the embodiment 3 of the present invention, the two glass plates 202 and 202 are spaced apart at their peripheral part by the frame body 205, and a space portion sealed between

the two glass plates 202 and 202 is provided. The space portion is called an air space 225 in this specification, and in the air space 225, a gas such as dry air or an inert gas is filled to increase the heat insulating property and/or sound insulation property. Further, in a case where a drying agent is contained in the space part 209 of the spacer part 210, a dew condensation preventing function is imparted to the multiple glazing sash 201 by the drying agent. Such an air space 225 may sometimes be called an air layer or a gas layer.

[0207] The projecting leg 211 of the projecting leg part 213 of the frame body 205 of the embodiment 3 of the present invention is located outside the spacer part 210 opposite to the air space 225 and is provided for interior decoration to a peripheral edge part of the two glass plates 202 and 202 spaced apart. Further, the bent projecting legs 212 are bent from the terminal parts on the opposite side of the projecting legs 211 from the side parts 208 of the spacer part 210 to the glass plate 202 side, extend toward the lateral direction, and protect and support edge face parts of the glass plates, and further as the case requires, prevent dropping of the glass plates 202, 202. The lengths of tips of the bent portions of the bent projecting legs 212 are preferably about the same as the thicknesses of the glass plates 202, 202 or lengths such that the bent projecting legs slightly protrude outside the glass plates 202, 202. As described above, in a preferred embodiment of the embodiment 3 of the present invention, since the projecting leg 211 of the projecting leg part 213 and the side part 208 of the spacer part 210 integrally formed of the frame body 205 form a continuous face, the projecting leg 211 of the projecting leg part 213 and the side part 208 of the spacer part 210 may be a design face at a peripheral part of the multiple glazing sash 201, by considering the color tone, the plane conditions, etc. of the projecting leg 211 of the projecting leg part 213 and the side part 208 of the spacer part 210 of the frame body 205, on the glass plate side.

[0208] In a case where a drying agent is contained in the space part 209 of the spacer part 210, air holes are provided to an inner surface part 206 of the spacer part 210. A plurality of air holes are provided along the longitudinal direction of the frame body 205 to be communicated with the space part 209. By a drying agent being contained in the space part 209 and by communicating the space part 209 and the air space 225 via the air holes, a dry state of the air space 225 can be maintained, and dew condensation can be prevented. The air holes are formed after the frame body is formed. On the inner surface part 206 of the spacer part 210, as shown in Fig. 33, a thin plate part 216 is preferably formed so that the air holes are easily formed.

[0209] In Fig. 33, the structure of the frame body of the multiple glazing sash is specifically described with reference to the lower side frame body 205 as an example, however, the structures of the upper side frame body 203 and the side frame bodies 204 are basically the same as the structure of the lower side frame body 205.

[0210] The shape and the thickness (plate thickness) of the two glass plates 202, 202 are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash. When the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, and the thicknesses are within a range of from 0.7 mm to 10 mm. In a case where the two glass plates are rectangular flat plates, their dimensions (the height and width) are preferably the same or substantially the same.

[0211] Further, as the two glass plates, usually a float glass plate, a common glass plate, a heat-absorbing glass plate, an ultraviolet-absorbing glass plate, a heat reflecting glass plate, a low-emissivity glass plate (a Low-E glass plate) having a low-emissivity film, a figured glass, a laminated glass, a wire or wire mesh glass plate, or an air-cooled tempered glass plate, which are commonly used for buildings, or a so-called chemically tempered glass plate obtained by subjecting a glass plate to ion exchange tempering treatment, or a glass plate having functions of such glass plates combined, may, for example, be properly selected depending upon the aimed specifications required. Particularly, a chemically tempered glass plate, which has compression stress imparted to its surface by chemical tempering, and which has increased strength, can be made thinner (for example, at a level of from 0.7 to 2 mm) than a float glass plate or a common glass plate (for example, from 3 to 6 mm), whereby weight saving and reduction in thickness of the multiple glazing sash can be achieved.

[0212] Further, the two glass plates may be different in the plate thickness or may be different in the type.

[0213] In a case where the two glass plates are rectangular flat glass plates, the glass plates are preferably spaced apart at their peripheral four edge sides by the frame body (that is, the upper side, left side, right side and lower side frame bodies) to constitute the multiple glazing sash. At four corners where the upper side, left side, right side and lower side frame bodies are butted, a corner block is inserted to connect the respective frame bodies. Use of frame bodies having the same shape for four sides of the multiple glazing sash is preferred, whereby the number of members in assembling of the multiple glazing sash can be reduced, and the outer appearances and the designs of the peripheral parts of the multiple glazing sash can be coordinated.

[0214] In the multiple glazing sash according to the embodiment 3 of the present invention, the side part 208 of the spacer part 210 and the projecting leg 211 of the projecting leg part 213 of the frame body 205 are bonded to the glass plate 202 at a portion where they face the glass plate 202, by an adhesive layer 214, and sealed so that airtightness of an air space 225 formed between a plurality of glass plates is maintained.

[0215] Fig. 34 illustrates the structure of the frame body for a multiple glazing sash in Fig. 33 in further detail. The reference symbols for the respective members are the

same as in Fig. 33. As shown in Figs. 33 and 34, the side part 208 of the spacer part 210 and the projecting leg 211 of the projecting leg part 213 of the frame body 205 are connected to each other and form a continuous face. Excluding concave parts 221 and 222 as described hereinafter, in the plane direction in parallel with the plane of the glass plates facing each other, the side part 208 of the spacer part 210 and the projecting leg 211 of the projecting leg part 213 of the frame body form a substantially flat plane.

[0216] As the structure of a portion where the frame body 205 having the side part 208 of the spacer part 210 and the projecting leg 211 of the projecting leg part 213 connected to each other faces the glass plate 202, 202, as shown in Fig. 35, a concave part 215 may be formed on the surface of the side part 208 of the spacer part 210 and/or the projecting leg 211 of the projecting leg part 213 of the frame body 205 facing the glass plate 202, 202. When such a concave part 215 is formed, the adhesive layer 214 may be thicker in the region of the concave part 215, thus increasing the adhesion property and the sealing property.

[0217] Further, the structure of the projecting leg part 213 of the frame body 205 may be, as shown in Fig. 36, such that an edge portion of the projecting leg 211 (that is, a portion opposite from the outer side part 207 of the spacer part 210) is bent toward the inner side direction of the groove part 220 and extends toward the tip direction of the glass plate 202, 202. By such a structure of the projecting leg 211 having a bent tip part 245, a concave part 217 is formed on a peripheral edge part of the glass plate 202, 202, and accordingly by filling the concave part 217 with an adhesive having a low water permeability and an excellent adhesion property, the adhesion property and the sealing property of the multiple glazing sash can be further increased. Otherwise, a bent tip part 245 may not be provided to the tip part of the projecting leg 211 of the projecting leg part 213, and the tip of the projecting leg 211 may be linear. Such a shape is an example in which no bent projecting leg 120 is formed on the tip of the projecting leg 211 of the projecting leg part 213 in the frame body shown in Figs. 32 to 36.

[0218] Further, as shown in Fig. 34, the frame body 205 has a substantially bilaterally symmetrical structure relative to the center line B-B in the longitudinal cross section in the multiple glazing sash thickness direction, has a pair of side parts 208 of the spacer part 210 on both sides and has projecting legs 211 and bent projecting legs 212 of the projecting leg part 213 on both sides, and has a groove part 220 formed between the pair of projecting legs 211 on both sides, and the shape of the longitudinal cross section of the projecting leg part 213 in the frame body height direction is a substantially U-shape. To the groove part 220 of the projecting leg part 213, a sash roller, a sash roller-bearing member, a latch member or another sash functional member may be provided. Such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash by the frame body 205. Here, the heights of the side parts 208, 208 (substantially corresponding to the thickness of the spacer part) on both sides of the spacer part 210 of the frame body are preferably the same or substantially the same.

[0219] Further, the heights of the projecting legs 211, 211 on both sides of the projecting leg part 213 are also preferably the same or substantially the same. The height of the side part 208 of the spacer part 210 of the frame body 205 is selected considering the adhesion strength between the glass plate 202 and the side part 208 of the spacer part 210 by an adhesive, the moisture-proof property and the design property, and the height of the projecting leg 211 of the projecting leg part 213 is also selected so that the above sash functional member can be shielded, and considering the adhesion strength between the glass plate 202 and the projecting leg 211 of the projecting leg part 213 by an adhesive, the moisture-proof property and the design property. Specifically, the height of the side part 208 of the spacer part 210 of the frame body is preferably within a range of from 5 mm to 15 mm, and the height of the projecting leg 211 of the projecting leg part 213 is preferably within a range of from 15 mm to 50 mm.

[0220] On a part of a plane on the glass plate 202 side of the side part 208 of the spacer part 210 of the frame body 205, a concave part 221 having a predetermined width is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 202 and the side part 208 of the spacer part 210 will not protrude to the air space 225 side of the side part 208 and that a predetermined thickness of the adhesive layer can be secured at the time of production of the multiple glazing sash. Further, also on a part of a plane on the glass plate 202 side of the projecting leg 211 of the projecting leg part 213, a concave part 222 having a predetermined width is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 202 and the projecting leg 211 of the projecting leg part 213 will not protrude outside the projecting leg 211 (that is, the edge face side of the glass plate 202) and that a predetermined thickness of the adhesive layer 214 can be secured at the time of production of the multiple glazing sash.

[0221] As shown in Fig. 34, an edge part protecting cover 230 may be disposed to the groove part 220 formed between the pair of projecting legs 211 on both sides of the projecting leg part 213. The edge part protecting cover 230 may have any structure so long as the groove part 220 can be clogged at the edge face of the multiple glazing sash. Further, the edge part protecting cover 230 may have a structural part to support the edge faces of the glass plates 202, 202.

[0222] The edge part protecting cover 230 shown in the drawing has a bottom part 231 to clog the bottom of the groove part 220 in the longitudinal direction of the edge face of the multiple glazing sash, guide rib parts 232, 232 the tip of which is bent in a L-shape, provided

so that they can be attached to guide convex strips 224, 224 provided on the lower side on the groove part 220 side of the projecting legs 211, 211, as sliding from the lateral direction, and bent parts 233 facing outside edge face parts of the glass plates 202, 202. The example shown in the drawing illustrates an edge part protecting cover of a slide attaching type, but the edge part protecting cover is not limited thereto, and an edge part protecting cover of a structure such that it can be attached by a fitting method from bottom in Fig. 34 to the groove part 220, or of a structure such that it can be attached by another attaching method, may be used.

[0223] On the lower side of the multiple glazing sash, in the case of a sliding door, usually a sash roller for a sash is attached, and thus an edge part protecting cover 230 may be provided on a portion excluding the sash roller. Further, on the upper side and on the sides of the multiple glazing sash, an edge part protecting cover 230 is preferably provided. Even when frame bodies having the same shape as above are used for four sides of a multiple glazing sash in which the glass plates are rectangular, by disposing an edge part protecting cover 230 to a groove part of each of frame bodies on the upper side and on the sides, the groove part 220 can be clogged, and such a multiple glazing sash can be practically used, and such is effective to reduce the number of members in assembling of the multiple glazing sash.

[0224] In a case where the edge part protecting cover 230 is disposed to the groove part 220 on the upper side, the left side or the right side of the multiple glazing sash, the structure of the edge part protecting cover 230 may be changed depending upon the function required in the upper side, the left side or the right side.

[0225] In a case where the multiple glazing sash is used for a swing window, since a roller sash is not necessary, the structure change of the edge part protecting cover on the left side, the right side and the upper side in conformity with the sash roller is unnecessary, and the covers for the lower side, the upper side, the left side and the right side may have the same structure.

<Example of application to sliding window>

[0226] Fig. 37 is a schematic longitudinal sectional view illustrating a sliding window employing the multiple glazing sash having an upper side frame body and a lower side frame body of the embodiment 3 of the present invention.

[0227] As shown in Fig. 37, in a groove part 220a of a frame body 205 on the lower side of each of multiple glazing sashes 201 a and 201 b of the present invention, applied to a sliding window, a sash roller 234 is rotatably attached via a sash roller-attaching member 235, and each of the multiple glazing sashes 201 a and 201 b is constituted so that it can move along a moving rail 237 provided on the lower side of a window frame 236. Here, an edge part protecting cover 230a is disposed between a lower edge part 238 on both sides of the sash roller-attaching member 235 and a lower edge of a projecting leg 211, and a fin part 239 in contact with the moving rail 237 is provided on the moving rail 237 side of the edge part protecting cover 230a.

[0228] In Fig. 37, as the sash roller-attaching members 235 for the multiple glazing sashes 201 a and 201 b on both sides, members having different structures are exemplified.

[0229] Further, to a groove part 220b of an upper side frame body 203 of each multiple glazing sash, a moving rail 240 provided on an upper side of a window frame 236 is fitted, and an edge part protecting cover 230b having a concave part 242 having fin parts 241, 241 is attached so that the multiple glazing sash 201 a or 201 b can move as guided along the moving rail 240.

[0230] Fig. 38 is a view illustrating a meeting portion of the multiple glazing sash applied to the sliding window shown in Fig. 37. To an edge part protecting cover 230c attached to a groove part 220c of a side frame body 204 of the multiple glazing sash, a meeting part airtight material 243 which contacts with a meeting part airtight material of the other multiple glazing sash at a meeting portion of the multiple glazing sashes 201 a and 201 b, is provided, and a jamb airtight material 244 is provided to a portion where the side edge part of the multiple glazing sash 201 a or 201 b meets a window frame 236. In Fig. 38, the same members as in Fig. 37 are represented by the same symbols.

<Triple type double glazing sash>

[0231] Fig. 39 illustrates an example of the structure of a frame body to be used for a triple type multiple glazing sash (that is, a type having totally three plates of glass plates and an intermediate plate) having two glass plates 202, 202 on both sides and one intermediate plate 260 disposed between and to be spaced apart from the two glass plates 202, 202. The drawing illustrates an example of a frame body disposed on the lower side of the multiple glazing sash. In the drawing, the structure of the frame body of the multiple glazing sash is specifically described with reference to the lower side frame body 205 as an example, however, the structures of the upper side frame body 203 and the side frame bodies 204 are basically the same as the structure of the lower side frame body 205. The lower side frame body 205 comprises a spacer part 210 having an inner surface part 206 and an outer side part 207 keeping a space between the outside two glass plates (a first glass plate and a second glass plate) 202 and 202, side parts 208, 208 connected to the inner surface part 206 and the outer side part 207 and facing the inner side of the glass plates, and space parts 209, 209 in which a drying agent can be contained, and a projecting leg part 213 having projecting legs 211 facing the inner side of a peripheral edge part of the glass plates on both sides and bent projecting legs 212 connected to the projecting leg 211 and facing an edge face part of the glass plates 202, 202. The spacer part 210 and the

projecting leg part 213 of the frame body are integrally formed of a frame body-forming material. As the frame body-forming material, the above-described synthetic resin material or aluminum material is preferably used.

[0232] In the frame body shown in Fig. 39, an insertion groove part 250 as one example of the intermediate plate-holding part is provided along the longitudinal direction of the spacer part 210 so that one intermediate plate (for example, a glass plate) 260 can be disposed to a middle part of the inner surface part 206 of the spacer part 210. And, on both sides in a groove of the insertion groove part 250, lip parts 251 made of an elastic material are provided so as to support an edge part of the intermediate plate disposed to the insertion groove part 250. Further, at the bottom of the insertion groove part 250, a base part 252 made of an elastic material or a cushioning material is provided so as to protect an edge face part of the intermediate plate to be disposed to the insertion groove part 250 and to secure positioning. In the example shown in the drawing, the lip parts 251, 251 are provided at different levels so that the intermediate plate to be disposed to the middle part will easily be inserted, however, they may be provided at the same level. Further, in this example, the space part 209 in which a drying agent is contained of the spacer part 210 is divided into two halves by the insertion groove part 250. Here, the method of supporting the intermediate plate is not limited to the above method by lip parts, and may be a supporting method by a glazing channel or may be a supporting method by a backup material.

[0233] The intermediate plate 260 may be a transparent plate, may be a colored plate, may be a plate with a pattern, or a combination thereof. The intermediate plate 260 is properly selected depending upon the location where the sash is used, the region, the design property, etc. Since the intermediate plate 260 is disposed between the first and second glass plates 202 and 202 and is not exposed to the outside, its strength may be low as compared with the first and second glass plates 202 and 202, and a thin material may be used. Therefore, as the intermediate plate, a glass plate having a thickness of at most 2 mm, which can reduce the entire thickness of the multiple glazing sash, can be used. Particularly a glass plate is preferred, since it has high transparency and durability and has higher rigidity, whereby a disposition operation of inserting the glass plate into the insertion groove part 250 of the spacer part of the frame body is easy.

[0234] The above example is an example of the structure of a frame body to be used for a triple type multiple glazing sash, and to obtain a quadruple or more multiple glazing sash, insertion groove parts 250 (intermediate plate-holding parts) depending upon the number of intermediate plates 260 to be disposed to the inner surface part 206 of the spacer part 210 are provided. For example, in the case of a quadruple type multiple glazing sash, two insertion groove parts 250 are provided, and in the case of a quintuple type multiple glazing sash, three insertion groove parts 250 are provided. In such a case, the respective insertion groove parts 250 are disposed along the thickness direction of the spacer part 210 with a predetermined distance. By the insertion groove parts, intermediate plates 260 are disposed to be spaced apart between the two glass plates 202 and 202. Further, in such a case, an air space is formed between the intermediate plates 260 spaced apart.

<Example of constitution of frame body>

[0235] The thicknesses and the heights of the respective parts of the frame body used for the multiple glazing sash of the embodiment 3 of the present invention are, in a case where the multiple glazing sash has a structure and a shape as shown in Figs. 33 to 37, preferably as follows, considering the moisture-proof property, the heat insulating property, a variation in the internal pressure of the air space of the multiple glazing sash, and the strength, the durability, etc. of the multiple glazing sash.

- ·The height of the side part 208 of the spacer part 210 of the frame body: 5 to 15 mm.
- ·The thickness of the side part 208 of the spacer part 210 of the frame body: 0.7 to 3.0 mm.
- ·The thickness of the inner surface part 206 and the outer side part 207 of the spacer part 210 of the frame body: 0.7 to 3.0 mm.
- ·The width of the inner surface part 206 and the outer side part 207 of the spacer part 210 of the frame body: 4 to 74 mm.
- ·The height of the projecting leg 211 of the projecting leg part 213 of the frame body: 15 to 50 mm.
- ·The thickness of the projecting leg 211 and the bent projecting leg of the projecting leg part 213 of the frame body: 0.7 to 3.0 mm.

[0236] Here, the spacer part 210 may not have a space part 209. In a case where a space part 209 is provided, as mentioned above, a dew condensation preventing function can be imparted to the multiple glazing sash by putting a drying agent in the space part 209.

<Adhesive layer>

[0237] As the adhesive to be used to bond the glass plate 202 and the side part 208 of the spacer part 210 to be used for the double glazing sash of the embodiment 3 of the present invention, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate 202 and the side part 208 of the spacer part, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 202 and the spacer part 210. For example, in a case where the side part 208 of the spacer part 210 is made of a synthetic resin material such as a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, the adhesive may, for exam-

ple, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. Also as the adhesive to be used to bond the glass plate 202 and the projecting leg 211 of the projecting leg part 213, in the same manner as above, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate 202 and the projecting leg 211 of the projecting leg part 213, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 202 and the projecting leg 211. For example, in a case where the projecting leg 211 of the projecting leg part 213 is made of a synthetic resin material such as a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, in the same manner as above, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape.

[0238] The adhesive to be used to bond the glass plate 202 and the side part 208 of the spacer part 210, and the adhesive to be used to bond the glass plate 202 and the projecting leg 211 of the projecting leg part 213, are preferably the same, whereby the above number of the bonding steps is reduced, however, depending upon the performance required for the multiple glazing sash, different adhesives may be used to function differently depending upon the performance required. Further, the adhesive to be used may be a transparent adhesive, or may be a black or another properly colored adhesive. By using a transparent adhesive, the projecting leg of the projecting leg part and the side part of the spacer part of the frame body may form a design face of the multiple glazing sash at the peripheral part of the glass plate. Further, by using a black or another properly colored adhesive, the resulting adhesive layer may form a design face of the multiple glazing sash.

<Air space>

[0239] The heat insulating property of the multiple glazing sash 201 varies depending upon the thickness of the air space 225 and the type of the gas filled in the air space 225.

[0240] A higher heat insulating property is obtained when a krypton gas or an argon gas is filled rather than air (dry air), at the same thickness of the air space 225.

[0241] Further, a higher heat insulating property is obtained when the air space 225 is thicker, when the same air is filled. However, there is a limitation regarding the thickness, and if the thickness exceeds a certain thickness, the heat insulating property will no more improve.

[0242] Accordingly, the thickness of the air space 225 is preferably set so that the highest heat insulating property will be obtained in relation to the gas to be filled.

[0243] For example, in a case where an argon gas is filled, the thickness of the air space 225 is preferably from 13 mm to 17 mm, whereby a high heat insulating property will be obtained while the entire thickness is suppressed.

[0244] Here, the thickness of the air space 225 is determined by the width of the inner surface part 206 and the outer side part 207 of the spacer part 210 of the frame body 205 and the thickness of the adhesive layers (the total thickness of the two layers on both sides). For example, in a case where the width of the inner surface part 206 and the outer side part 207 of the spacer part 210 of the frame body 205 is 14 mm and the thickness of the adhesive layer is 0.5 mm, the thickness of the air space 225 is 15 mm.

<Glass plate>

[0245] In the multiple glazing sash 201 having a closed air space 225, the internal pressure of the air space 225 changes by a temperature change, and the air space 225 expands or shrinks. When the air space 225 expands or shrinks, a stress is applied to the outside two glass plates 202, 202, and the glass plates 202, 202 may be broken. Particularly if the air space 225 is made thicker so as to improve the heat insulating property, the degree of expansion or shrinkage tends to be large, and the glass plates are likely to be broken. Considering the breakage, for the two glass plates 202 and 202 to be disposed outside, a glass plate having a high allowable stress is preferably used. Particularly a glass plate having an allowable stress in its plane of at least 47 MPa is preferred.

[0246] Further, the outside two glass plates 202, 202 are preferably a thin glass plate since if they are thick, the entire thickness of the sash will be thick, and they are more preferably a glass plate having a thickness of from 2 mm to 3 mm.

[0247] Thus, considering the breakage by a temperature change and the total thickness of the sash, it is preferred to use as the outside two glass plates 202, 202 a glass plates having a thickness of from 2 mm to 3 mm and having an allowable stress in its plane of at least 47 MPa.

[0248] Further, it is particularly preferred to use a low emissivity glass plate (Low-E glass plate) having a low emissivity film as at least one of the two glass plates (a first glass plate and a second glass plate) disposed on the outside of the multiple glazing sash, whereby the insulation efficiency can further be improved by the low emissivity film.

<Stress analysis of glass plate by internal pressure change of air space>

[0249] The stress (in-plane) formed in the two glass plates when the internal pressure of the air space is changed by a temperature change was analyzed by changing the glass constitution and the glass size of the glass plate. Fig. 40 is a table illustrating the results of

analysis. Here, the ordinary temperature was set at 25°C, and the stress was analyzed in a case where the temperature was lowered by 35°C from the ordinary temperature (-10°C) and a case where the temperature was increased by 35°C (60°C) (in Nos. 10 to 18, the stress was analyzed only when the temperature was lowered).

[0250] The multiple glazing sash used for analysis was a double type multiple glazing sash shown in Fig. 31, and the gas in the air space was an argon gas.

[0251] Further, physical properties of the glass plate, the adhesive, the sealing and the frame body used for analysis are as follows.

·Glass Young's modulus: 7.16×10^4 (MPa), Poisson's ratio: 0.23
·Adhesive Young's modulus: 5.0 (MPa), Poisson's ratio: 0.49
·Sealing Young's modulus: 1.1 (MPa), Poisson's ratio: 0.49
·Spacer Young's modulus: 6.9×10^4 (MPa), Poisson's ratio: 0.33

[0252] In the table, the glass constitution represents [the thickness (mm) of the first glass plate+the thickness (mm) of the air space+the thickness (mm) of the second glass plate]. Accordingly, in No. 1 for example, the glass constitution [1.3+29.4+1.3] means that the thickness of the first glass plate is 1.3 mm, the thickness of the air space is 29.4 mm and the thickness of the second glass plate is 1.3 mm. Further, the thickness of the air space is defined by the thickness of the spacer part and the thickness of the adhesive layers. Here, the thickness of the adhesive layer is 0.5 mm. Accordingly, the thickness of the air space of 29.4 mm corresponds to a thickness of the spacer part of 28.4 mm and a thickness of 0.5 mm ($\times2$) of the thickness of the adhesive layers (excluding Nos. 12, 13 and 18).

[0253] Further, the glass size represents [the height (mm) of the glass plate x the width (mm) of the glass plate] (the sizes of the first glass plate and the second glass plate are the same). Accordingly, in No. 1 for example, the glass size [1197x800] means a glass plate having a height of 1,197 mm and a width of 800 mm. The glass size [500×350] is the glass size defined in the sealed insulating glass durability test in JIS R3209.

[0254] Further, as the stress, the maximum stress on the exterior side and the maximum stress on the air space side are shown. Here, the maximum stress on the exterior side is formed on a line on the air space side of the frame body (a region shown by the reference symbol R in Fig. 33). Further, the maximum stress on the air space side is formed on a center portion of the glass plate.

[0255] Nos. 1 to 9 represent results of analysis of a stress when the glass constitution and the glass size are changed. The following can be confirmed from the analysis results. (1) The smaller the glass size, the larger the stress formed. (2) The largest stress is formed when the glass plate has a thickness of 2.0 mm, among the thicknesses 1.3 mm, 2.0 mm and 3.0 mm. (3) The thicker the air space, the larger the stress formed. (4) The stress tends to be large when the air space shrinks (when the temperature is lowered) than when the air space expands (when the temperature is increased).

[0256] No. 10 illustrates results of analysis of a stress when the thickness of the air space is further increased as compared with No. 7, and No. 11 illustrates results of analysis of a stress when the thickness of the air space is further increased as compared with No. 8. It can be confirmed also from the analysis results that the stress is larger when the air space is thicker.

[0257] No. 12 illustrates results of analysis of a stress when the adhesion thickness (the thickness of the adhesive layer) is changed as compared with No. 10, and No. 13 illustrates results of analysis of a stress when the adhesion thickness is changed as compared with No. 11. Further, Nos. 14 and 16 illustrate results of analysis when the adhesion width (the width of the adhesive layer) is changed as compared with Nos. 10 and 12, and Nos. 15 and 17 illustrate results of analysis of a stress when the adhesive width is changed as compared with Nos. 11 and 13. It is confirmed from the analysis results that the stress formed in the glass plate changes also by the thickness or the width of the adhesive layer.

[0258] Fig. 41 is tables illustrating results of analysis of a stress (in-plane) formed in two glass plates when the adhesion thickness and the adhesion width are changed.

[0259] Here, the thickness of each of the two glass plates was 2.0 mm, the thickness of the air space was 63.9 mm, the gas in the air space was an argon gas, and the glass size was 500 mm $\times$ 350 mm. Physical properties of the glass plates, the adhesive, the sealing and the frame body used for analysis are the same as above.

[0260] The adhesion width was changed every 5 mm from 20 mm to 5 mm (20 mm, 15 mm, 10 mm and 5 mm). Further, the adhesion thickness was changed every 5 mm from 0.5 mm to 2.0 mm, and every 1.0 mm from 2.0 mm to 5.0 mm (0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm, 3.0 mm, 4.0 mm and 5.0 mm). Further, the adhesive layer was disposed at a position of 4.5 mm from an edge part of the glass plate. Thus, for example, when the adhesion width is 20 mm, the adhesive layer is disposed at a position of from 4.5 mm to 24.5 mm from an edge part of the glass plate.

[0261] Table (A) illustrates analysis results with an adhesion width of 20 mm, Table (B) illustrates analysis results with an adhesion width of 15 mm, Table (C) illustrates analysis results with an adhesion width of 10 mm, and Table (D) illustrates analysis results with an adhesion width of 5 mm.

[0262] As shown in Tables (A) to (D), a maximum adhesion stress of 46.8 MPa is formed on the exterior side at an adhesion thickness of 5.0 mm and an adhesion width of 5.0 mm (No. 18 in Fig. 40).

[0263] Accordingly, a multiple glazing sash resistant to breakage by a temperature change will be obtained at

least with a glass plate having an allowable stress in its plane of higher than 46.8 MPa, and further, a multiple glazing sash sufficiently resistant to breakage will be obtained with a glass plate having an allowable stress in its plane of higher than 47 MPa. The allowable stress of a glass plate in its plane depends on the thickness of the glass plate, and in the case of a glass plate having a thickness of from 2 mm to 3 mm, for example, a chemically tempered glass may be selected.

<Another embodiment of the embodiment 3>

[0264] A multiple glazing sash having a plurality of glass plates may be constituted by disposing a plurality of glass plates to be spaced apart by a plurality of frame bodies.

(Description of embodiment 4)

[0265] Now, the corner block for a multiple glazing, a multiple glazing using the corner block for a multiple glazing, and a multiple glazing sash using the corner block for a multiple glazing of the embodiment 4 of the present invention will be described in detail with reference to Figs. 42 to 59. The corner block for a multiple glazing, the multiple glazing using the corner block for a multiple glazing and the multiple glazing sash using the corner block for a multiple glazing having the constitutions of Figs. 42 to 59 are based upon Japanese Patent Application No. 2013-073369 which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 4.

[0266] Fig. 42 is a schematic front view illustrating a multiple glazing employing the corner block for a multiple glazing of the embodiment 4 of the present invention, and the reference symbol 301 represents a multiple glazing, 302 a first glass plate (a second glass plate 303 is located on the rear side of the first glass plate 302 and is not shown in the drawing), 304a an upper side spacer part of the multiple glazing, 304b a side spacer part of the multiple glazing, 304c a lower side spacer part of the multiple glazing (in this specification, hereinafter the upper side spacer part, the side spacer parts and the lower side spacer part may sometimes be generally referred to simply as a spacer part, and the spacer parts 304a, 304b and 304c may sometimes be generally represented as "304", and they may sometimes be referred to as a frame body 313), 305 a corner block for a multiple glazing connecting spacer parts on a joint part of a corner part of the multiple glazing where the spacer parts 304a, 304b and 304c are butted (hereinafter in this specification, "the corner block for a multiple glazing" may sometimes be referred to simply as "a corner block").

[0267] Fig. 43 is a partial cross-sectional schematic perspective view illustrating a multiple glazing 301 as one example of a double type (that is, a type having two air spaces) employing the corner block for a multiple glazing of the embodiment 4 of the present invention. The multiple glazing 301 has a first glass plate 302 and a second glass plate 303 spaced apart at their periphery so as to form a concave part, a frame body 313 having a spacer part 311 and a projecting leg part 312 being provided to the inside of the concave part for interior decoration, one intermediate plate 306 being disposed between and to be spaced apart from the first glass plate 302 and the second glass plate 303, and a first air space 307 and a second air space 308 being formed. The multiple glazing shown in Fig. 43 is constituted by disposing a plurality of glass plates to be spaced apart by a frame body having a spacer part and a projecting leg part integrally formed, and accordingly it may be called a multiple glazing sash, and hereinafter in this specification, a multiple glazing of a type with such a structure may sometimes be referred to as a multiple glazing sash.

[0268] Further, Fig. 44 is a partial cross-sectional schematic perspective view illustrating a multiple glazing 301 as one example of a three layer type (that is, a type having three air spaces) employing the corner block for a multiple glazing of the embodiment 4 of the present invention. The multiple glazing 301 has a first glass plate 302 and a second glass plate 303 spaced apart at their periphery so as to form a concave part, a frame body 313 having a spacer part 311 and a projecting leg part 312 being provided to the inside of the concave part for interior decoration, two intermediate plates 306a and 306b being disposed between and to be spaced apart from the first glass plate 302 and the second glass plate 303, and a first air space 307, a second air space 308 and a third air space 309 being formed, that is, a multiple glazing sash.

[0269] Fig. 45 is a cross-sectional view illustrating a scheme of the frame body 313 of the multiple glazing sash at the portion indicated by the circle A in Fig. 43, and the frame body 313 comprises a spacer part 311 having an inner surface part 317 and an outer side part 318 keeping a space between the first glass plate 302 and the second glass plate 303, side parts 319, 319 each connected to the inner surface part 317 and the outer side part 318 and facing the inner side of the first glass plate 302 and the second glass plate 303, and space parts 320, 320 in which a drying agent is contained, and a projecting leg part 312 having projecting legs 321, 321 facing the inner side of a peripheral edge part of the first glass plate 302 and the second glass plate 303, and the spacer part 311 and the projecting leg part 312 of the frame body 313 are integrally formed of a synthetic resin material such as a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin material.

[0270] In the projecting leg part 312 shown in the drawing, bent projecting legs 322, 322 connected to the projecting leg 321, 321 and facing an edge face part of the glass plates are provided to protect edge faces of the first and second glass plates.

[0271] The intermediate plate 306 (a plate-form body, a sheet-form body or a film-form body to be disposed

between the first glass plate 302 and the second glass plate 303 will be referred to as an intermediate plate in this specification) is fitted to the inside of a groove part 323 provided to the inner surface part 317 of the spacer part 311 of the frame body 313 and is supported by lip parts 324, 324. The projecting leg part 312 of the frame body 313 has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section in the multiple glazing sash thickness direction, and is in a substantially U-shape. And, a groove part 325 is formed by the projecting legs 321, 321 of the projecting leg part 312 and the outer side part 318 of the spacer part 311. In the case of a multiple glazing sash applied to a sliding window, a sash roller, a sash roller-bearing member, a latch member or another sash functional member is to be provided to a necessary portion of the groove part 325, and such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash by the frame body 313.

[0272] The intermediate plate 306 may be a transparent plate, may be a colored plate, may be a plate with a pattern, or a combination thereof. The intermediate plate is properly selected depending upon the location where the sash is used, the region, the design property, etc. As a glass plate used as the intermediate plate, since it is disposed between the first and second glass plates 302 and 303, a glass plate having a thickness of at most 2 mm is preferred, whereby the entire thickness can be made thin. A glass plate having such a thickness is preferred, since it has high transparency and durability and higher rigidity, whereby a disposition operation of inserting the intermediate plate to the groove part 323 of the spacer part of the frame body is easily carried out. In a case where a plurality of intermediate plates are used, intermediate plates differing in the type may be used.

[0273] In the multiple glazing (multiple glazing sash) shown in Figs. 43 and 44, dry air or an inert gas such as an argon gas is filled in the air space 307 between the first glass plate 302 and the intermediate plate 306 and the air space 308 between the intermediate plate 306 and the second glass plate 303, or in the air space 307 between the first glass plate 302 and the intermediate plate 306a, the air space 308 between the intermediate plate 306a and the intermediate plate 306b and the air space 309 between the intermediate plate 306b and the second glass plate 303, to impart heat insulating property and/or sound insulation property. Such an air space may sometimes be called an air layer or a gas layer. The corner block for a multiple glazing of the present invention is characterized by having a structure which makes an operation of filling a filler gas in the air space easy.

[0274] Fig. 46 is views illustrating a state where a frame body 313a and a frame body 313b to space the first and second glass plates 302 and 303 apart at corner parts on four sides of the first and second glass plates 302 and 303, are to be connected, in a multiple glazing (multiple glazing sash) in which the first glass plate 302 and the second glass plate 303 and the intermediate plate 306 are rectangular. The frame bodies 313a and 313b on both sides shown in Fig. 46 substantially correspond to assembling of the structure of the portion of the circle A in Fig. 43, the frame body 313a corresponds to a side frame body of the multiple glazing 1, 313b corresponds to a lower side frame body. The side frame body 313a and the lower side frame body 313b are butted and assembled at right angles via a corner block 330 shown in Fig. 47. As shown in the drawing, to openings 326 at an edge part of space parts 320 of the respective spacer parts 311 at edge parts of the frame bodies 313a and 313b on both sides, the respective connecting parts 331 of the corner block 330 are inserted to connect the frame body 313a and the frame body 313b as shown in Fig. 48.

[0275] Figs. 47 and 49 to 52 are views illustrating one example of the corner block 330 for a multiple glazing of the embodiment 4 of the present invention. The corner block 330 is an example applied to a two-layer type multiple glazing (multiple glazing sash) having two air spaces as shown in Fig. 43. The corner block 330 for a multiple glazing has, on the air space side on the multiple glazing, connecting parts 331 to be connected to edge parts of the spacer part 311 of the frame body. That is, the corner block 330 has connecting parts 331 a, 331 b, 331 c and 331 d to be inserted into and connected to space parts 320a, 320b, 320c and 320d at edge part sides of the spacer part 311 i.e. 311a, 311b, 311 c and 311 d shown in Fig. 46. The connecting part 331 a corresponds to an opening 326 of the space part 320a of the spacer part 311 a, the connecting part 331 b corresponds to an opening 326 of the space part 320b of the spacer part 311 b, the connecting part 331 c corresponds to an opening 326 of the space part 320c of the spacer part 311c, and the connecting part 331 d corresponds to an opening 326 of the space part 320d of the spacer part 311 d, and the connecting part 331 a is inserted into the space part 320a, the connecting part 331 b is inserted into the space part 320b, the connecting part 331 c is inserted into the space part 320c, and the connecting part 331 d is inserted into the space part 320d, whereby a corner part of a spacer assembly of the multiple glazing as shown in Fig. 48 is formed.

[0276] Further, in the case of a multiple glazing sash of a type shown in Fig. 43, having one intermediate plate 306 disposed in the air space, a groove part 336 is preferably formed in the inside of the corner block 330 so that the corner of a rectangular intermediate plate can be put between the connecting parts 331 a and 331 b and between the connecting parts 331 c and 331 d forming pairs, on the inner side on the air space side of the corner block. As shown in Fig. 54 described hereinafter, the corner part of a rectangular intermediate plate disposed between the first and second glass plates 302 and 303 is put in the groove part 336 to form a void part 344.

[0277] Further, to the main body part of the corner block 330, two gas inlets for injecting a filler gas into the two air spaces (air spaces 307 and 308 in Fig. 43) are provided to be communicated with the corresponding two

air spaces. As shown in Fig. 52, gas inlets 332a and 332b are provided so as to open at a deep part of an opening 342 on the air space side of the multiple glazing of the corner block 330.

[0278] To the gas inlets 332a and 332b, gas feed pipe parts 333a and 333b are provided as being communicated, in the inside of the main body part of the corner block 330, gas feed openings 334a and 334b are provided on the opposite side of the gas feed pipe parts 333 and 333 from the gas inlet side, and a filler gas (for example, dry air, an inert gas such as argon, krypton, helium or sulfur hexafluoride, or a mixture thereof) is filled into the air spaces 307 and 308 from the gas inlets 332a and 332b respectively through the gas feed opening 334a via the gas feed pipe part 333a and through the gas feed opening 334b via the gas feed pipe part 333b. The gas inlets, the gas feed pipe parts and the gas feed openings are provided in the corner block longitudinal direction from the air space side toward the tip of the corner part of the multiple glazing.

[0279] The above corner block is an example having two gas inlets, gas feed pipe parts and gas feed openings corresponding to the two air spaces so that a filler gas can be filled in the two air spaces, and for a multiple glazing (multiple glazing sash) having three air spaces as shown in Fig. 44, three gas inlets, gas feed pipe parts and gas feed openings can be provided. Also for a multiple glazing (multiple glazing sash) having four or more air spaces, they can be provided correspondingly.

[0280] The corner block shown in Figs. 47 and 49 to 52 is an example such that a filler gas is filled in the two air spaces by forming two gas inlets, gas feed pipe parts and gas feed openings corresponding to the two air spaces. However, as shown in Fig. 53(a), one gas inlet 334 may be formed, a bifurcate branched gas passage 343 is connected to the gas feed pipe part 333c on the gas feed opening side, two gas feed pipe parts 333a and 333b are provided to the branched gas passage 343 as being communicated, gas inlets 332a and 332b are provided respectively to the two gas feed pipe parts 333a and 333b, and a filler gas is injected from the one gas feed opening 334 and filled into the air spaces from the gas inlets 332a and 332b via the one gas feed pipe part 333c, the bifurcate branched gas passage 343 and the gas feed pipe parts 333a and 333b.

[0281] Otherwise, as shown in Fig. 53(b), two gas feed openings 334a and 334b may be provided, gas feed pipe parts 333e and 333f are provided respectively to the gas feed openings 334a and 334b, branched gas passages 343a and 343b are connected respectively to the gas feed pipe parts 333e and 333f, four gas feed pipe parts 333c, 333a, 333b and 333d are provided respectively to the branched gas passages 343a and 343b as being communicated, and gas inlets 332c, 332a, 332b and 332d are provided respectively to the four gas feed pipe parts 333c, 333a, 333b and 333d, and a filler gas is injected from the two gas feed openings 334a and 334b and filled into the respective air spaces from the gas inlets 332c, 332a, 332b and 332d via the gas feed pipe parts 333e and 333f, the branched gas passages 343a and 343b and the gas feed pipe parts 333c, 333a, 333b and 333d.

[0282] Otherwise, as shown in Fig. 53(c), two gas feed openings 334a and 334b may be provided, gas feed pipe parts 333g and 333h are provided respectively to the gas feed openings 334a and 334b, a branched gas passage 343c is connected to the gas feed pipe part 333h and two gas feed pipe parts 333i and 333j are provided to the branched gas passage 343c as being communicated, gas inlets 332a, 332b and 332c are provided respectively to the gas feed pipe parts 333g, 333i and 333j, and a filler gas is injected from the two gas feed openings 334a and 334b and filled into the respective air spaces from the gas inlets 332a, 332b and 332c via the gas feed pipe part 333g and via the gas feed pipe part 333h, the branched gas passages 343c and the gas feed pipe parts 333i and 333j.

[0283] Otherwise, as shown in Fig. 53(d), two gas feed openings 334a and 334b may be provided, gas feed pipe parts 333k and 333l are provided respectively to the gas feed openings 334a and 334b, a branched gas passage 343d is connected to the gas feed pipe part 333k, two gas feed pipe parts 333m and 333n are provided to the branched gas passage 343d as being communicated, gas inlets 332a, 332b and 332c are provided respectively to the gas feed pipe parts 333m, 333n and 333l, and a filler gas is injected from the two gas feed openings 334a and 334b and filled into the respective air spaces from the gas inlets 332a, 332b and 332c via the gas feed pipe part 333k, the branched gas passage 343d and the gas feed pipe parts 333m and 333n, and via the gas feed pipe part 333l.

[0284] In the corner block for a multiple glazing of the embodiment 4 of the present invention, as shown in Fig. 54, it is preferred to form a void part 344 communicated with the respective air spaces at a portion where a corner part of one or more intermediate plates 306 is located, i.e. at a corner of the intermediate plate 306, so that the filler gas supplied from the gas feed opening 334 is filled into the at least two air spaces via the gas inlet 332 and then the void part 344.

[0285] The void part 344 shown in Fig. 54 opens on the air space 307, 308 side of the multiple glazing, of the corner block 330 as shown in Figs. 51 and 52, and the gas inlets 332a and 332b are located on the bottom side in the inside of the opening 342. And, the void part 344 is formed on the bottom side of the opening 342 in a state where the corner part C (corner) of the rectangular intermediate plate 306 is supported by the groove part 336 of the corner block 330. The multiple glazing 301 air space 307, 308 side of the void part 344 is divided into two halves by the intermediate plate 306, and the filler gas discharged from the gas inlet 332 (332a, 332b, 332c and 332d) once passes through the void part 344 and is filled into the respective air spaces 307 and 308 of the multiple glazing 301. It is preferred to fill the filler gas into

the respective two air spaces via the gas inlets and the void part, whereby the pressures of the filler gas filled into the respective air spaces can be equalized. Even in a case of a multiple glazing (multiple glazing sash) having three or more air spaces with two or more intermediate plates, the pressures of the filler gas in the three or more air spaces can be equalized by forming the void part around the corner of the intermediate plates in the inside of the opening of the corner block 330.

[0286] Further, the intermediate plate 306 is an intermediate plate (a transparent glass plate in Fig. 54) which is rectangular and smaller than the first and second glass plates, and is positioned as attached to the spacer part 311 of the frame body 313 by a groove part 323 formed on the inner surface part 317 of the spacer part 311 as shown in Fig. 45. Thus, an edge face of the intermediate plate 306 can be positioned in the middle part of the opening 342, and the void part 344 can be formed.

[0287] The corner block 330 preferably has side face parts 335 so as to form a substantially flat plane with the side faces of the frame bodies 313 butted from both sides. Further, the side face part 335 preferably extends toward a tip direction of a joint of the corner part where the spacer parts are butted, that is, to a tip of a corner of the rectangular glass plates 302 and 303. The tip preferably makes an angle of about 90°. By using a corner block having side face parts 335 which form a substantially flat plane with the side faces of the frame bodies and extending toward a tip direction of a joint, it is easy to assemble frame bodies and corner blocks and it is thereby easy to assemble a double glazing sash.

[0288] In the corner black of the embodiment 4 of the present invention, the connecting parts for being connected to edge parts of the spacer parts on the multiple glazing air space side, a plurality of gas inlets provided as being communicated with the corresponding at least two air spaces, and side parts and the main body part are preferably integrally formed by a rigid synthetic resin material (for example, a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin material). "Integrally formed" means that a frame body-forming material is formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method. When the respective parts are integrally formed, members for the corner block will easily be assembled into one piece, and the number of members for the corner block can be reduced, and the assembling steps can be simplified.

[0289] Further, as shown in Fig. 57, the frame bodies 313a and 313b are connected as being butted via the corner block 330 at their edge parts, to constitute a corner part, and in order for more secure connection, as shown in Fig. 56, a locking piece 327 extending in a lateral direction of the projecting leg 321 of the frame body to be butted may be provided on a plane 338 on a wall part 337 of the corner block 330. The locking piece 327 has a bent claw 328 on its tip, and the claw 328 is fitted to an opening 329 of the projecting leg 321 of the frame body provided on a portion corresponding to the position of the claw 328, and is locked by the opening 329, whereby the frame bodies 313a and 313b and the corner block 330 will not be disconnected.

[0290] Another embodiment of the corner block for a multiple glazing of the embodiment 4 of the present invention will be described with reference to Figs. 58 and 59. In Figs. 58 and 59, the same members as those of the corner block for a multiple glazing in Figs. 47 to 55 are represented by the same reference symbols.

[0291] The corner block of this embodiment is a corner block 330 to be butted by frame bodies 313a and 313b of which an edge part is cut at an angle of about 90°, not the corner block butted by frame bodies 313a and 313b of which an edge part is cut at an angle of about 45° as shown in Fig. 46. The corner block 330 is a block of which the cross section is substantially rectangular having side face parts 351 a and 351b to be in contact with about 90° cut edge faces 350a and 350b of the frame bodies 313a and 313b and corner face parts 352a and 352b forming a corner of a corner part on each of the four sides of the multiple glazing sash.

[0292] In the corner block, connecting parts 331 a, 331 b, 331 c and 331 d are formed so as to extend at right angles to the planes of the side face parts 351 a and 351 b so that the respective connecting parts 331 of the corner block 330 can be inserted into openings on an edge part (on the lower edge part in the drawing) of the space parts 320 of the respective spacer parts 311 exposed to the about 90° cut edge faces 350a and 350b on the edge parts of the frame bodies 313a and 313b. According to the corner block of such a shape, the connecting parts of the corner block can be inserted into openings on edge parts of the space parts 320 of the spacer parts 311 of the frame bodies 313a and 313b at right angles to the cut edge faces 350a and 350b of openings of the space parts 320 of the spacer parts 311 of the frame bodies 313a and 313b, whereby the frame bodies on four sides can securely be connected, and further, as each corner block is a substantially rectangular block body, the connection of the corner parts can highly be maintained.

[0293] To the main body part of the corner block 330 consisting of such a substantially rectangular block body, two gas inlets 332 for injecting a filler gas into the two air spaces are provided so as to open at a deep part of the opening 342 on the multiple glazing air space side of the corner block 330 to be communicated with the corresponding two air spaces. To each gas inlet 332, a gas feed pipe part is provided as being communicated in the inside of the main body part of the corner block 330, a gas feed opening is provided on the opposite side of the gas feed pipe part from the gas inlet side, and a filler gas is supplied from the gas feed opening via the gas feed pipe part, or from the gas feed opening via the gas feed pipe part, and is filled from the gas inlet 332. As such a constitution, the same constitution as in Fig. 53 may be employed.

[0294] The corner block of the embodiment 4 of the

present invention is suitable for a multiple glazing sash as shown in Figs. 43 and 44. That is, it is suitable as a corner block for forming a corner part of a multiple glazing sash having frame bodies 313 each comprising a spacer part 311 keeping a space between a first glass plate 302 and a second glass plate 303, and a projecting leg part 312 having projecting legs 321, 321 facing the inner side of a peripheral edge part of the first glass plate 302 and the second glass plate 303, the spacer part 311 and the projecting leg part 312 of the frame body being integrally formed of a synthetic resin material such as a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin material, and each frame body 313 having a groove part 323 so that one intermediate plate 306 can be disposed to a middle part of an inner surface part 317 of the spacer part 311, to form a corner part of the multiple glazing sash by butting edge parts of the frame bodies at substantially right angles. The frame body for such a multiple glazing sash may have bent projecting legs 322, 322 connected to the projecting leg 321, 321 and facing an edge face part of the glass plates. The projecting legs 321, 321 of the projecting leg part 312 of the frame body 313 are provided to peripheral edge parts of the first glass plate 302 and the second glass plate 303 spaced apart for interior decoration, and according to the corner block of the present invention, the projecting legs also function as joint members at the corner of projecting leg part provided for interior decoration. In the multiple glazing sash of this type, a groove part 325 of the frame body 313 is clogged by a surface 338 of a wall part 337 of the corner block 330. A long hole 339 formed on the wall part 337 is an insertion hole for a working jig so as to adjust a sash functional member such as a sash roller.

[0295] According to a preferred embodiment of the embodiment 4 of the present invention, the projecting leg 321 of the projecting leg part 312 and the side part 319, 319 of the spacer part 311 of the frame body 313 integrally formed, and the side face part 335 of the corner block 330, are in contact with each other so as to form a substantially flat plane. When such a substantially flat plane is formed, the projecting leg 321 of the projecting leg part, the side part of the spacer part and the side face part 335 of the corner block 330 may be coordinated, and the design property at a peripheral part of the multiple glazing sash can be increased, by considering the color tone, the plane conditions, etc. of the projecting leg 321 of the projecting leg part 312 and the side part 319, 319 of the spacer part 311 of the frame body 313, and the side face part 335 of the corner block 330.

[0296] Here, convex strip parts 340 formed in the lengthwise direction on the side face side of the corner block 330 are provided in order that the corner block is well locked with the projecting legs 321, 321 of the projecting leg part 312 of the frame body 313 and that the corner block 330 and the frame body 313 are well fitted.

[0297] Further, a neck 341 may be formed at the bottom of each connecting part 331 of the corner block 330 in order that after the connecting parts 331 are inserted into the space parts at edge parts of the spacer parts 311 of the frame body 313, a sealing operation by a sealing medium such as a butyl rubber will easily be carried out and the sealing property will be increased. Further, a bottom base 345 may be formed at the bottom of each connecting part 331 in order that a packing material will easily be inserted which is disposed to increase the sealing property at a locking part between the connecting part 331 of the corner block 330 and the edge part of the space part 320 of the spacer part 311 of the frame body 313.

[0298] Fig. 55 is a partially abbreviated view illustrating a state where a packing material 346 is fitted to bottom bases 345 formed around the bottoms of the connecting parts 331 of the corner block 330 from an arrow direction. The connecting parts 331 a and 331 b in a pair shown in Fig. 55 have a quadrangular cross-sectional shape, and the cross-sectional shape of the bottom base 345 is also quadrangular. The packing material 346 is a thin material made of a rubber with high sealing property, and has a pair of openings 347 to be fitted to the bottom bases 345, and by the packing material, 346, the sealing property at the bottom part of the connecting parts 331 of the corner block 330 inserted to edge parts of the space parts 320 of the spacer parts 311 of the frame body 313 is increased.

[0299] The shape and the thickness of the first glass plate 302 and the second glass plate 303 are properly selected depending upon the shape and the dimensions of the aimed multiple glazing (multiple glazing sash), and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, the thicknesses are within a range of from 0.7 mm to 10 mm, and it is preferred that the sizes of the rectangles of the first glass plate 302 and the second glass plate 303 are substantially the same. The first and second glass plates 302 and 303 may be glass plates of the same type or may be glass plates of different types. Further, in the multiple glazing sash shown in Figs. 43 and 44, the intermediate plates 306, 306a and 306b to be disposed in the middle are preferably in a rectangular shape similar to and smaller than the outside dimensions of the first and second glass plates 302 and 303 so that they can be inserted to the groove part 323 of the inner surface part 317 of the frame body 313. In a case where the plurality of glass plates are rectangular, the first glass plate 302 and the second glass plate 303 are preferably spaced apart at their peripheral four edge sides by the spacer part or the spacer part of the frame body to constitute a multiple glazing (multiple glazing sash). Use of frame bodies having the same shape for four sides of the multiple glazing sash is preferred, whereby the number of members in assembling of the multiple glazing sash can be reduced, and the outer appearances and the designs of the peripheral parts of the multiple glazing sash can be coordinated. In a case where the multiple glazing sash is prepared by using the above frame bodies, a drying agent may be

contained in the space part of the spacer part of the frame body, in a required side or in a necessary portion.

[0300] In the multiple glazing sash of the embodiment 4 of the present invention, it is preferred that the side part 335 of the corner block 330, the side part 319 of the spacer part 311 and the projecting leg 321 of the projecting leg part 312 of the frame body 313, are bonded to the first or second glass plate 302 or 303 at a portion where they face the first or second glass plate 302 or 303, by an adhesive, and the air spaces between the first and second glass plates 302 and 303 are airtightly sealed. As the adhesive, a proper adhesive is used so as to obtain excellent adhesion strength between the first and second glass plates 302 and 303, and the side face part 335 of the corner block 330, the side part 319 of the spacer part 311 and the projecting leg 321 of the projecting leg part 312, moisture-proof property, durability and favorable bonded surface, etc. For example, in a case where the side face part 335 of the corner block 330, the side part 319 of the spacer part 311 and the projecting leg 321 of the projecting leg part 312 are made of a rigid vinyl chloride resin or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape.

[0301] The multiple glazing (multiple glazing sash) of the embodiment 4 of the present invention has an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by spacer parts, at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates, and at least two air spaces being formed, wherein on at least one of corner parts where the spacer parts are butted, the joint parts of the spacer parts are connected by the corner block of the present invention. In the case of a multiple glazing (multiple glazing sash) using rectangular glass plates, a corner block is used at four corner parts, and the corner block of the present invention should be used at least as a corner block for a corner part at which a filler gas is filled in the air space, and a corner block having no gas feed opening may be used for the other corner parts. However, by use of the corner blocks of the present invention having the same shape and outer appearance for the four corner parts, the number of members can be reduced, and the operation in the assembling step can be simplified.

[0302] To fill a filler gas into air spaces of a multiple glazing having two or more air spaces by using the corner block of the embodiment 4 of the present invention, an inlet of a pipe from a filler gas cylinder is inserted into each of the gas feed openings of the corner block or into a gas feed opening brought together, and the filler gas is filled into the plurality of air spaces, whereby the filler gas can be filled into the air spaces simultaneously. After the filler gas is filled, the gas feed opening used for injection is sealed by a sealing plug, a sealing medium or the like. Further, in a case where the corner block of the present invention is used at a portion where the filler gas is not filled, the gas feed opening may preliminarily be sealed.

(Description of embodiment 5)

[0303] Now, the multiple glazing sash of the present invention will be described in detail with reference to Figs. 60 to 74. The multiple glazing sash having the constitutions of Figs. 60 to 74 is based upon Japanese Patent Application No. 2013-073370, which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 5.

[0304] Fig. 60 is a front view illustrating the multiple glazing sash according to the embodiment 5 of the present invention, Figs. 61, 62 and 63 are partial cross-sectional schematic perspective views illustrating the multiple glazing sash according to the embodiment 5 of the present invention (the details of the frame body are omitted), Fig. 64 is a schematic longitudinal sectional view illustrating a frame body portion shown by the circle A in Fig. 61, and Fig. 65 is a longitudinal sectional view illustrating a scheme of the frame body portion shown by the circle A in Fig. 62. In Fig. 60, the reference symbol 401 represents a multiple glazing sash, 402 a glass plate and 403 a frame body of the multiple glazing sash, and 403a represents an upper side frame body, 403b a side frame body of the multiple glazing sash, and 403c a lower side frame body of the multiple glazing sash. Hereinafter in this specification, the upper side frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to as a frame body 403.

[0305] Fig. 61 illustrates an example of a double type multiple glazing sash (that is, a type having two glass plates and one air space 404) having a first glass plate 402a and a second glass plate 402b spaced apart. Fig. 62 illustrates an example of a triple type multiple glazing sash (that is, a multiple glazing sash having two air spaces 404a and 404b) having totally three plates of two glass plates and one intermediate plate, having a first glass plate 402a and a second glass plate 402b spaced apart and one intermediate plate 405 being disposed between the first glass plate 402a and the second glass plate 402b. Further, Fig. 63 illustrates an example of a quadruple type multiple glazing sash (that is, a multiple glazing sash having three air spaces 404a, 404b and 404c) having totally four plates of two glass plates and two intermediate plates, having a first glass plate 402a and a second glass plate 402b spaced apart, and two intermediate plates 405a and 405b being disposed between the first glass plate 402a and the second glass plate 402b.

[0306] The frame body 403 of the multiple glazing sash shown in Figs. 61, 62 and 63 comprises a spacer part 410 having an inner surface part 406 and an outer side part 407 keeping a space between the two glass plates

402a and 402b, side parts 408, 408 connected to the inner surface part 406 and the outer side part 407 and facing the inner side of the glass plates 402a and 402b, and a space part 409 in which a drying agent is contained, and a projecting leg part 413 having projecting legs 411, 411 facing the inner side of a peripheral edge part of the two glass plates 402a and 402b, and bent projecting legs 412 connected to the projecting leg 411, 411 and facing an edge face part of the glass plates 402a and 402b, and the spacer part 410 and the projecting leg part 413 of the frame body are integrally formed of a synthetic resin material for forming a frame body.

[0307] In the embodiment 5 (the same applies to the other embodiments) of the present invention, "integrally formed" means that a synthetic resin material for forming a frame body is formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method. The synthetic resin material for forming a frame body is preferably a synthetic resin material such as a polyvinyl chloride resin, an acrylonitrile/styrene resin, an acrylic resin, an ABS resin (a copolymer synthetic resin of acrylonitrile, butadiene and styrene) or a polyester resin. Further, the synthetic resin material for forming a frame body is not limited to one type, and a plural types of materials may be used to form a composite structure. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different synthetic resin materials. In the case of such a composite structure frame body, the frame body may be obtained by integrally forming any one type of synthetic resin materials for forming a frame body, and a different synthetic resin material and/or metal material may be partially or entirely bonded to the integrally formed frame body. Particularly, a frame body comprising the spacer part 10 and the projecting leg part 13 integrally formed of a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin is excellent in the heat insulating property when used for a sash, its integral forming is easy, it is excellent in the durability and it is available at a low cost.

[0308] The frame body for a multiple glazing sash shown in Fig. 65 has a groove part 414 into which one intermediate plate is inserted, formed in a middle part on an inner surface part 406 of the spacer part 410 along the longitudinal direction of the spacer part 410 so that one intermediate plate 405 can be disposed in the air space formed by disposing the first glass plate 402a and the second glass plate 402b to be spaced apart at their periphery by the frame body 403 to be spaced apart from the first and second glass plates 402a and 402b. Further, on both sides of the groove part 414, lip parts 415, 415 made of an elastic material are provided so as to support an edge part of the intermediate plate 405 disposed to the groove part 414, and at the bottom of the groove part 414, a base part 416 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 405 to be disposed to the groove part 414 and to secure positioning. The method of supporting the intermediate plate is not limited to the above supporting method by lip parts, and may be a supporting method by a glazing channel or may be a supporting method by a sealing material or a backup material.

[0309] Further, in the frame body 403 of the multiple glazing sash shown in Fig. 68(a), two groove parts 414, 414 are provided in rows to be spaced apart from each other in a middle part on an inner surface part 406 of the spacer part 410 along the longitudinal direction of the spacer part 410 so that two intermediate plates 405a and 405b are disposed in the air space between the first glass plate 402a and the second glass plate 402b to be spaced apart from the first and second glass plates 402a and 402b. That is, Fig. 68(a) illustrates an example of a quadruple type multiple glazing sash (a multiple glazing sash having three air spaces 404a, 404b and 404c) having totally 4 plates of two glass plates and two intermediate plates. Further, Fig. 68(b) illustrates an quintuple type multiple glazing sash (a multiple glazing sash having four air spaces 404a, 404b, 404c and 404d) having totally five plates of two glass plates and three intermediate plates, having three groove parts 414, 414, 414 provided in rows to be spaced apart from one another in a middle part on an inner surface part 406 of the spacer part 410 along the longitudinal direction of the spacer part 410 and three intermediate plates 405a, 405b and 405c disposed to the three groove parts. On both sides of each groove part 414 in such examples also, lip parts 415, 415 made of an elastic material are provided so as to support an edge part of the intermediate plate 405 disposed to the groove part 414, and at the bottom of each groove part 414, a base part 416 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 405a, 405b or 405c to be disposed to the groove part 414 and to secure positioning.

[0310] In the multiple glazing sash of the embodiment 5 of the present invention, the first and second glass plates 402a and 402b are spaced apart at their periphery by the frame body, and between the two glass plates, one air space 404, or a plurality of air spaces 404a, 404b and 404c or air spaces 404a, 404b, 404c and 404c are formed by one or more intermediate plates, and in such an air space, a gas such as dry air or an inert gas is filled to increase the heat insulating property and/or sound insulation property, and a dew condensation preventing function is imparted to the air space in the multiple glazing sash by a drying agent contained in a space part of the spacer part.

[0311] In the frame body 403 of the multiple glazing sash of the embodiment 5 of the present invention, a groove part 417 surrounded by the projecting legs 411, 411 of the projecting leg part 413 and the outer side part 407 of the spacer part 410 is formed in the longitudinal direction of the frame body 403. For example, as shown in Fig. 66, the groove part 417 has a substantially bilat-

erally symmetrical structure relative to the center line B-B of the frame body 403, is formed below the outer side part 407 of the spacer part 410 between the pair of projecting legs 411, 411 on both sides, and opens downward.

[0312] As shown in Figs. 64 to 72, on at least a part of an inner surface of the groove part 417 of the frame body 403 of the multiple glazing sash of the embodiment 5 of the present invention, a moisture-proof layer 418 for preventing moisture from passing from outside to the air space side of the multiple glazing sash is formed. The moisture-proof layer 418 is preferably formed in the longitudinal direction of the groove part 417, covering at least a part of the pair of projecting legs 411 on both sides of the projecting leg part 413 and at least a part of the outer side part 407 of the spacer part 410, on the inner side of the groove part 417. Further, depending upon the thickness of the pair of projecting legs 411 on both sides of the projecting leg part 413 of the frame body 403, the thickness of the outer side part 407 of the spacer part 410, and the moisture-proof performance of the moisture-proof layer, the moisture-proof layer 418 may be formed in the longitudinal direction of the groove part 417 covering either one of a part of the pair of projecting legs 411 on both sides of the projecting leg part 413 and a part of the outer side part 407 of the spacer part 410.

[0313] In the multiple glazing sash of the present invention, since the frame body is formed of a synthetic resin material such as a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin material, in order to obtain moisture-proof property at the same level as a frame body made of aluminum which itself has high moisture-proof property, the frame body should be thick, thus increasing the weight or the size of the frame body itself. However, according to the present invention, moisture permeability can be lowered by forming the moisture-proof layer on the inner side of the groove part of the frame body, whereby drawbacks such as a heavy weight and a large size of the frame body itself formed of a synthetic resin can be removed.

[0314] The moisture-proof layer is made of a material which can prevent moisture from passing to the air space of the multiple glazing sash through the frame body itself made of a synthetic resin. Such a moisture-proof layer is preferably a layer obtained by applying a moisture-proof coating and curing it, or a layer obtained by bonding a moisture-proof film-form body.

[0315] The moisture-proof coating may be a fluorinated resin coating or a polyvinylidene chloride resin coating as representative examples. The thickness of a cured film of the moisture-proof coating depends on the thickness of the projecting leg 411 of the projecting leg part 413 of the frame body 403 and the outer side part 407 of the spacer part 410, and is preferably at least 25 μm. In a case where the moisture-proof layer is formed by applying the moisture-proof coating, the moisture-proof layer may have a multilayer structure of two or more layers by applying two or more moisture-proof coatings.

[0316] Further, the moisture-proof film-form body may be a metal-coated film, a ceramic-coated film, a metal and ceramic composite-coated film, a metal tape, each having a moisture-proof function, a moisture-proof resin film which itself is made of a resin having a moisture-proof function, or a moisture-proof resin-coated film. For example, the metal-coated film may be an aluminum-coated film obtained by coating a plastic film carrier with aluminum having a moisture-proof function by means of a vacuum deposition method, a sputtering method or the like, as a representative example. Further, the ceramic-coated film may be a ceramic-coated film obtained by coating a plastic film carrier with a metal oxide (for example, SiO_2) having a moisture-proof function by means of a vacuum deposition method, a sputtering method or the like, as a representative example. Further, the metal tape may be an aluminum metal tape or a stainless steel metal tape as representative examples. The moisture-proof resin film may be a fluorinated resin film or a polyvinylidene chloride film as representative examples.

[0317] The moisture-proof film-form body is preferably one having a pressure-sensitive adhesive or an adhesive formed on a side to be bonded to the groove part of the moisture-proof film-form body, so that it can easily be bonded to an inner surface of the groove part formed by the projecting legs on both sides of the projecting leg part and the outer side part of the spacer part of the frame body. Further, a moisture-proof film-form body having a butyl tape comprising a butyl rubber type adhesive and a metal tape laminated, which is easily bonded to the groove part and which is excellent in the moisture-proof performance, is also preferred. One type of such moisture-proof film-form body may be formed on the groove part e.g. by means of bonding, or two or more of such moisture-proof film-form bodies may be formed on the groove part as overlaid, or moisture-proof film-form bodies of partly different types may be formed. Further, in formation of the moisture-proof film-form body on the groove part, a reinforcing member, a reinforcing core or the like may be formed in the groove part.

[0318] The thickness of the moisture-proof film-form body depends on the thickness of the projecting leg 411 of the projecting leg part 413 of the frame body 403 and the outer side part 407 of the spacer part 410, and is preferably at least 25 μm.

[0319] Now, structures of specific examples of the multiple glazing sash of the embodiment 5 of the present invention will be described with reference to drawings.

[0320] Figs. 64 to 68 illustrate representative examples of the multiple glazing sash of the embodiment 5 of the present invention, and the projecting legs 411 of the projecting leg part 413 of the frame body 403 are provided to a peripheral edge part of two glass plates 402a and 402b spaced part for interior decoration. Further, bent projecting legs 412 of the projecting leg part 413 are bent from terminal parts on the opposite side of the projecting legs 411 from side parts 408 of the spacer part 410, to the glass plates 402a and 402b side, extend toward the

lateral direction, and protect and support edge face parts of the glass plates, and further as the case requires, prevent dropping of the glass plates, and the lengths of tips of the bent portions of the bent projecting legs 412 are preferably about the thicknesses of the glass plates or lengths such that the bent projecting legs slightly protrude outside the glass plates. According to the preferred embodiment of the present invention, the side part of the spacer part and the projecting leg of the projecting leg part of the frame body integrally formed of a synthetic resin are connected and form a continuous face. Since the projecting leg 411 of the projecting leg part 413 and the side part 408 of the spacer part 410 form a continuous face, the projecting leg 411 of the projecting leg part 413 and the side part 408 of the spacer part 410 of the frame body 413 may be a design face at a peripheral part of the multiple glazing sash, by considering the color tone, the plane conditions, etc. of the projecting leg 411 of the projecting leg part 413 and the side part 408 of the spacer part 410 of the frame body 403, on the glass plate side.

[0321] It is preferred to provide a thin plate part 419 on the inner surface part 406 of the spacer part 410 as shown in Figs. 64 to 72. The thin plate part 419 is formed so that an air hole to allow air permeation between the space part 409 and the air space 404 is easily formed, and by the air hole, the dry state of the air space is maintained by a drying agent, and dew condensation of the multiple glazing sash can be prevented.

[0322] In Figs. 64 to 72, for convenience, the structure of the frame body 403 disposed on the lower side is described in detail, and the structures of the upper side frame body and the side frame bodies are preferably basically the same as the structure of the frame body disposed on the lower side shown in the drawings, with a view to reducing the number of members. However, the structures may partly be changed depending upon the positions where they are disposed, and the region.

[0323] Fig. 66 is a partial cross-sectional view specifically illustrating an embodiment of usage of the multiple glazing sash having the frame body structure shown in Fig. 64. The reference symbols for the respective members are the same as in Fig. 64. As shown in Figs. 64 and 66, the side part 408 of the spacer part 410 and the projecting leg 411 of the projecting leg part 413 of the frame body 403 are connected to form a continuous face. Excluding concave parts as described hereinafter, in the plane direction in parallel with the plane of the glass plates 402a and 402b facing each other, the side part 408 of the spacer part 410 and the projecting leg 411 of the projecting leg part 413 of the frame body 403 form a substantially flat plane.

[0324] As the structure of a portion where the frame body 403 having the side part 408 of the spacer part 410 and the projecting leg 411 of the projecting leg part 413 connected to each other faces the glass plate 402a or 402b, as shown in Figs. 69 and 70, a concave part 420 may be formed on the surface of the side part 408 of the spacer part 410 and/or the projecting leg 411 of the projecting leg part 413 of the frame body 403 faces the glass plate 402a or 402b. When the concave part 420 is formed, an adhesive layer 421 may be thick in the region of the concave part 420, thus increasing the adhesion property and the sealing property.

[0325] Further, the structure of the projecting leg part 413 of the frame body 403 may be, as shown in Figs. 71 and 72, such that an edge portion of the projecting leg 411 (that is, a portion opposite from the outer side part 407 of the spacer part 410) is bent toward the inner side direction of the groove part 417 and extends toward the tip direction of the glass plate 402a or 402b. By such a structure of the projecting leg 411 having a bent tip part 423, a concave part 424 is formed at a peripheral edge part of the glass plate 402a or 402b, and accordingly by filling the concave part 424 with a sealing medium 425 having a low water permeability and excellent adhesion property, the adhesion property and the sealing property of the multiple glazing sash can be further increased. For example, a sealing medium comprising an adhesive excellent in the adhesion property and a moisture-proof material mixed may be used, or an adhesive excellent in the adhesion property and a moisture-proof material may be partly applied. Otherwise, a bent tip part 423 is not provided to the tip part of the projecting leg 411 of the projecting leg part 413, and the tip of the projecting leg 411 may be linear. Such a shape is an example in which no bent projecting leg 412 is formed on the tip of the projecting leg 411 of the projecting leg part 413 in the frame body 403 shown in Figs. 64 to 68.

[0326] Further, as shown in Figs. 66 and 67, it is preferred that the frame body 403 has a substantially bilaterally symmetrical structure relative to the center line B-B in the longitudinal cross section in the thickness direction of the multiple glazing sash, and the shape of the longitudinal cross section of the groove part 417 is a substantially U-shape. To the groove part 417, a sash roller, a sash roller-bearing member, a latch member or another sash functional member may be provided. Such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash by the frame body. The heights of the side parts 408, 408 on both sides of the spacer part 410 of the frame body 403 (substantially corresponding to the thickness of the spacer part) are preferably the same or substantially the same. Further, the heights of the projecting legs 411, 411 on both sides of the projecting leg part 413 are also preferably the same or substantially the same. The height of the side part 408 of the spacer part 410 of the frame body 403 is selected considering the adhesion strength between the glass plate 402a or 402b and the side part 408 of the spacer part 410 by an adhesive, the moisture-proof property and the design property, and the height of the projecting leg 411 of the projecting leg part 413 is selected so that the above sash functional member can be shielded, and considering the adhesion strength between the glass plate 402a or 402b and the projecting leg 411 of the projecting leg part 413 by an adhesive, the

moisture-proof property and the design property. Specifically, the height of the side part 408 of the spacer part 410 of the frame body is preferably within a range of from 5 mm to 15 mm, and the height of the projecting leg 411 of the projecting leg part 413 is preferably within a range of from 15 mm to 50 mm.

[0327] On a part of a plane on the glass plate 402a or 402b side of the side part 408 of the spacer part 410 of the frame body, as shown in Figs. 65 to 72, a concave part 420 having a predetermined width is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 402a or 402b and the side part 408 of the spacer part 410 will not protrude to the air space side of the side part 408 and that a predetermined thickness of the adhesive layer 421 can be secured at the time of production of the multiple glazing sash. Further, also on a part of a plane on the glass plate 402a or 402b side of the projecting leg 411 of the projecting leg part 413, a concave part 422 having a predetermined width is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 402a or 402b and the projecting leg 411 of the projecting leg part 413 will not protrude outside the projecting leg 411 (that is, the edge face side of the glass plate 402a or 402b) and that a predetermined thickness of the adhesive layer 421 can be secured at the time of production of the multiple glazing sash.

[0328] As shown in Figs. 66 and 67, an edge part protecting cover 430 may be disposed to the groove part 417 formed between the pair of projecting legs 411 on both sides of the projecting leg part 413. The edge part protecting cover 430 may have any structure so long as the groove part 417 can be clogged at the edge face of the multiple glazing sash. Further, the edge part protecting cover 430 may have a structural part to support the edge faces of the glass plates 402a and 402b.

[0329] The edge part protecting cover 430 shown in the drawings has a bottom part 431 to clog the bottom of the groove part 417 in the longitudinal direction of the edge face of the multiple glazing sash, guide rib parts 432, 432 the tip of which is bent in a L-shape, provided so that they can be attached to guide convex strips 426, 426 provided on the lower side on the groove part 417 side of the projecting legs 411, 411, as sliding from the lateral direction, and bent parts 433 facing outside edge face parts of the glass plates 402a and 402b. The example shown in the drawings illustrates an edge part protecting cover of a slide attaching type, but the edge part protecting cover is not limited thereto, and an edge part protecting cover of a structure such that it can be attached by a fitting method from bottom in Figs. 66 and 67 to the groove part 417, or of a structure such that it can be attached by another attaching method, may be used.

[0330] On the lower side of the multiple glazing sash, in the case of a sliding door, an edge part protecting cover may be provided on a portion excluding the sash roller. Further, on the upper side and on the sides of the multiple glazing sash, an edge part protecting cover 430 is preferably disposed. Even when frame bodies having the same shape as above are used for four sides of a multiple glazing sash in which the glass plates are rectangular, by disposing an edge part protecting cover 430 to a groove part of each frame body on the upper side and on the sides, the groove part 417 can be clogged, and such a multiple glazing sash can be practically used, and such is effective to reduce the number of members in assembling of the multiple glazing sash.

[0331] In a case where the edge part protecting cover 430 is provided to the groove part 417 on the upper side, the left side or the right side of the multiple glazing sash, the structure of the edge part protecting cover 430 may be changed depending upon the function required in the upper side, the left side or the right side.

[0332] In a case where the multiple glazing sash is used for a swing window, since a roller sash is not necessary, the structure change of the edge part protecting cover on the lower side and on the upper side in conformity with the sash roller is unnecessary, and the covers for the lower side, the upper side, the left side and the right side may have the same structure.

[0333] The shape and the thickness of the first and second glass plates 402a and 402b are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash, and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, the thicknesses are within a range of from 0.7 mm to 10 mm, and it is preferred that the sizes of the rectangles of the plurality of glass plates are substantially the same. Further, the plurality of glass plates may be different in the thickness or the type. Further, as the type of the glass plate, a float glass plate or a common glass plate commonly used for buildings, and in addition, a so-called chemically tempered glass plate obtained by applying an ion exchange tempering treatment to a glass plate, may be used. A chemically tempered glass plate has a compression stress applied to its surface by the tempering treatment and thus has increased breaking strength, and accordingly its thickness can be reduced, for example, to a level of from 0.7 to 2 mm. Accordingly, by use of a chemically tempered glass plate, weight saving and reduction in thickness of the multiple glazing sash can be achieved by reduction in thickness of the glass plate as compared with a thickness (for example, 3 to 6 mm) of a float glass plate or a common glass plate. In a case where the plurality of glass plates are rectangular, the plurality of glass plates are preferably spaced apart at their peripheral four edge sides by the frame body (that is, the frame bodies on the upper side, the left side, the right side and the lower side) to constitute a multiple glazing sash. At four corners where the frame bodies on the upper side, the left side, the right side and the lower side are butted, corner blocks are inserted to connect the respective frame bodies. Use of frame bodies having the same shape for four sides of the multiple glazing sash is preferred, whereby the number of members in assem-

bling of the multiple glazing sash can be reduced, and the outer appearances and the designs of the peripheral parts of the multiple glazing sash can be coordinated.

[0334] In the multiple glazing sash, the intermediate plate 405 (405a, 405b, 405c) disposed between the first and second glass plates 402a and 402b to be spaced apart from the glass plates 402a and 402b in parallel with the glass plates 402a and 402b, is to reduce the convection of the gas in a space between the first and second glass plates 402a and 402b thereby to increase the heat insulating property and to increase the sound insulation performance. And, since the intermediate plate 405 (405a, 405b, 405c) is disposed between the first and second glass plates 402a and 402b and is not exposed to the outside, its strength may be low as compared with the first and second glass plates, and a thin material may be used. Therefore, even a triple or more multiple glazing sash can have a small entire thickness. Such an intermediate plate may, for example, be a glass plate, a plastic plate or a plastic film. The intermediate plate may be a transparent plate, may be a colored plate, may be a plate with a pattern, or a combination thereof. The intermediate plate is properly selected depending upon the location where the sash is used, the region, the design property, etc. As a glass plate used as the intermediate plate, since it is disposed between the first and second glass plates 402a and 402b, a glass plate having a thickness of at most 2 mm is preferred, whereby the entire thickness can be made thin. A glass plate having such a thickness is preferred, since it has high transparency and durability and higher rigidity, whereby a disposition operation of inserting the intermediate plate to the groove part 414 of the spacer part 410 of the frame body 403 is easily carried out.

[0335] Particularly, as the intermediate plate 405, a chemically tempered glass plate having sufficient strength even when it is made thin can be preferably used. A chemically tempered glass plate is a glass plate produced by a chemical tempering technique of dipping a glass plate containing a Na component and a Li component such as soda lime silicate glass in a molten salt of e.g. potassium nitrate to replace Na ions and/or Li ions having a small atomic size present on the surface of the glass plate with K ions having a large atomic size present in the molten salt to form a compression stress layer on the surface layer of the glass plate thereby to increase the strength, and has a sufficiently high breaking strength even when the thickness is at most 2 mm. Accordingly, use of a chemically tempered glass plate as the intermediate plate 5, at the time of preparation of the multiple glazing sash of the present invention, breakage of the intermediate plate can be prevented, such being particularly preferred.

[0336] In the multiple glazing sash of the embodiment 5 of the present invention, the side part 408 of the spacer part 410 and the projecting leg of the projecting leg part of the frame body are bonded to the glass plate 402a or 402b at a portion where they face the glass plate 402a or 402b, by an adhesive layer 421, and they are sealed to maintain airtightness of the air space 404 formed by the first and second glass plates 402a and 402b.

[0337] As shown in Fig. 73, in the groove part 417 of the frame body 403 on the lower side of each of multiple glazing sashes 401a and 401b of the present invention, applied to a sliding window, a sash roller 440 is rotatably attached via a sash roller-attaching member 441, and each of the multiple glazing sashes 401 a and 401 b is constituted so that it can move along a moving rail 444 provided on the upper side of a window frame 443. An edge part protecting cover 430a is disposed between a lower edge part 445 on both sides of the sash roller-attaching member 441 and a lower edge of the projecting leg 411, and a fin part 446 in contact with the moving rail 444 is provided to the moving rail 444 side of the edge part protecting cover 430a.

[0338] In Fig. 73, as the sash roller-attaching members 441 for the multiple glazing sashes 401 a and 401 b on both sides, members having different structures are exemplified.

[0339] Further, to the groove part 417 of an upper side frame body 403 of each multiple glazing sash, a moving rail 448 provided on an upper side of a window frame 443 is fitted, and an edge part protecting cover 430b having a concave part 447 having fin parts 449, 449 is attached so that the multiple glazing sash 401 a or 401 b can move as guided along the moving rail 448.

[0340] Fig. 74 is a view illustrating a meeting portion of the multiple glazing sashes applied to the sliding window shown in Fig. 73. To an edge part protecting cover 430c attached to a groove part 417 of a side frame body 403 of the multiple glazing sash, a meeting part airtight material 450 which contacts with a meeting part airtight material of the other multiple glazing sash at a meeting portion of the multiple glazing sashes 401 a and 401 b is provided, and a jamb airtight material 451 is provided to a portion in contact with a window frame 443. In Fig. 74, the same members as in Fig. 73 are represented by the same symbols.

[0341] The thicknesses and the heights of the respective parts of the frame body used for the multiple glazing sash of the embodiment 5 of the present invention, are determined considering the moisture-proof property, the heat insulating property, a variation in the internal pressure of the air space of the multiple glazing sash, and the strength, durability, etc. of the multiple glazing sash, and in a case where the multiple glazing sash has a structure and a shape as shown in Figs. 64 to 68, they are preferably as follows.

- ·The height of the side part 408 of the spacer part 410 of the frame body 403: 5 to 15 mm.
- ·The thickness of the side part 408 of the spacer part 410 of the frame body 403: 0.7 to 3.0 mm.
- ·The thickness of the inner surface part 406 and the outer side part 407 of the spacer part 410 of the frame body 403: 0.7 to 3.0 mm.

·The width of the inner surface part 406 and the outer side part 407 of the spacer part 410 of the frame body 403: 4 to 50 mm.
·The height of the projecting leg 411 of the projecting leg part 413 of the frame body 403: 15 to 50 mm.
·The thickness of the projecting leg 411 and the bent projecting leg of the projecting leg part 413 of the frame body 403: 0.7 to 3.0 mm.
·The distance between the first glass plate 402a and the second glass plate 402b (that is, the width of the spacer part 10): 4 to 50 mm.

[0342] Further, in the case of a multiple glazing sash having a triple type structure and shape as shown in Fig. 65, they are preferably as follows. In the case of a multiple glazing sash of such a type, the distance between the first glass plate 402a and the intermediate plate 405 and the distance between the second glass plate 402b and the intermediate plate 405 may be the same or different. Further, the height and the thickness of the side part 408 of the spacer part 410 of the frame body 403, the thickness and the width of the inner surface part 406 and the outer side part 407 of the spacer part 410 of the frame body 403, the height of the projecting leg 411 of the projecting leg part 413 of the frame body 403, and the thickness of the projecting leg 411 and the bent projecting leg of the projecting leg part 413 of the frame body 403 are as described above.

·The distance between the first glass plate 402a and the second glass plate 402b (that is, the width of the spacer part 410): 8 mm to 50 mm.
·The distance between the first glass plate 402a and the intermediate plate 405: 4 mm to 25 mm.
·The distance between the second glass plate 402b and the intermediate plate 405: 4 mm to 25 mm.

[0343] As the adhesive to be used to bond the glass plate 402a, 402b and the side part 408 of the spacer part 410 to be used for the multiple glazing sash of the embodiment 5 of the present invention, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate 402a, 402b and the side part 408 of the spacer part 410, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 402a, 402b and the spacer part 410. For example, in a case where the side part 408 of the spacer part 410 is made of a synthetic resin material such as a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. Also as the adhesive to be used to bond the glass plate 402a, 402b and the projecting leg 411 of the projecting leg part 413, in the same manner as above, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate 402a, 402b and the projecting leg 411 of the projecting leg part 413, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 402a, 402b and the projecting leg 411. For example, in a case where the projecting leg 411 of the projecting leg part 413 is made of a synthetic resin material such as a rigid vinyl chloride resin or an acrylonitrile/styrene rein, in the same manner as above, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive type. In a case where the projecting leg part 413 of the frame body 403 has a bent projecting leg 412 connected to the projecting leg 411 and facing an edge face part of the glass plate 402a, 402b, a void part may be provided between the edge face part of the glass plate 402a, 402b and the bent projecting leg 412, and a sealing medium having high moisture-proof performance is filled in the void part, whereby the moisture-proof function and the sealing performance of the multiple glazing sash can be further increased.

[0344] The adhesive to be used to bond the glass plate 402a, 402b and the side part 408 of the spacer part 410, and the adhesive to be used to bond the glass plate 402a, 402b and the projecting leg 411 of the projecting leg part 413, are preferably the same, whereby the number of the bonding steps is reduced, however, depending upon the performance required for the multiple glazing sash, different adhesives may be used to function differently depending upon the performance required. Further, the adhesive to be used may be a transparent adhesive, or may be a black or another properly colored adhesive. By using a transparent adhesive, the projecting leg of the projecting leg part and the side part of the spacer part of the frame body may form a design face of the multiple glazing sash at the peripheral part of the glass plate. Further, by using a black or another properly colored adhesive, the resulting adhesive layer may form a design face of the multiple glazing sash.

(Description of embodiment 6)

[0345] Now, the multiple glazing sash of the embodiment 6 of the present invention will be described in detail with reference to Figs. 75 to 81. The multiple glazing sash having the constitutions of Figs. 75 to 81 is based upon Japanese Patent Application No. 2013-073371 which the present application is based upon the claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 5.

[0346] Fig. 75 is a front view illustrating the multiple glazing sash according to the embodiment 6 of the present invention, Figs. 76, 77 and 78 are partial cross-sectional schematic perspective view illustrating the multiple glazing sash according to the embodiment 6 of the

present invention (details of the frame body are omitted), Fig. 79 is a schematic longitudinal sectional view illustrating the frame body portion shown by the circle A in Fig. 76, and Fig. 80 is a longitudinal sectional view illustrating a scheme of the frame body portion shown by the circle A in Fig. 77. In Fig. 75, the reference symbol 501 represents a multiple glazing sash, 502 a glass plate, and 503 a frame body of the multiple glazing sash, and 503a represents an upper side frame body, 503b a side frame body of the multiple glazing sash, and 503c a lower side frame body of the multiple glazing sash. Hereinafter in this specification, the upper side frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to as a frame body 503.

[0347] Fig. 76 illustrates an example of a double type multiple glazing sash (that is, a type having two glass plates and one air space 404) having a first glass plate 502a and a second glass plate 502b spaced apart. Further, Fig. 77 illustrates an example of a triple type multiple glazing sash (that is, a multiple glazing sash having two air spaces 504a and 504b) having totally three plates of two glass plates and one intermediate plate, having a first glass plate 502a and a second glass plate 502b spaced apart and having one intermediate plate 505 disposed between the first glass plate 502a and the second glass plate 502b. Further, Fig. 78 illustrates an example of a quadruple type multiple glazing sash (that is, a multiple glazing sash having three air spaces 504a, 504b and 504c) having totally four plates of two glass plates and two intermediate plates, having a first glass plate 502a and a second glass plate 502b spaced apart and two intermediate plates 505a and 505b disposed between the first glass plate 502a and the second glass plate 502b.

[0348] The frame body 503 of the multiple glazing sash shown in Figs. 76, 77 and 78 comprises, as shown in Figs. 79, 80, 81 (a) and 81 (b), a spacer part 510 having an inner surface part 506 and an outer side part 507 keeping a space between the first and second glass plates 502a and 502b, side parts 508, 508 connected to the inner surface part 506 and the outer side part 507 and facing the inner side of the glass plates 502a, 502b, and a space part 509 in which a drying agent is contained, and a projecting leg part 513 having projecting legs 511, 511 facing the inner side of a peripheral edge part of the two glass plates 502a, 502b, and bent projecting legs 512 connected to the projecting leg 511, 511 and facing an edge face part of the glass plates 502a, 502b, and the spacer part 510 and the projecting leg 513 of the frame body are integrally formed of a frame body-forming material.

[0349] In the embodiment 6 (the same applies to the other embodiments) of the present invention, "integrally formed" means that a synthetic resin material for forming a frame body or an aluminum material is formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method. The synthetic resin material for forming a frame body is preferably a synthetic resin material such as a polyvinyl chloride resin, an acrylonitrile/styrene resin, an acrylic resin, an ABS resin (a copolymer synthetic resin of acrylonitrile, butadiene and styrene) or a polyester resin. Further, the synthetic resin material for forming a frame body is not limited to one type, and a plural types of materials may be used to form a composite structure. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different synthetic resin materials. In the case of such a composite structure frame body, the frame body may be obtained by integrally forming any one type of synthetic resin materials for forming a frame body, and a different synthetic resin material and/or metal material may be partially or entirely bonded to the integrally formed frame body. Particularly, a frame body comprising the spacer part 510 and the projecting leg part 513 integrally formed of a rigid polyvinyl chloride material or an acrylonitrile/styrene resin is excellent in the heat insulating property when used for a sash, its integral forming is easy, it is excellent in the durability and it is available at a low cost.

[0350] The frame body for a multiple glazing sash shown in Fig. 80 has a groove part 514 into which one intermediate plate is inserted, formed in a middle part on an inner surface part 506 of the spacer part 510 along the longitudinal direction of the spacer part 510 so that one intermediate plate 505 can be disposed in an air space formed by disposing the first glass plate 502a and the second glass plate 502b to be spaced apart at their periphery by the frame body 503, to be spaced apart from the first and second glass plates 502a and 502b, to form air spaces 504a and 504b. The intermediate plate 505 disposed to be spaced apart from the glass plates 502a and 502b in parallel with the glass plates 502a and 502b, is to reduce the convection of the gas in a space part between the first and second glass plates 502a and 502b thereby to increase the heat insulating property, and to increase the sound insulation performance (the intermediate plate disposed in Figs. 81(a) and 81(b) functions in the same manner). Further, on both sides of the groove part 514, lip parts 515, 515 made of an elastic material are provided so as to support an edge part of the intermediate plate 505 disposed to the groove part 514, and at the bottom of the groove part 514, a base part 516 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 505 disposed to the groove part 514 and to secure positioning. The method of supporting the intermediate plate is not limited to the above supporting method by lip parts, and may be a supporting method by a glazing channel or may be a supporting method by a sealing material or a backup material.

[0351] Further, in the frame body 503 of the multiple glazing sash shown in Fig. 81 (a), two groove parts 514, 514 are provided in rows to be spaced apart from each other in a middle part on an inner surface part 506 of the spacer part 510 along the longitudinal direction of the

spacer part 510 so that two intermediate plates 505a and 505b are disposed in the air space between the first glass plate 502a and the second glass plate 502b to be spaced apart from the first and second glass plates 502a and 502b. That is, Fig. 81 (a) illustrates an example of a quadruple type multiple glazing sash (a multiple glazing sash having three air spaces 504a, 504b and 504c) having totally four plates of two glass plates and two intermediate plates. Further, Fig. 81 (b) illustrates an quintuple type multiple glazing sash (a multiple glazing sash having four air spaces 504a, 504b, 504c and 504d) having totally five plates of two glass plates and three intermediate plates, having three groove parts 514, 514, 514 provided in rows to be spaced apart from one another in a middle part on an inner surface part 506 of the spacer part 510 along the longitudinal direction of the spacer part 510 and three intermediate plates 505a, 505b and 505c disposed to the three groove parts. On both sides of each groove part 514 in such examples also, lip parts 515, 515 made of an elastic material are provided so as to support an edge part of the intermediate plate 505 disposed to the groove part 514, and at the bottom of each groove part 514, a base part 516 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 505a, 505b or 505c disposed to the groove part 514 and to secure positioning.

[0352] In the multiple glazing sash of the embodiment 6 of the present invention, the first and second glass plates 502a and 502b are spaced apart at their periphery by the frame body 503, and between the two glass plates, one air space 504, or a plurality of air spaces (504a and 504b), (504a, 504b and 504c) or (504a, 504b, 504c and 504d) are formed by one or more intermediate plates, and in such an air space, a gas such as dry air or an inert gas is filled to increase the heat insulating property and/or sound insulation property, and a dew condensation preventing function is imparted to the air space in the multiple glazing sash by a drying agent contained in a space part of the spacer part.

[0353] Further, in the multiple glazing sash, the side part 508 of the spacer part 510 and the projecting leg 511, 511 of the projecting leg part 513 of the frame body 503 are bonded to the first or second glass plate 502a, 502b at a predetermined region where they face the first or second glass plate 502a or 502b, by an adhesive layer 521, whereby the frame body is bonded to the first and second glass plates 502a and 502b to maintain the sealing property of the air spaces 504, 504a, 504b, 504c and 504d formed between the first and second glass plates 502a and 502b.

[0354] Now, the process for producing a multiple glazing sash of the embodiment 6 of the present invention will be described.

[0355] The process according to a first embodiment of the embodiment 6 of the present invention is a process for producing a multiple glazing sash, which comprises a bonding step of disposing a first glass plate and a second glass plate, and a frame body having a spacer part and a projecting leg part, at a periphery of the glass plates so that an air space is formed between the first glass plate and the second glass plate, and applying an adhesive to at least a part of a region where the frame body faces the first glass plate and the second glass plate and bonding them to seal the air space, wherein the bonding step comprises the following steps. That is, the process comprises:

- a step of covering at least a part of a region in which the frame body is to be disposed of the first glass plate to form a first adhesive layer having a predetermined width (step 1-1),
- a step of covering at least a part of a region in which the frame body is to be disposed of the second glass plate to form a first adhesive layer having a predetermined width (step 1-2),
- a step of forming a second adhesive layer narrower than the first adhesive layer having a predetermined width on a region facing the first glass plate of the frame body (step 1-3),
- a step of forming a second adhesive layer narrower than the first adhesive layer having a predetermined width on a region facing the second glass plate of the frame body (step 1-4),
- a step of contacting the first adhesive layer and the second adhesive layer to bond the first glass plate and the frame body (step 1-5), and
- a step of contacting the first adhesive layer and the second adhesive layer to bond the second glass plate and the frame body (step 1-6).

[0356] The above steps may be conducted in the above order, however, the order of the steps 1-1 to 1-4 is not limited and may properly be changed, or the steps may be conducted simultaneously. The steps 1-5 and 1-6 are conducted after completion of the steps 1-1 to 1-4, however, the order of the steps 1-5 and 1-6 is not limited, and either step may be conducted first, or both the steps may be conducted simultaneously.

[0357] The process according to a second embodiment of the embodiment 6 of the present invention is a process for producing a multiple glazing sash, which comprises a bonding step of disposing a first glass plate and a second glass plate, and a frame body having a spacer part and a projecting leg part, at a periphery of the glass plates so that an air space is formed between the first glass plate and the second glass plate, and applying an adhesive to at least a part of a region where the frame body faces the first glass plate and the second glass plate and bonding them to seal the air space, wherein the bonding step comprises the following steps. That is, the process comprises:

- a step of covering at least a part of a region in which the frame body is to be disposed of the first glass plate to form a first adhesive layer having a prede-

termined width (step 2-1),
a step of covering at least a part of a region in which the frame body is to be disposed of the second glass plate to form a first adhesive layer having a predetermined width (step 2-2),
a step of covering at least a part of the first adhesive layer surface formed on the first glass plate to form a second adhesive layer having a predetermined width (step 2-3),
a step of covering at least a part of the first adhesive layer surface formed on the second glass plate to form a second adhesive layer having a predetermined width (step 2-4),
a step of bonding the first glass plate and the frame body by means of the first adhesive layer and the second adhesive layer (step 2-5), and
a step of bonding the second glass plate and the frame body by means of the first adhesive layer and the second adhesive layer (step 2-6).

[0358] The above steps may be conducted in the above order, however, the order of the steps 2-1 and 2-2 is not limited, and either step may be conducted first, or they may be conducted simultaneously. Further, the step 2-3 is conducted after completion of the step 2-1, the step 2-4 is conducted after completion of the step 2-2, and the order of the steps 2-3 and 2-4 is not limited, and either may be conducted first or they may be conducted simultaneously. Further, the order of a set of the step 2-1 and the subsequent step 2-3, and a set of the step 2-2 and the subsequent step 2-4, is not limited, and either set may be conducted first, or both the sets may be conducted simultaneously. Further, the step 2-5 is conducted after completion of the steps 2-1 and 2-3, and the step 2-6 is conducted after completion of the steps 2-2 and 2-4, however, the order is also not limited, and either of the steps 2-5 and 2-6 may be conducted first, or they may be conducted simultaneously.

[0359] Now, the process for producing a multiple glazing sash of the embodiment 6 of the present invention will be described in further detail.

[0360] First, first and second glass plates 502a and 502b for the front and rear sides of the multiple glazing sash, and a frame body 503, are prepared.

[0361] The shape and the thickness of the first and second glass plates 502a and 502b are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash, and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are rectangular flat glass plates. The thicknesses of the first and second glass plates are usually within a range of from 0.7 mm to 10 mm, and it is preferred that the sizes of the rectangles of the first and second glass plates are substantially the same. The first and second glass plate may be different in the thickness or the type. Further, as the type of the glass plate, a float glass plate, a common glass plate, a heat-reflecting glass plate, a heat-absorbing glass plate, an ultraviolet-absorbing glass plate, a low-emissivity glass plate (a Low-E glass plate), a figured glass, a laminated glass, a wire or wire mesh glass plate, an air-cooled tempered glass plate, or a glass plate having functions of such glass plates combined, commonly used for buildings, may, for example, be properly used depending upon the aimed specifications required. Further, a so-called chemically tempered glass plate obtained by applying an ion exchange tempering treatment to a glass plate may be used.

[0362] In a case where the first and second glass plates are rectangular, the first and second glass plates are spaced apart at their peripheral four edge sides by the frame body (that is, the upper side, left side, right side and lower side frame bodies). As one specific method of assembling the frame bodies of the multiple glazing sash, at four corners where the upper side, left side, right side and lower side frame bodies are butted, corner blocks are inserted to connect the respective frame bodies. Use of frame bodies having the same shape for four sides of the multiple glazing sash is preferred, whereby the number of members in assembling of the multiple glazing sash can be reduced, and the outer appearances and the designs of the peripheral parts of the multiple glazing sash can be coordinated.

[0363] The frame body 3 according to a preferred embodiment used for the process for producing a multiple glazing sash of the embodiment 6 of the present invention, has a side part of a spacer part and a projecting leg of a projecting leg part integrally formed of a synthetic resin are connected to form a continuous face, and excluding concave parts as described hereinafter, in the plane direction in parallel with the plane of the glass plates 502a and 502b facing each other, the side part 508 of the spacer part 510 and the projecting leg 511 of the projecting leg part 513 of the frame body form a substantially flat plane.

[0364] Further, as shown in Fig 79, it is preferred that the frame body 503 has a substantially bilaterally symmetrical structure relative to the center line B-B in the longitudinal cross section in the thickness direction of the multiple glazing sash, and the shape of the longitudinal cross section of the groove part 517 is a substantially U-shape. To the groove part 517, a sash roller, a sash roller-bearing member, a latch member or another sash functional member may be provided. Such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash by the frame body. The heights of the side parts 508, 508 on both sides of the spacer part 510 of the frame body 503 (substantially corresponding to the thickness of the spacer part) are preferably the same or substantially the same. Further, the heights of the projecting legs 511, 511 on both sides of the projecting leg part 513 are also preferably the same or substantially the same. The height of the side part 508 of the spacer part 510 of the frame body 503 is selected considering the adhesion strength between the glass plate 502a, 502b and the side part 508

of the spacer part 510 by an adhesive, the moisture-proof property and the design property, and the height of the projecting leg 511 of the projecting leg part 513 is selected so that the above sash functional member can be shielded, and considering the adhesion strength between the glass plate 502a, 502b and the projecting leg 511 of the projecting leg part 513 by an adhesive, the moisture-proof property and the design property. Specifically, the height of the side part 508 of the spacer part 510 of the frame body is preferably within a range of from 5 mm to 15 mm, and the height of the projecting leg 511 of the projecting leg part 513 is preferably within a range of from 15 mm to 50 mm. The structure of the frame body applied to the present invention is not limited to the above exemplified preferred embodiment of the present invention.

[0365] The process for producing a multiple glazing sash of the embodiment 6 of the present invention will be described with reference to Figs. 82(a) and 82(b). Hereinafter, the process for producing a multiple glazing sash of the present invention with reference to the Figs. 82(a) and 82(b) will be referred to as a first embodiment of the embodiment 6 of the present invention.

[0366] An adhesive is applied or disposed with a predetermined width respectively to a predetermined region in which the frame body 503 is to be disposed of a peripheral part of the first glass plate 502a, so as to form a first adhesive layer 530a, and to a region in which the frame body 503 is to be disposed of a peripheral part of the second glass plate 502b, so as to form a first adhesive layer 530b.

[0367] Further, an adhesive is applied or disposed respectively to a predetermined region at a portion where a side part 508a of the spacer part 510 and a projecting leg 511a of the projecting leg part 513 of the frame body 503 face the first glass plate 502a, so as to form a second adhesive layer 531a, and to a predetermined region at a portion where a side part 508b of the spacer part 510 and a projecting leg 511 b of the projecting leg part 513 of the frame body 503 face the second glass plate 502b, so as to form a second adhesive layer 531b.

[0368] When the adhesive is applied or disposed to the frame body, it is preferred that upper side, left side, right side and lower side frame bodies are connected by corner blocks at edge parts where they are butted and assembled into a frame body, and to a frame body in such a state, as mentioned above, the second adhesive layer 531a is formed on a portion where the side part 508a of the spacer part 510 and the projecting leg 511 a of the projecting leg part 513 face the first glass plate 502a, and the second adhesive layer 531 b is formed on a portion where the side part 508b of the spacer part 510 and the projecting leg 511 b of the projecting leg part 513 face the second glass plate 502b.

[0369] As the adhesive for forming the first adhesive layer, a proper adhesive is used so as to secure excellent adhesion strength between the side part 508a, 508b of the spacer part 510 and the projecting leg 511 a, 511 b of the projecting leg part 513 of the frame body 503, and the first and second glass plates 502a and 502b, moisture-proof property, durability, favorable bonded surface and linearity of the edge of the adhesive layer, in order that bubbles will not form, considering he workability and simplification of the step of bonding the glass plate and the frame body. Further, also as the adhesive for forming the second adhesive layer, a proper adhesive is used considering various aspects. As the adhesives for forming the first adhesive layer and the second adhesive layer, a proper adhesive, double-coated adhesive tape or double-coated pressure-sensitive adhesive tape is selected considering the functions of the respective adhesive layers, workability and finish.

[0370] Each of the first adhesive layers 530a and 530b is formed on the first or second glass plate in the longitudinal direction of the frame body 503 with a predetermined width a covering at least a part of a region where the first or second glass plate is in contact with the side part 508a or 508b of the spacer part 510 and the projecting leg 511 a or 511 b of the projecting leg part 513 of the frame body 503. The edge of the first adhesive layer 530a, 530b on the air space side of the spacer part 510 of the frame body 503 is preferably at the same position as the edge of the spacer part 510 on the air space side, or located on the inner side of the edge. Further, the edge of the first adhesive layer 530a, 530b on the side of the edge face of the first or second glass plate 502a, 502b of the projecting leg 511 of the projecting leg part 513 of the frame body 503 is also preferably at the same position as the edge of the projecting leg part 511 on the edge face side of the first or second glass plate 502a or 502b, or located on the inner side of the edge. The width of the first adhesive layer and the width of the second adhesive layer are preferably determined so that $(m+n) \geqq a > b$ is satisfied, where m is the height of the side part 508 of the spacer part 510 of the frame body 503, n is the height of the projecting leg 511 of the projecting leg part 513, (m+n) is the total height (that is, l), a is the width of the first adhesive layer, and b is the width of the second adhesive layer.

[0371] Further, the second adhesive layers 531 a and 531 b narrower than the first adhesive layers having a predetermined width are formed on a region facing the first or second glass plate 502a, 502b of the frame body. Particularly, it is preferred that the first adhesive layers are formed on a predetermined region of the first and second glass plates 502a and 502b, and the second adhesive layers are formed on a predetermined region of the side parts 508a, 508b of the spacer part 510 and the projecting legs 511 a, 511 b of the projecting leg part 513 of the frame body 503, so that the width of the second adhesive layer is located within the predetermined width of the first adhesive layer and that the second adhesive layer is covered with the first adhesive layer when the first and second glass plates 502a and 502b are bonded to the frame body 503.

[0372] In the process for producing a multiple glazing

sash of the embodiment 6 of the present invention, as the adhesive to be used for forming the first adhesive layer at a peripheral part of the glass plates 502a and 502b, a proper adhesive is used so as to obtain excellent adhesion strength to the side part 508 of the spacer part 510 and the projecting leg 511 a, 511 b of the projecting leg part 513 of the frame body 503, moisture-proof property, durability, favorable bonded surface, etc., and considering the adhesion to the second adhesive layer, excellent durability and simplification of the step of bonding the glass plates 502a and 502b and the spacer part 510. For example, in a case where the frame body 503 comprising the side part 508 of the spacer part 510 and the projecting leg 511 of the projecting leg part 513 integrally formed is made of a synthetic resin material such as a rigid vinyl chloride resin or an acrylonitrile/styrene resin, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. Further, as the adhesive to be used for forming the second adhesive layer on a region stepping over the side part 508 of the spacer part 510 and the projecting leg 511 a, 511 b of the projecting leg part 513 of the frame body 503, in a case where the frame body 503 is made of a rigid vinyl chloride resin, from the same reasons as above, a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape may, for example, be preferably used.

[0373] Further, the adhesive to be used may be a transparent adhesive, or may be a black or another properly colored adhesive. By using a transparent adhesive, the projecting leg of the projecting leg part and the side part of the spacer part of the frame body may form a design face of the multiple glazing sash at the peripheral part of the glass plate. Further, by using a black or another properly colored adhesive, the resulting adhesive layer may form a design face of the multiple glazing sash.

[0374] As the adhesive to be used for forming the first adhesive layer and the adhesive to be used for forming the second adhesive layer, a proper combination is selected so that the respective steps for forming the first adhesive layer and the second adhesive layer, and the step of bonding the first adhesive layer and the second adhesive layer are simplified, sufficient adhesion strength and its durability are secured, bubbles will not form in the adhesive layer, and further, a desired line shape of a boundary of the edge of the adhesive layer i.e. a boundary line will be obtained.

[0375] The first and second glass plates 502a and 502b having the first adhesive layers 530a and 530b having a predetermined width formed at a peripheral part of the first and second glass plates 502a and 502b covering at least a part of a region where the glass plate is in contact with the side part 508a, 508b of the spacer part 510 and the projecting leg 511 a, 511 b of the projecting leg part 513 of the frame body 503, and the frame body 503 having the second adhesive layers 531 a and 531 b narrower than the first adhesive layers having a predetermined with formed on a region facing the first and second glass plates 502a and 502b of the frame body 503, are disposed with the frame body 503 interposed between the first and second glass plates 502a and 502b to form an air space 504 between the first and second glass plates 502a and 502b, and the first adhesive layers 530a and 530b are respectively brought into contact with the second adhesive layers 531 a and 531 b, and the assembly is subjected to a curing treatment or a heat treatment or held for a predetermined time so that the first adhesive layers 530a and 530b are respectively bonded to the second adhesive layers 531 a and 531 b, thereby to produce a multiple glazing sash.

[0376] The layer obtained by contacting and bonding the first adhesive layer and the second adhesive layer as mentioned above is an adhesive layer 521.

[0377] Further, Fig. 82(b) illustrating the process for producing a multiple glazing sash according to one example of the first embodiment of the present invention, illustrates an example of a process for producing a triple type multiple glazing sash (a multiple glazing sash having two air spaces 504a and 504b) having totally three plates of two glass plates and one intermediate plate, having a first glass plate 502a and a second glass plate 502b, and one intermediate plate disposed between the first glass plate 502a and the second glass plate 502b, and the production process of this case is the same as the process described in Fig. 82(a). In Fig. 82(b), the same members as in Fig. 82(a) are represented by the same symbols. The process in Fig. 82(b) is different from the process in Fig. 82(a) in that the process has a step of disposing an intermediate plate 505 to a groove part 514 for insertion of the intermediate plate 505 provided on an inner surface part 506 of the spacer part 510 of the frame body 503.

[0378] Now, an example of the second embodiment of the process for producing a multiple glazing sash of the embodiment 6 of the present invention will be described with reference to Figs. 83(a) and 83(b). In Fig. 83(a), the same members as in Fig. 82(a) are represented by the same symbols.

[0379] An adhesive is applied or disposed with a predetermined width respectively to at least a part of a region in which the frame body 3 is to be disposed of the peripheral part of the first glass plate 502a, so as to form a first adhesive layer 530a, and to at least a part of a region in which the frame body 503 is to be disposed of the peripheral part of the second glass plate 502b, so as to form a first adhesive layer 530b. Then, second adhesive layers 531 a and 531 b are formed with a predetermined width covering at least a part of the first adhesive layer 530a and 530b surfaces formed on the first glass plate 502a and the second glass plate 502b. Then, the first glass plate 502a and the frame body 503 are bonded by

means of the first adhesive layer 530a and the second adhesive layer 531 b, and the second glass plate 502b and the frame body 503 are bonded by means of the first adhesive layer 530a and the second adhesive layer 531 b, and sealed to form an air space 504 between the first glass plate 502a and the second glass plate 502b. In such a manner, a multiple glazing sash having the first glass plate 502a and the second glass plate 502b spaced apart at their periphery by the frame body 503 having the spacer part 510 and the projecting leg part 513, and sealed by an adhesive, and having an air space being formed, is produced.

[0380] The process for producing a multiple glazing sash of the present invention shown in Fig. 83(b) is an example of a process for producing a triple type multiple glazing sash (a multiple glazing sash having two air spaces) having totally three plates of two glass plates and one intermediate plate, having a first glass plate 502a and a second glass plate 502b, and one intermediate plate disposed between the first glass plate 502a and the second glass plate 502b. The production process shown in Fig. 83(b) is the same as the process shown in Fig. 83(a). In Fig. 83(b), the same members as in Fig. 83(a) are represented by the same symbols. The process shown in Fig. 83(b) is different from the process shown in Fig. 83(a) in that the process has a step of disposing an intermediate plate 505 to a groove part 514 for insertion of the intermediate plate 505 provided on an inner surface part 506 of the spacer part 510 of the frame body 503.

[0381] In the second embodiment, the method, material, members and the like are the same as in those in the first embodiment except that the second adhesive layers having a predetermined width are formed covering at least a part of the first adhesive layer surfaces formed on the first and second glass plates, and then the first glass plate and the frame body are bonded by means of the first adhesive layer and the second adhesive layer, and the second glass plate and the frame body are bonded by means of the first adhesive layer and the second adhesive layer.

[0382] In Figs. 82(a), 82(b), 83(a) and 83(b), as a process for producing a rectangular multiple glazing sash, for convenience, a step of bonding the first and second glass plates 502a and 502b and the frame body 503 disposed on one side among four sides is specifically described, however, the steps of bonding the first and second glass plates 502a and 502b and the frame bodies 503 on the other sides are conducted in the same manner, and they are preferably conducted simultaneously.

[0383] The structure of a typical frame body to be used in the process for producing a multiple glazing sash of the embodiment 6 of the present invention is described with reference to Figs. 79 to 81, and the structure of the frame body will be described in further detail.

[0384] As shown in Fig. 79, the projecting leg 511 of the projecting leg part 513 of the frame body is provided to a peripheral edge part of two glass plates 502a, 502b spaced apart for interior decoration. Further, the projecting leg part 513 of the frame body 503 has projecting legs 511 a, 511 b facing the inner side of a peripheral edge part of the first and second glass plates 502a, 502b, and bent projecting legs 512 connected to the projecting leg 511 a, 511 b, bent at a terminal part of the projecting leg 511a, 511b to the glass plate 502a, 502b side, extending in a lateral direction, and facing an edge face part of the glass plate. The bent projecting leg 512 protects and supports an edge face part of the glass plate, and further as the case requires, prevents dropping of the glass plate, and the length of the tip of the bent portion of the bent projecting leg 512 is designed so that the above functions are fulfilled.

[0385] On a part of a plane on the glass plate 502a, 502b side of the side part 508 of the spacer part 510 of the frame body, as shown in Figs. 80 to 85, a concave part 520 having a predetermined width is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 502a or 502b and the side part 508 of the spacer part 508 will not protrude to the air space side of the side part 508 and that a predetermined thickness of the adhesive layer 521 can be secured at the time of production of the multiple glazing sash. Further, also on a part of a plane on the glass plate 502a, 502b side of the projecting leg 511 of the projecting leg part 513, a concave part 522 having a predetermined width is preferably provided so that an adhesive injected, applied or disposed to between the glass plate 502a, 502b and the projecting leg 511 of the projecting leg part 513 will not protrude outside the projecting leg 511 (that is, the edge face side of the glass plate 502a, 502b) and that a predetermined thickness of the adhesive layer 521 can be secured at the time of production of the multiple glazing sash.

[0386] Further, as the structure of a portion where the frame body 503 having the side part 508 of the spacer part 510 and the projecting leg 511 of the projecting leg part 513 connected to each other faces the glass plate 502a, 502b, as shown in Fig. 84, a concave part 518 may be formed on the surface of the projecting leg 511 of the projecting leg part 513 facing the glass plate 502a or 502b. When such a concave part 518 is formed, the adhesive layer 521 may be thicker in the region of the concave part 518, thus increasing the adhesion property and the sealing property.

[0387] Further, the structure of the projecting leg 513 of the frame body 503 may be, as shown in Fig. 85, such that an edge portion of the projecting leg 511 (that is, a portion opposite from the outer side part 507 of the spacer part 510) is bent toward the inner side direction of the groove part 517 and extends toward the tip direction of the glass plate 502a, 502b. By such a structure of the projecting leg 511 having a bent tip part 523, a concave part 524 is formed at a peripheral edge part of the glass plate 502a, 502b, and accordingly by filling the concave part 524 with a sealing medium 525 having a low water permeability and an excellent adhesion property, the adhesion property and the sealing property of the multiple

glazing sash can be further increased. Otherwise, a bent tip part 523 may not be provided to the tip part of the projecting leg 511 of the projecting leg part 513, and the tip of the projecting leg 511 may be linear.

[0388] The thicknesses and the heights of the respective parts of the frame body used for the multiple glazing sash of the embodiment 6 of the present invention are, in a case of a double type multiple glazing sash having a structure and a shape as shown in Fig. 79, preferably as follows, considering the moisture-proof property, the heat insulating property, a variation in the internal pressure of the air space of the multiple glazing sash, and the strength, the durability, etc. of the multiple glazing sash.

- ·The height of the side part 508 of the spacer part 510 of the frame body 503: 5 to 15 mm.
- ·The thickness of the side part 508 of the spacer part 510 of the frame body 503: 0.7 to 3.0 mm.
- ·The thickness of the inner surface part 506 and the outer side part 507 of the spacer part 510 of the frame body 503: 0.7 to 3.0 mm.
- ·The width of the inner surface part 506 and the outer side part 507 of the spacer part 510 of the frame body 503: 4 to 50 mm.
- ·The height of the projecting leg 511 of the projecting leg part 513 of the frame body 503: 15 to 50 mm.
- ·The thickness of the projecting leg 511 and the bent projecting leg 512 of the projecting leg part 513 of the frame body 503: 0.7 to 3.0 mm.
- ·The distance between the first glass plate 502a and the second glass plate 502b (that is, the width of the spacer part 510): 4 mm to 50 mm.

[0389] Further, in the case of a triple type multiple glazing sash having a structure and a shape as shown in Fig. 80, they are preferably as follows. In the multiple glazing sash of such a type, the distance between the first glass plate 502a and the intermediate plate 505 and the distance between the second glass plate 502b and the intermediate plate 505 may be the same or different. Further, the height and the thickness of the side part 508 of the spacer part 510 of the frame body 503, the height and the width of the inner surface part 506 and the outer side part 507 of the spacer part 510 of the frame body 503, the height of the projecting leg 511 of the projecting leg part 513 of the frame body 503, and the thickness of the projecting leg 511 and the bent projecting leg 512 of the projecting leg part 513 of the frame body 503 are as described above.

- ·The distance between the first glass plate 502a and the second glass plate 502b (that is, the width of the spacer part 510): 4 mm to 50 mm.
- ·The distance between the first glass plate 502a and the intermediate plate 505: 4 mm to 25 mm.
- ·The distance between the second glass plate 502b and the intermediate plate 505: 4 mm to 25 mm.

(Description of embodiment 7)

[0390] Now, the multiple glazing sash to which the edge face protecting cover of the embodiment 7 of the present invention is applied will be described in detail with reference to Figs. 86 to 95. The multiple glazing sash having the constitutions of Figs. 86 to 95 is based upon Japanese Patent Application No. 2013-073372, which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 7.

[0391] Fig. 86 is a front view illustrating the multiple glazing sash according to the embodiment 7 of the present invention, and Figs. 87 and 88 are partial cross-sectional schematic perspective views illustrating the multiple glazing sash according to the embodiment 7 of the present invention, and the reference symbol 601 represents a multiple glazing sash, 602 a glass plate, and 603 a frame body of the multiple glazing sash, and 603a represents an upper side frame body, 603b a side frame body of the multiple glazing sash, and 603c a lower frame body of the multiple glazing sash. Hereinafter, in this specification, the upper frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to as a frame body 603. In Figs. 87 and 88, description of the glass edge face protecting cover is omitted so as to simplify the description of the multiple glazing sash.

[0392] Fig. 87 illustrates an example of a double type multiple glazing sash (that is, a type having two glass plates and one air space 604) having a first glass plate 602a and a second glass plate 602b spaced apart. Further, Fig. 88 illustrates an example of a triple type multiple glazing sash (that is, a multiple glazing sash having two air spaces 604a and 604b) having totally three plates of two glass plates and one intermediate plate, having a first glass plate 602a and a second glass plate 602b spaced apart and having one intermediate plate 605 disposed between the first glass plate 602a and the second glass plate 602b.

[0393] The frame body 603 of the multiple glazing sash shown in Figs. 87 and 88 comprises, as shown in Figs. 89 and 90, a spacer part 610 having an inner surface part 606 and an outer side part 607 keeping a space between the first glass plate 602a and the second glass plate 602b, side parts 608, 608 connected to the inner surface part 606 and the outer side part 607 and facing the inner side of the first and second glass plates 602a and 602b, and a space part 609 in which a drying agent is contained, and a projecting leg part 613 having projecting legs 611, 611 facing the inner side of a peripheral edge part of the first glass plate and the second glass plate 602a and 602b, and bent projecting legs 612 connected to the projecting leg 611,611 and facing an edge face part of the glass plates 602a, 602b, and a groove part 617 formed by the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part. Figs. 89(a) and 90(a) illustrate a state

before an edge part protecting cover 630 is attached to the frame body 603, and Figs. 89(b) and 90(b) illustrate a state where the edge part protecting cover 630 is attached to the groove part 617 of the frame body 603.

[0394] The frame body 603 having the spacer part 610 and the projecting leg part 613 is preferably formed of a synthetic resin material for forming a frame body or aluminum material by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method. The synthetic resin material for forming a frame body may, for example, be preferably a synthetic resin material such as a polyvinyl chloride resin, an acrylonitrile/styrene resin, an acrylic resin, an ABS resin (a copolymer synthetic resin of acrylonitrile, butadiene and styrene) or a polyester resin. Further, the synthetic resin material for forming a frame body is not limited to one type, and a plural types of materials may be used to form a composite structure. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different synthetic resin materials. In the case of such a composite structure frame body, the frame body may be obtained by integrally forming any one type of synthetic resin materials for forming a frame body, and a different synthetic resin material and/or metal material may be partially or entirely bonded to the integrally formed frame body. Particularly, a frame body comprising the spacer part 610 and the projecting leg part 613 integrally formed by a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin is excellent in the heat insulating property when used for a sash, its integral forming is easy, it is excellent in the durability and it is available at a low cost.

[0395] In the frame body for the multiple glazing sash shown in Fig. 90, a groove part 614 to which one intermediate plate is inserted is provided in a middle part of an inner surface part 606 of the spacer part 610 along the longitudinal direction of the spacer part 610 so that in an air space formed by disposing the first glass plate 602a and the second glass plate 602b to be spaced apart at their periphery by the frame body 603, one intermediate plate 605 is disposed to be spaced apart from the first and second glass plates 602a and 602b. Further, on both sides of the groove part 614, lip parts 615, 615 made of an elastic material are provided so as to support an edge part of the intermediate plate 605 disposed to the groove part 614, and at the bottom of the groove part 614, a base part 616 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 605 to be disposed to the groove part 614 and to secure positioning. The method of supporting the intermediate plate is not limited to the above supporting method by lip parts, and may be a supporting method by a glazing channel or may be a supporting method by a sealing material or a backup material.

[0396] Further, in the frame body 603 of the multiple glazing sash shown in Fig. 91, two groove parts 6014, 614 are provided in rows in a middle part on an inner surface part 606 of the spacer part 610 along the longitudinal direction of the spacer part 610 so that in an air space between the first glass plate 602a and the second glass plate 602b, two intermediate plates 605a and 605b are disposed to be spaced apart from the first and second glass plates 602a and 602b. That is, Fig. 91 illustrates an example of a quadruple type multiple glazing sash (a multiple glazing sash having three air spaces 604a, 604b and 604c) having totally four plates of two glass plates and two intermediate plates. Further, Fig. 92 illustrates an example of a quintuple type multiple glazing sash (a multiple glazing sash having four air spaces 604a, 604b, 604c and 604d) having totally five plates of two glass plates and three intermediate plates, having three groove parts 614, 614, 614 provided in rows to a middle part of an inner surface part 606 of the spacer part 610, to be spaced apart from each other along the longitudinal direction of the spacer part 610, and having three intermediate plates 605a, 605b and 605c disposed to the groove parts. On both sides of each groove part 614 in this example also, lip parts 615, 615 made of an elastic material are provided so as to support an edge part of the intermediate plate 605 disposed to the groove part 614, and at the bottom of the groove part 614, a base part 616 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate plate 605a, 605b, 605c to be disposed to the groove part 614 and to secure positioning.

[0397] In the multiple glazing sash of the embodiment 7 of the present invention, the first and second glass plates 602a and 602b are spaced apart at their periphery by the above frame body, and between the first and second glass plates 602a and 602b, one air space 604, or a plurality of air spaces (604a, 604b), (604a, 604b, 604c) or (604a, 604b, 604c, 604d) by disposition of one or more intermediate plates, are formed, and in such air spaces, a filler gas such as dry air or an inert gas is filled, thereby to increase the heat insulating property and/or sound insulation property, and further, a dew condensation preventing function is imparted to the air spaces of the multiple glazing sash by a drying agent contained in a space part of the spacer part.

[0398] In the frame body 603 of the multiple glazing sash of the embodiment 7 of the present invention, a groove part 617 surrounded by the projecting legs 611, 611 of the projecting leg part 613 and the outer side part 607 of the spacer part 610 is formed in the longitudinal direction of the frame body 603. For example, this frame body 603 has, as shown in Fig. 89, a substantially bilaterally symmetrical structure relative to the center line B-B of the frame body 603, has the groove part 617 formed between the pair of projecting legs 611, 611 on both sides, and the cross-sectional shape of the projecting leg 613 in the frame body 603 length direction is a substantially U-shape. Fig. 89 illustrates the lower side frame body, and the groove part 617 is formed below the outer side part 607 of the spacer part 610 and opens down-

ward. That is, the frame body 603 is provided to the peripheral edge part of the first glass plate 602a and the second glass plate 602b for interior decoration. To the groove part 617, a sash roller, a sash roller-bearing member, a latch member or another sash functional member may be provided, and such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash. Here, the heights of the projecting legs 611, 611 of the projecting leg part 613 are preferably the same or substantially the same.

[0399] In the frame body 603 shown in Figs. 89 to 92, the bent projecting legs 612, 612 connected to the projecting legs 611, 611 of the frame body 603 and facing an edge face part of the glass plates 602a, 602b are bent from the terminal parts on the opposite side of the projecting legs 611, 611 from the side parts 608, 608 of the spacer part 610 to the first glass plate 602a or second glass plate 602b side, extend toward the lateral direction, and protect and support edge face parts of the glass plates, and further as the case requires, prevent dropping of the glass plates. The lengths of tips of the bent portions of the bent projecting legs 612, 612 are preferably about the same as the thicknesses of the glass plates or lengths such that the bent projecting legs slightly protrude outside the glass plates. Further, in a case where the projecting leg part 613 of the frame body 603 has bent projecting legs 612 connected to the projecting leg 611 and facing an edge face part of the glass plates 602a, 602b, a void part may be provided between the edge face part of the glass plates 602a and 602b and the bent projecting leg 612, and a sealing medium having a high moisture-proof performance is filled, whereby the moisture-proof performance and the sealing performance of the multiple glazing sash will further be increased.

[0400] Figs. 89 to 92 illustrate a structure of the frame body of the multiple glazing sash with reference to the lower side frame body 603 (603c), however, the structures of the upper side frame body 603a and the side frame bodies 603b are basically the same as the structure of the lower side frame body.

[0401] The shape and the thickness of the first glass plate 602a and the second glass plate 602b are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash, and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, the thicknesses are within a range of from 0.7 to 10 mm, and it is preferred that the sizes of the first and second glass plates 602a and 602b are the same or substantially the same. The first and second glass plates 602a and 602b may be different in the thickness or the type. Further, as the type of the glass plate, a float glass plate, a common glass plate, a heat-absorbing glass plate, an ultraviolet-absorbing glass plate, a heat reflecting glass plate, a low-emissivity glass plate (a Low-E glass plate), a figured glass, a laminated glass, a wire or wire mesh glass plate, an air-cooled tempered glass plate, a chemically tempered glass plate, or a glass plate having functions of such glass plates combined may, for example, be properly used depending upon the aimed specifications required.

[0402] Further, in a case where one or more intermediate plates 605 are disposed between the first and second glass plates 602a and 602b, the intermediate plate 605 preferably has a rectangular shape which is similar to and smaller than the first and second glass plates 602a and 602b so that it can be inserted to the groove part 614 of the inner surface part 606 of the frame body 603.

[0403] In a case where the first and second glass plates 602a and 602b are rectangular, the first and second glass plates 602a and 602b are preferably spaced apart at their peripheral four edge sides by the frame body (that is, the upper side, left side, right side and lower side frame bodies) to constitute a multiple glazing sash. At four corners where the upper side, left side, right side and lower side frame bodies are butted, corner blocks are inserted to connect the respective frame bodies. Use of frame bodies having the same shape for four sides of the multiple glazing sash and of the after-mentioned edge face protecting cover is preferred, whereby the number of members in assembling of the multiple glazing sash can be reduced, and the outer appearances and the designs of the peripheral parts of the multiple glazing sash can be coordinated. In a case where the multiple glazing sash is prepared by using the above frame bodies, a drying agent may be contained in the space part 609 of the spacer part 610 of the frame body 603, in a required side or in a necessary portion.

[0404] In the multiple glazing sash, the intermediate plate 605 (605a, 605b) or (605a, 605b, 605c) disposed between the first and second glass plates 602a and 602b to be spaced apart from the glass plates 602a and 602b in parallel with the glass plates 602a and 602b, is to reduce the convection of the gas in a space part between the first and second glass plates 602a and 602b thereby to increase the heat insulating property, and to increase the sound insulation performance. Such an intermediate plate may, for example, be a glass plate, a plastic plate or a plastic film. The intermediate plate may be a transparent plate, may be a colored plate, may be a plate with a pattern, or a combination thereof. The intermediate plate is properly selected depending upon the location where the sash is used, the region, the design property, etc. As a glass plate used as the intermediate plate, since it is disposed between the first and second glass plates 602a and 602b, a glass plate having a thickness of at most 2 mm is preferred, whereby the entire thickness can be made thin. A glass plate having such a thickness is preferred, since it has high transparency and durability and higher rigidity, whereby a disposition operation of inserting the intermediate plate to the groove part 614 of the spacer part 610 of the frame body 603 is easily carried out.

[0405] In the multiple glazing sash of the embodiment 7 of the present invention, the side part 608, 608 of the spacer part 610 and the projecting leg 611 of the project-

ing leg part 613 of the frame body 603 are bonded to the first or second glass plate 602a or 602b at a portion where they face the first or second glass plate 602a or 602b, by an adhesive layer 621, and sealed so that airtightness of an air space formed between the first and second glass plates 602a and 602b is maintained.

[0406] Further, the heights of the side parts 608, 608 on both sides of the spacer part 610 of the frame body 603 (that is, substantially corresponding to the thickness of the spacer part) are also preferably the same or substantially the same.

[0407] The heights of the side parts 608, 608 of the spacer part 610 of the frame body 603 are selected considering the adhesion strength between the first and second glass plates 602a and 602b and the side parts 608, 608 of the spacer part 610 by an adhesive, the moisture-proof property and the design property, and the heights of the projecting legs 611, 611 of the projecting leg part 613 are also selected so that the above sash functional member can be contained and shielded, and considering the adhesion strength between the first and second glass plates 602a and 602b and the projecting legs 611 of the projecting leg part 613 by an adhesive, the moisture-proof property and the design property. Specifically, the height of the side part 608, 608 of the spacer part 610 of the frame body 603 is preferably within a range of from 5 mm to 15 mm, and the height of the projecting leg 611 of the projecting leg part 613 is preferably within a range of from 15 mm to 50 mm.

[0408] On a part of a plane on the glass plate 602a or 602b side of the side part 608, 608 of the spacer part 610 of the frame body 603, as shown in Figs. 89 to 92, a concave part 620a is preferably provided so that an adhesive injected, applied or disposed to between the first or second glass plate 602a or 602b and the side part 608, 608 of the spacer part 610 will not protrude to the air space 604 side of the side part 608, 608 and that a predetermined thickness of the adhesive layer 621 can be secured at the time of production of the multiple glazing sash. Further, also on a part of a plane on the first or second glass plate 602a or 602b side of the projecting leg 611 of the projecting leg part 613, a concave part 620b is preferably provided so that an adhesive injected, applied or disposed to between the first or second glass plate 602a or 602b and the projecting leg 611 of the projecting leg part 613 will not protrude outside the projecting leg 611 (that is, the edge face side of the first or second glass plate 602a or 602b) and that a predetermined thickness of the adhesive layer 621 can be secured at the time of production of the multiple glazing sash.

[0409] The edge face protecting cover of the embodiment 7 of the present invention is attached to the groove part 617 formed between the pair of projecting legs 611, 611 on both sides of the projecting leg part 613 of the frame body as shown in Figs. 89 to 92, and is characterized by having the following constitutions.

[0410] That is, the edge part protecting cover 630 has a structure such that it can easily be attached to the groove part 617 and it can clog the bottom of the groove part 617 at the edge face of the multiple glazing sash, and it has a bottom part 631 for clogging the bottom of the groove part 617 in the longitudinal direction of the edge face of the multiple glazing sash, rib parts 632, 632 to be engaged with locking parts 622, 622 provided on the lower side on the groove part 617 side of the projecting legs 611, 611, and closely fitting parts 633, 633 to be closely fitted to edge parts of the first and second glass plates 602a and 602b. Further, each closely fitting part 633 has a curved part 634 curved to the surface direction of the first glass plate 602a or the second glass plate 602b, to be in contact with an edge part of the first glass plate 602a or the second glass plate 602b, and the edge part of each of the first and second glass plates 602a and 602b is closely fitted to the closely fitting part 633, and the tips of the curved parts 634 of the closely fitting parts elastically press the surfaces of the first glass plate 602a and the second glass plate 602b.

[0411] More specifically, the edge part protecting cover 630 has a bottom part 631 for clogging the bottom of the groove part 617 of the frame body 603, a pair of rib parts 632, 632 standing on predetermined positions on the groove part 617 side of the first glass plate 602a and on the groove part 617 side of the second glass plate 602b on the bottom part 631, and a pair of closely fitting parts 633 to be closely fitted to edge parts of the first glass plate 602a and the second glass plate 602b on both edge sides of the bottom part 631, curved parts 634, 634 are formed on the outside of the closely fitting parts 633, and their tips are curved toward surface directions of the first glass plate and the second glass plate to elastically press the surfaces of the first glass plate and the second glass plate.

[0412] Figs. 89 and 90 illustrate an example of an edge part protecting cover having guide rib parts 632, 632 the tip of which is bent in a L-shape, provided so that they can be attached to locking parts 622, 622 as guide convex strips provided on the lower side on the groove part 617 side of the projecting legs 611, 611, as sliding from the lateral direction. The drawings illustrate an example of an edge part protecting cover of a slide attaching type, but the edge part protecting cover is not limited thereto, and an edge part protecting cover of a structure such that it can be attached by a fitting method from bottom in Figs. 89 to 92 to the groove part 617, or of a structure such that it can be attached by another attaching method, may be used.

[0413] Such an edge part protecting cover 630 is preferably one integrally formed of a rigid synthetic resin material such as a rigid polyvinyl chloride resin material or an acrylonitrile/styrene resin.

[0414] The curved parts 634, 634 formed on the outside of the closely fitting parts 633 are curved toward surface directions on the outside of edge parts of the first glass plates 602a and second glass plates 602b, and preferably have lip tip parts to press the lower edge parts on the outside of the first and second glass plates 602a

and 602b. In such a case, as shown in Fig. 89(a), in the left closely fitting part 633, the width x1 of a closely fitting groove part at an upper edge part in the inside of the curved part 634 preferably satisfies y1+z1≧x1, where y1 is the thickness of the first glass plate 602a and z1 is the thickness of the projecting leg 611 of the frame body 603. Further, in the right closely fitting part 633, the width x2 of a closely fitting groove part at an upper edge part in the inside of the curved part 634 preferably satisfies y2+z2≧x2, where y2 is the thickness of the first glass plate 602a and z2 is the thickness of the projecting leg 611 of the frame body 603. By such widths x1 and x2 of the upper edge of the closely fitting groove parts of the closely fitting parts 633, the edge face protecting cover can easily and securely attached to the frame body 603. Further, in a case where the multiple glazing sash is applied to a sliding window, in order to prevent abrasion of the edge face protecting cover of the multiple glazing sash by contact at the time of sliding, at least the outside of the curved parts may be formed of an abrasion resistance synthetic resin material.

[0415] In a case where the edge part protecting cover 630 is provided to the groove part 617 on the upper side, the left side or the right side of the multiple glazing sash, the structure of the edge part protecting cover 630 may be changed depending upon the function required in the upper side, the left side or the right side. For example, in a case where the edge part protecting cover 630 is used for a multiple glazing sash of a sliding window, a meeting part airtight material 640 may be provided to the side part of the edge part protecting cover on the sliding side as shown in Fig. 95.

[0416] Further, in the case of a sliding door, a sash roller for a sash is attached, and thus an edge part protecting cover may be provided on a portion excluding the sash roller. Further, in the case of a sliding window, the edge face protecting cover may not be attached to the lower side, and the edge face protecting cover 630 may be provided on the upper side and on the sides of the multiple glazing sash.

[0417] In a case where the multiple glazing sash is a swing window, since a roller sash is not necessary, the structure change of the edge part protecting cover on the left side, on the right side and on the upper side in conformity with the sash roller is unnecessary, and the covers for the lower side, the upper side, the left side and the right side may have the same structure.

[0418] Particularly use of the above edge face protecting cover as an edge face protecting cover to the frame body on at least the upper side and both sides among the four sides of the multiple glazing sash of which the first and second glass plates are rectangular, is effective for reduction of the number of members in assembling of the multiple glazing sash since the same edge face protecting cover can be used.

[0419] As the structure of a portion where the frame body 603 having the side parts 608, 608 of the spacer part 610 and the projecting legs 611, 611 of the projecting leg part 613 connected to each other faces the first or second glass plate 602a or 602b, as shown in Fig. 93, a concave part 618 may be formed on the surface of the side part 608, 608 of the spacer part 610 and/or the projecting leg 611, 611 of the projecting leg part 613 of the frame body 603 facing the first or second glass plate 602a or 602b. When such a concave part 618 is formed, the adhesive layer 621 may be thicker in the region of the concave part 618, thus increasing the adhesion property and the sealing property.

[0420] Further, the structure of the projecting leg part 613 of the frame body 603 may be, as shown in Fig. 94, such that an edge portion of the projecting leg 611, 611 (that is, a portion opposite from the outer side part 607 of the spacer part 610) is bent toward the inner side direction of the groove part 617 and extends toward the tip direction of the first or second glass plate 602a, 602b. By such a structure of the projecting legs 611, 611 having a bent tip part 623, a concave part 624 is formed at a peripheral edge part of the first and second glass plates 602a, 602b, and accordingly by filling the concave part 624 with a sealing medium 625 having a low water permeability and an excellent adhesion property, the adhesion property and the sealing property of the multiple glazing sash can be further increased. Otherwise, a bent tip part 623 may not be provided to the tip part of the projecting leg 611, 611 of the projecting leg part 613, and the tip of the projecting leg 611, 611 may be linear. Such a shape is an example of the frame body shown in Figs. 89 to 92 in which no bent projecting leg 612 is formed on the tip of the projecting legs 611,611 of the projecting leg part 613.

[0421] The thicknesses and heights of the respective parts of the frame body used in the multiple glazing sash of the embodiment 7 of the present invention are determined considering the moisture-proof property, the heat insulating property, a variation in the internal pressure of the air space of the multiple glazing sash, and the strength, durability, etc. of the multiple glazing sash, and in a case where the multiple glazing sash has a structure and a shape as shown in Fig. 89, they are preferably as follows.

- ·The height of the side part 608 of the spacer part 610 of the frame body 603: 5 to 15 mm.
- ·The thickness of the side part 608 of the spacer part 610 of the frame body 603: 0.7 to 3.0 mm.
- ·The thickness of the inner surface part 606 and the outer side part 607 of the spacer part 610 of the frame body 603: 0.7 to 3.0 mm.
- ·The width of the inner surface part 606 and the outer side part 607 of the spacer part 610 of the frame body 603: 4 to 50 mm.
- ·The height of the projecting leg 611 of the projecting leg part 613 of the frame body 603: 15 to 50 mm.
- ·The thickness of the projecting leg 611 and the bent projecting leg of the projecting leg part 613 of the frame body 603: 0.7 to 3.0 mm.

·The distance between the first glass plate 602a and the second glass plate 602b (that is, the width of the spacer part 610): 4 mm to 50 mm.

[0422] In the case of a triple type multiple glazing sash having a structure and a shape as shown in Fig. 90, they are preferably as follows. In the multiple glazing sash of such a type, the distance between the first glass plate 602a and the intermediate plate 605 and the distance between the second glass plate 602b and the intermediate plate 605 may be the same or different. Further, the height and the thickness of the side part 608 of the spacer part 610 of the frame body 603, the height and the width of the inner surface part 606 and the outer side part 607 of the spacer part 610 of the frame body 603, the height of the projecting leg 611 of the projecting leg part 613 of the frame body 603, and the thickness of the projecting leg 611 and the bent projecting leg of the projecting leg part 613 of the frame body 603 are as described above.

·The distance between the first glass plate 602a and the second glass plate 602b (that is, the width of the spacer part 10): 8 mm to 50 mm.
·The distance between the first glass plate 602a and the intermediate plate 605: 4 mm to 25 mm.
·The distance between the second glass plate 602b and the intermediate plate 605: 4 mm to 25 mm.

(Description of embodiment 8)

[0423] Now, the multiple glazing sash according to embodiment 8 of the present invention will be described in detail with reference to Figs. 96 to 104. The multiple glazing sash having the constitutions of Figs. 96 to 104 is based upon Japanese Patent Application No. 2013-271908, which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 8.

[0424] Fig. 96 is a front view illustrating the multiple glazing sash according to the embodiment 8 of the present invention, and Figs. 97 and 98 are partial cross-sectional schematic perspective views illustrating the multiple glazing sash according to the embodiment 8 of the present invention. In Figs. 96 to 98, the reference symbol 701 represents a multiple glazing sash, 702 a glass plate, 703a a lower side frame body of the multiple glazing sash, 703b a side frame body of the multiple glazing sash, 703c an upper side frame body of the multiple glazing sash (hereinafter the upper side frame body, the side frame bodies and the lower side frame body may sometimes be generally referred to as a frame body 703), 704 an intermediate plate disposed between the glass plates 702 and 702 spaced apart by the frame body 703 to be spaced apart from the glass plates 702 and 702, 705 an air space formed between the glass plates 702 and 702, 706 a corner member connecting the respective frame bodies 703a, 703b and 703c at their corner parts. In Fig. 97, the frame body 703 comprises a spacer part 754 having an inner surface part 750 and an outer surface part 751 keeping a space between the first and second glass plates 702 and 702, side parts 752 connected to the inner surface part 750 and the outer surface part 751 and facing the inner side of the first and second glass plates 702 and 702, and a space part 753 in which a drying agent is contained, and a projecting leg part 756 having projecting legs 755 facing the inner side of a peripheral edge part of the first and second glass plates 702 and 702, an intermediate plate-holding part for holding at least a part of a peripheral part of the intermediate plate is provided to the spacer part 754, and an intermediate plate is disposed to the intermediate plate-holding part. The example shown in Fig. 98 has the same constitution as in Fig. 97.

[0425] Figs. 99 to 104 are partial schematic cross-sectional views illustrating a substantially part of the multiple glazing sash according to specific examples of embodiments of the embodiment 8 of the present invention. The drawings illustrate specific examples of a lower side portion of the multiple glazing sash, and are schematic cross-sectional views illustrating a lower side portion of the multiple glazing sash as observed from the arrow direction of the line B-B in Fig. 98. In the multiple glazing sash of the embodiment 8 of the present invention, a first glass plate 711 and a second glass plate 712 are spaced apart by a frame body 713, a space part is provided between the first and second glass plates 711 and 712, and a plurality of compartmentalized intermediate layers are provided by disposition of at least one intermediate plate to the intermediate layer between the first and second glass plates 711 and 712.

[0426] The intermediate layer formed between the first glass plate 711 and the second glass plate 712 and the plurality of compartmentalized intermediate layers formed between the first glass plate 711 and the second glass plate 712 by disposition of the intermediate plate will be referred to as a space layer in this specification, and to the space layer, a filler gas such as dry air or an inert gas such as an argon gas, a krypton gas or a helium gas is filled to increase the heat insulating property and/or sound insulation property, and a dew condensation preventing function is imparted to the multiple glazing sash by a drying agent contained in a space part of the spacer part of the frame body. Such a space layer may be called an air layer, a gas layer, an intermediate layer or an air space, and the space layer is synonymous with the air layer, the gas layer, the intermediate layer, the air space or the like.

[0427] In the multiple glazing sash 710, the first glass plate 711 and the second glass plate 712 are disposed to be spaced apart by disposing the frame body 713 on a periphery between the first and second glass plates to form a space layer 714, and the space layer 714 is sealed at the periphery of the first and second glass plates, and one or a plurality of intermediate plate-holding parts 716

for holding at least a part of a peripheral part of the intermediate plate 715 disposed in the space layer 714 are provided in rows to the frame body 713, and in the space layer 714, at least one intermediate plate 715 is disposed by the intermediate plate-holding part 716 provided to the frame body 713, and the space layer 714 is divided into a plurality of compartmentalized space layers by the intermediate plate 715. Hereinafter the space layers formed by compartmentalizing the space layer 714 by the intermediate plate 715 will sometimes be referred to as compartmentalized space layers. In the drawings, 717 and 718 represent a first sealing material and a second sealing material, respectively, for sealing the space layer between the first and second glass plates 711 and 712 by adhesion or pressure-sensitive adhesion at a portion where the side of the frame body 713 and the first glass plate 711 are in contact with each other and at a portion where the side of the frame body 713 and the second glass plate 712 are in contact with each other at a periphery of the multiple glazing sash 710.

[0428] The shape and the thickness of the first glass plate 711 and the second glass plate 712 are properly selected depending upon the shape and the dimensions of the aimed multiple glazing sash, and when the multiple glazing sash is used for a window of a conventional residence or building, the glass plates are usually rectangular flat glass plates, the thicknesses are within a range of from 0.7 mm to 10 mm, and it is preferred that the sizes of the first and second glass plates 711 and 712 are the same or substantially the same. The first and second glass plates may be different in the thickness or the type. Further, as the type of the glass plate, a float glass plate, a common glass plate, a heat-absorbing glass plate, an ultraviolet-absorbing glass plate, a heat reflecting glass plate, a low-emissivity glass plate (a Low-E glass plate), a figures glass, a laminated glass plate, a wire or wire mesh glass plate, an air-cooled tempered glass plate, a chemically tempered glass plate, or a glass plate having functions of such glass plates combined may, for example, be properly used depending upon the aimed specifications required.

[0429] The one or more intermediate plates 715 disposed between the first and second glass plates 711 and 712 to be spaced apart from the first and second glass plates 711 and 712 in parallel with the glass plates 711 and 712, are to reduce the convection of the gas in a space of the space layer 714 between the first and second glass plates 711 and 712 thereby to increase the heat insulating property and to increase the sound insulation performance.

[0430] The intermediate plate 715 is preferably in a rectangular shape similar to and smaller than the glass plates 711 and 712 so that the intermediate plate can be disposed by a disposition method such as insertion, fitting or locking, to the intermediate plate-holding part 716 provided on the inner face side (i.e. on the space layer side) of the frame body 713. In a case where the first and second glass plates 711 and 712 are rectangular, the first and second glass plates 711 and 712 are preferably spaced apart at their peripheral four edge sides by the frame body 713 to constitute the multiple glazing sash.

[0431] Since the intermediate plate 715 is disposed between the first and second glass plates 711 and 712 and is not exposed to the outside, its strength may be low as compared with the first and second glass plates, and a thin material may be used. Therefore, even a multiple glazing sash of a triple type or more, can have a small entire thickness. Such an intermediate plate 715 may, for example, be a glass plate, a plastic plate or a plastic film. The intermediate plate 715 may be a transparent plate, may be a colored plate, may be plate with a pattern, or a combination thereof. The intermediate plate is properly selected depending upon the location where the sash is used, the region, the design property, etc. In a case where a glass plate is used as the intermediate plate, since it is disposed between the first and second glass plates 711 and 712, a glass plate having a thickness of at most 2 mm is preferred, whereby the entire thickness can be made thin. In a case where the intermediate plate 715 is a glass plate, since it has high rigidity even when it is thin, a disposition operation such as insertion, fitting or locking to the intermediate plate-holding part 716 is easily carried out, and further a glass plate has high transparency and durability and is thereby favorable as an intermediate plate for the multiple glazing sash.

[0432] Particularly, as the intermediate plate 715, a chemically tempered glass plate having sufficient strength even when it is made thin can be preferably used. A chemically tempered glass plate is a glass plate produced by a chemical tempering technique of dipping a glass plate containing a Na component and a Li component such as soda lime silicate glass in a molten salt of e.g. potassium nitrate to replace Na ions and/or Li ions having a small atomic size present on the surface of the glass plate with K ions having a large atomic size present in the molten salt by ion exchange to form a compression stress layer on the surface layer of the glass plate thereby to increase the strength, and has a sufficiently high breaking strength even when the thickness is at most 2 mm. For example, as compared with a common glass plate made of conventional soda lime silica glass, having a thickness of 2 mm, a chemically tempered glass plate obtained by tempering a common glass plate having the same thickness by the above ion exchange treatment has a breaking strength of from about 2 to about 10 times. Accordingly, by use of a chemically tempered glass plate as the intermediate plate 715, weight saving can be achieved by reduction in thickness of the intermediate plate in the multiple glazing sash of the present invention, and at the time of preparation of the multiple glazing sash of the present invention, breakage of the intermediate plate can be prevented, such being particularly favorable. In the case of a chemically tempered glass plate, it can be post-cut by selecting a cutting means or by controlling the degree of the chemical tempering treatment, and ac-

cordingly the produced chemically tempered glass plate may be cut to be fitted to the predetermined size of the intermediate plate 715.

[0433] The frame body 713 has a structure having a function as a spacer part to space apart the first and second glass plates 711 and 712 with a predetermined distance. In the case of a rectangular multiple glazing sash in a planar view, the frame body 713 is disposed on four sides i.e. the upper side, the lower side, the left side and the right side of the multiple glazing sash. The frame body on each side is preferably basically formed of a single member. That is, the frame body on each side is preferably one basically formed of one member. Further, at butting parts of the frame bodies on the four sides of the upper side, the lower side, the left side and the right side, usually a corner member is disposed to connect the frame bodies on the four sides of the upper side, the lower side, the left side and the right side to assemble them into a frame shape.

[0434] The frame body 713 is preferably provided with a spacer part having a space part in which a drying agent is contained, on at least a part of the space layer side. The frame body may be provided with a spacer part on at least one of the four sides of the upper side, the lower side, the left side and the right side.

[0435] Further, the frame body 713 may have a projecting leg on both or either one of the first glass plate side and the second glass plate side of the frame body.

[0436] Further, the frame body 713 may have a structure having a function to merely space the first and the second glass plates 711 and 712 apart, without the above spacer part or projecting leg.

[0437] In the case of a rectangular multiple glazing sash in a planar view, the frame bodies to be disposed on the four sides of the upper side, the lower side, the left side and the right side of the multiple glazing sash are preferably frame bodies having the same structure, whereby the number of members in assembling of the multiple glazing sash can be reduced, and further, the outer appearances and the designs at a peripheral part on the four sides of the multiple glazing sash can be coordinated, however, needless to say, the lower side frame body, the upper side frame body, the left side frame body and the right side frame body of the multiple glazing sash may have different structures so as to fulfill the functions required for the respective sides. Further, in a case where the frame bodies disposed on the four sides of the upper side, the lower side, the left side and the right side have the same structure and have a spacer part, in preparation of the multiple glazing sash using such frame bodies, a drying agent may be contained in a space part in the spacer part of the frame body 713 in a required side or in a required portion.

[0438] In the multiple glazing sash of the embodiment 8 of the present invention, as shown in Figs. 99 to 103, one or more intermediate plate-holding parts 716 in a groove shape for holding an edge part of the intermediate plate 715 disposed in the space layer 714 are provided in rows on the inner face side on the space layer 714 side of the frame body 713 in a longitudinal direction, in parallel with a plane direction of the first and second glass plates 711 and 712, with a predetermined distance in the width direction of the frame body 713, i.e. in the width direction of the distance between the first and second glass plates 711 and 712. In the case of a rectangular multiple glazing sash in a planar view, such intermediate plate-holding parts may be provided symmetrically on at least opposite sides among the four sides of the upper side, the lower side, the left side and the right side of the multiple glazing sash, and are preferably provided symmetrically on the three sides of the lower side, the left side and the right side, on the three sides of the upper side, the left side and the right side, or on the four sides of the upper side, the lower side, the left side and the right side.

[0439] The shape of each intermediate plate-holding part provided to the frame body may be a shape by which compartmentalized space layers are formed in the space layer by holding the edge part of the intermediate plate, and for example, a groove part or a fitting part into which the edge part of the intermediate plate is inserted, or a gripping part or a locking part with which the edge part of the intermediate plate is locked, or a combination thereof, may be mentioned as a typical example. Further, the plurality of intermediate plate-holding parts may have the same structure or may have different structures. Needless to say, the intermediate plate-holding part is not limited to such specific structures, and may have another structure having a function to hold the edge part of the intermediate plate.

[0440] In the multiple glazing sash 710 of the embodiment 8 of the present invention, in the space layer 714, one or a plurality of intermediate plates 715 are disposed by the above one or plurality of intermediate plate-holding parts 716 provided in rows to the frame body 713, and the space layer 714 is divided into a plurality of compartmentalized space layers by the intermediate plate 715. Such a plurality of compartmentalized space layers are communicated with each other by a communicating structure provided to the frame body. Here, "communicating" means that the filler gas filled in the compartmentalized space layers flows through the compartmentalized space layers.

[0441] Now, specific examples of the multiple glazing sash of the embodiment 8 of the present invention will be described with reference to Figs. 99 to 103.

[0442] The multiple glazing sash 710 shown in Figs. 99 to 103 has a frame body 713 formed of a single member, and in the longitudinal direction of the frame body 713, three intermediate plate-holding parts 716 each having a groove part extending in parallel with the plane direction of the first glass plate 711 and the second glass plate 712 are provided in rows. The three intermediate plate-holding parts 716 are provided with a predetermined distance in the width direction of the frame body 713 i.e. in the width direction of the distance between the

first and second glass plates 711 and 712. And, an edge part of an intermediate plate 715 such as a glass plate is inserted into the groove part of each of the three intermediate plate-holding parts 716, and the space layer 714 between the first and second glass plates 711 and 712 spaced apart by the spacer part 724 of the frame body 713 is divided into three compartmentalized space layers 714a, 714b, 714c and 714d by the three intermediate plates 715, 715 and 715.

[0443] In the multiple glazing sash 710 shown in Figs. 99(a) and 99(b), at the bottom of the groove part of each intermediate plate-holding part 716, the edge part of the intermediate plate 715 is supported by a base member 721 made of a cushioning material, an elastic material or the like, and further on both sides on the upper part of the groove part of each intermediate plate-holding part 716, the peripheral part of the intermediate plate 715 is supported by lip parts 722 made of an elastic material, a cushioning material or the like. The base member 721 has, for example, a structure such that blanks (that is, portions where no base member 721 is provided) are formed on at least a part in the longitudinal direction of the bottom of the groove part of each intermediate plate-holding part 716. That is, as shown in Fig. 99(b), the base member 721 is not seamlessly formed in the longitudinal direction of the groove part of each intermediate plate-holding part 716, but a plurality of base members 721, 721, 721, 721 having a predetermined length are disposed at the bottom of the groove part of each intermediate plate-holding part, and blanks 741, 741, 741, 741, 741 are formed between the adjacent base members 721 and 721 or on the edge side of the base member 721. Such blanks 741 form a bottom communicating part through which the right and left of the groove parts are communicated, at the bottom of the groove part of each intermediate plate-holding part 716 to which the intermediate plate is disposed. Further, the lip parts 722, 722 supporting the peripheral part of the intermediate plate 715 on both sides on the upper part of the groove part of each intermediate plate-holding part 716 have such a structure that blanks (that is, portions where no lip parts 722, 722 are provided) are formed on at least a part in the longitudinal direction of the groove part of each intermediate plate-holding part 716. That is, as shown in Fig. 99(b), the lip parts 722 are not seamlessly formed on both sides in the longitudinal direction of the groove part of each intermediate plate-holding part 716, but a plurality of lip parts 722, 722, 722, 722 having a predetermined length are disposed on the upper part of the groove part of each intermediate plate-holding parts 716, and blanks 742, 742, 742, 742, 742 are formed between the adjacent lip parts 722 and 722 or on the edge side of the lip part 722. Such blanks 742 form an upper communicating part through which the adjacent compartmentalized space layers are communicated, on the upper part of the groove part of each intermediate plate-holding part 716 to which the intermediate plate is disposed. The four compartmentalized space layers 714a, 714b, 714c and 714d are communicated by the bottom communicating part and the upper communicating part.

[0444] By the above communicating structure, the pressures in the respective compartmentalized space layers can be equalized, and warpage or displacement of the intermediate plate by a variation in the air pressure, a temperature change or the like can be prevented, and long term durability can be improved. Further, since the respective compartmentalized space layers are communicated, it is not necessary to separately fill the filler gas into the respective compartmentalized space layers, and the operation of filling the filler gas may be carried out from one portion.

[0445] In the above example, all the four compartmentalized space layers 714a, 714b, 714c and 714d are communicated, however, only required compartmentalized space layers among the four compartmentalized space layers 714a, 714b, 714c and 714d may be communicated. For example, the compartmentalized space layers 714a and 714b are communicated, the compartmentalized space layers 714c and 714d are communicated, and the compartmentalized space layers 714b and 714c are not communicated.

[0446] Further, in the multiple glazing sash 710, separate space parts 723 in which a drying agent is contained, corresponding to the respective four compartmentalized space layers, are provided to the frame body 713. A communicating part 726 such as a hole or a slip communicated with the space layer is formed on the upper wall on the space layer side among walls constituting each space part 723, and a drying agent (in Fig. 99, small approximate circles in the space part 723 represent a drying agent, the same applies hereinafter) contained in the space part 723 absorbs moisture in the space layer 714 through the communicating part 726 of the space part 723 to maintain a dry state in the space layer 714. Further, in a case where the space part 723 is formed in the frame members on the four sides of the multiple glazing sash, a drying agent is contained only in the frame member on the required side among the four sides or only in a necessary portion.

[0447] As the frame body 713, a frame body formed of a rigid vinyl chloride resin material or another synthetic resin material, a frame body formed of an aluminum material, or a frame body consisting of a single member formed of a composite material of a synthetic resin material and an aluminum material is preferably selected. Particularly, a multiple glazing sash using a frame body formed of a rigid vinyl chloride resin material or another synthetic resin material is more preferred, in that such a multiple glazing sash has a high heat insulation effect, is less likely to have dew condensation and is excellent in the sound insulation property.

[0448] In a case where the frame body 713 is formed of a rigid vinyl chloride resin material or another synthetic resin material, a moisture-proof film such as an aluminum foil may be bonded to the outer side part S of the frame body 713 so as to further increase the moisture resist-

ance of the frame body 713 from the outside.

[0449] The example shown in the drawings is to illustrate the structure of the frame body on the lower side of the multiple glazing sash, and it is more preferred that the upper side frame body, the left side frame body and the right side frame body of the multiple glazing sash basically have the same structure as the lower side frame body, whereby the entire frame bodies can easily be assembled.

[0450] In the multiple glazing sash 710 shown in Fig. 100, spacer parts 724a, 724b, 724c and 724d having separate space parts 723 in which a drying agent is contained, corresponding to the four compartmentalized space layers 714a, 714b, 714c and 714d, are provided to the frame body 713. And, a flow path 725 is formed between the spacer parts 724a and 724b, ends of the flow path 725a open toward the space layers 714a and 714b, and the space layers 714a and 714b are communicated by the flow path 725a. In the same manner, a flow path 725b is formed between the spacer parts 724b and 724c, ends of the flow path 725b open toward the space layers 714b and 714c, and the space layers 714b and 714c are communicated by the flow path 725b; and a flow path 725c is formed between the spacer parts 724c and 724d, ends of the flow path 725c open toward the space layers 714c and 714d, and the space layers 714c and 714d are communicated by the flow path 725c. The four compartmentalized space layers 714a, 714b, 714c and 714d are communicated by the flow paths 725a, 725b and 725c. By such a communicating structure, in the same manner as the multiple glazing sash having the structure shown in Fig. 99, the pressures in the respective compartmentalized space layers 714a, 714b, 714c and 714d can be equalized, and warpage or displacement of the intermediate plate by a variation in the internal pressure, a variation in the temperature or the like can be prevented, and long term durability can be improved. Further, since the respective compartmentalized space layers are communicated, it is not necessary to separately fill the filler gas into the respective compartmentalized space layers, and the operation of filling the filler gas may be carried out from one portion.

[0451] A communicating part 726 such as a hole or a slit communicated with the space layer is formed on the upper wall on the space layer side among walls constituting the space part 723, and a drying agent contained in the space part 723 absorbs moisture in the space layer 714 through the communicating part 726 of the space part 723 to maintain a dry state in the space layer 714. Further, in a case where the space part 723 is formed in the frame bodies on the four sides of the multiple glazing sash, a drying agent is contained only in the frame body on the required side among the four sides or only in a necessary portion.

[0452] In the example shown in Fig. 100, at the bottom of the groove part of each intermediate plate-holding part 716, the edge part of the intermediate plate 715 is supported by a base member 721 made of a cushioning material, an elastic material or the like, and further on both sides on the upper part of the groove part of each intermediate plate-holding part 716, the peripheral part of the intermediate plate 715 is supported by a caulking compound 735.

[0453] In the multiple glazing sash 710 shown in Fig. 101, in the same manner as in Fig. 100, separate spacer parts 724a, 724b, 724c and 724d each having a space part 723 in which a drying agent is contained corresponding to the respective four compartmentalized space layers 714a, 714b, 714c and 714d are provided to the frame body 713. And, on the lower side of the spacer parts 724a and 724b (that is, the opposite side from the space layer 714), a flow path 727a of which one end opens toward the spacer part 724a and the other end opens to the spacer part 724b, by which the spacer parts 724a and 724b are communicated, is formed. Further, on the lower side of the spacer parts 724b and 724c, a flow path 727b of which one end opens to the spacer part 724b and the other end opens to the spacer part 724c, by which the spacer parts 724b and 724c are communicated, is formed; and on the lower side of the spacer parts 724c and 724d, a flow path 727c of which one end opens to the spacer part 724c and the other end opens to the spacer part 724d, by which the spacer parts 724c and 724d are communicated, is formed. The four compartmentalized space layers 714a, 714b, 714c and 714d are communicated by such flow paths 727a, 727b and 727c. By such a communicating structure, the same effects as the multiple glazing sashes shown in Figs. 99 and 100 will be obtained.

[0454] In example shown in Fig. 101 also, in the same manner as in Fig. 100, at the bottom of the groove part of each intermediate plate-holding part 716, the edge part of the intermediate plate 715 is supported by a base member 721 made of a cushioning material, an elastic material or the like, and further on both sides on the upper part of the groove part of each intermediate plate-holding part 716, the peripheral part of the intermediate plate 715 is supported by a caulking compound 735.

[0455] In the multiple glazing sash 710 shown in Fig. 102, spacer parts 724a, 724b, 724c and 724d having separate space parts 723a, 723b, 723c and 723d corresponding to the respective four compartmentalized space layers 714a, 714b, 714c and 714d are provided to the frame body 713. The lower sides of the space parts 723a, 723b, 723c and 723d of the respective spacer parts (that is, on the opposite side from the space layer 714 side) open to each other, to form a shared space part 728 which is one space region shared by the communicating space parts 723a, 723b, 723c and 723d. In this example, the space parts 723a, 723b, 723c and 723d are communicated on their lower side by formation of the shared space part 728. Further, below the shared space part 728, a casing 729 in which a drying agent is contained is provided. A communicating part 730 such as a hole or a slit communicated with the shared space part 728 is formed on the wall on the space layer 714 side of

the casing 729, a communicating part 726 such as a hole or a slit communicated with the space layer is formed on the upper wall on the space layer side among walls constituting each space part 723, and a drying agent contained in the casing 729 absorbs moisture in the space layer 714 through the communicating part 730 of the casing 729 and the communicating part 726 of the space part 723 to maintain a dry state in the space layer 714.

[0456] The multiple glazing sash 710 shown in Fig. 103 is a modified example of the multiple glazing sash 710 shown in Fig. 99. The edge part of the intermediate plate 715 is supported by a base member 721 at the bottom of the groove part of each intermediate plate-holding part 716, the peripheral part of the intermediate plate 715 is supported by lip parts 722 at both sides on the upper part of the groove part of each intermediate plate-holding part 716, a bottom communicating part through which the right and left of the groove parts are communicated is formed at the bottom of the groove part of each intermediate plate-holding plate 716 to which the intermediate plate is disposed, an upper communicating part communicated with the space layer is formed on the upper part of the groove part of each intermediate plate-holding part 716 to which the intermediate plate is disposed, and the four compartmentalized space layers 714a, 714b, 714c and 714d are communicated by the bottom communicating part and the upper communicating part, as in the same as in Fig. 99.

[0457] In Fig. 103, spacer parts 724 having separate space parts 723 in which a drying agent is contained corresponding to the respective four compartmentalized space layers are provided to the frame body 713, and a projecting leg 731 is provided to at least a part on the first glass plate 711 and second glass plate 712 side of the frame body. The projecting leg 731 extends from the side of the frame body 713, that is, a portion in contact with the peripheral part of the first glass plate 711 or the second glass plate 712, toward the opposite side from the space layer 714 (the lower side in Fig. 103), and extends to the edge face of the first or second glass plate, whereby a concave part 733 of which the cross-sectional shape is a substantially U-shape is formed at a peripheral edge part between the first glass plate 711 and the second glass plate 712 on the outer side of the frame body 713. Further, the projecting leg 731 has a bent projecting leg 732 bent from a terminal part to the edge face direction of the first or second glass plate 711, 712 side, extending in the lateral direction, and protects an edge face part of the first or second glass plate 711, 712 and supports the first or second glass plate 711, 712 more securely. In the example shown in the drawing, the projecting leg part is composed of the projecting legs 731 and the bent projecting legs 732, and the projecting leg part is integrated with the side part of the spacer part of the frame body 713 to constitute a part of the frame body. Further, it is possible to provide a sash roller, a sash roller-bearing member, a latch member, a reinforcing material or another sash functional member by selecting a predetermined height of the projecting leg 731 and utilizing the resulting concave part 733. By providing the above sash functional member utilizing the space in the concave part 733, the sash functional member may be shielded from the outside by the projecting leg of the frame body.

[0458] Figs. 99 to 103 illustrate an example in which the specific constitution of the frame body of the present invention is applied to the lower side frame body of the multiple glazing sash. However, the structure shown in Figs. 99 to 103 may be applied to at least any of the lower side, upper side, left side and right side frame bodies of the multiple glazing sash so that at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated. Accordingly, the structure shown in Figs. 99 to 103 may be applied respectively to the lower side, upper side, left side and right side frame bodies of the multiple glazing sash, or may be applied to at least any one of the lower side, upper side, left side and right side frame bodies of the multiple glazing sash.

[0459] Now, another specific example of a multiple glazing sash in which a plurality of compartmentalized space layers formed by disposing at least one intermediate plate in the space layer are communicated will be described. In this example, in a rectangular multiple glazing sash 701 in a planar view as shown in Fig. 96, a plurality of compartmentalized space layers are communicated utilizing corner parts of frame bodies formed by assembling the lower side frame body 703a, the upper side frame body 703c and the right and left side frame bodies 703b using a corner member 706 at their corner parts.

[0460] Figs. 104(a) and 104(b) are front views illustrating a portion where the lower side frame body 703a and the left side frame body 703b are connected by a corner member 706.

[0461] A typical corner member 706 used at such a portion has a first connecting part (not shown) to be inserted into a space part of a spacer part opening to an edge face of the lower side frame body 703a and a second connecting part (not shown) to be inserted into a space part of a spacer part opening to an edge face of the left side frame body 703b, and connects the lower side frame body 703a and the left side frame body 703b by inserting the first connecting part of the corner member 706 into the space part of the spacer part opening to the edge face of the lower side frame body 703a and inserting the second connecting part of the corner member 706 into the space part of the spacer part opening to the edge face of the left side frame body 703b. In a case where there are a plurality of space parts of spacer parts, it is preferred to employ at least two among the plurality of space parts for the above connecting.

[0462] In a case where the frame bodies are connected at the corner part in such a manner, as shown in Fig. 104, a rectangular intermediate plate 715 disposed in a space layer between the first and second glass plates are disposed via a base member 721 at the bottom of

the groove part of the intermediate plate-holding part, and the lower side of the rectangular intermediate plate 715 is represented by an alternate long and short dash line 715p, the left side of the rectangular intermediate plate 715 is represented by an alternate long and short dash line 715q and the corner of the rectangular intermediate plate 715 is represented by an alternate long and short dash line 715r. Further, the peripheral edge part of the intermediate plate 715 is sandwiched between lip parts 722 from both sides at an upper part of the groove part of the intermediate plate-holding part.

[0463] In the example shown in Fig. 104(a), a plurality of base members 721 formed in rows on the frame member 703a do not extend to the corner of the intermediate plate, that is, a portion where the frame body 703a is butted to the frame body 703b in the corner member 706, but are cut at the butting face 706a of the frame member 703a of the corner member 706, whereby a plurality of blanks on which the base member 721 is not formed are formed in rows in the interior of the corner member. Further, the plurality of base members 721 formed in rows on the frame body 703b also do not extend to the corner of the intermediate plate, that is, a portion where the frame body 703b is butted to the frame body 703a in the corner member 706, but are cut at the butting face 706b of the frame body 703b of the corner member 706, whereby a plurality of blanks on which the base member 721 is not formed are formed in rows in the interior of the corner member.

[0464] Further, a plurality of lip parts 722 formed in rows on the frame member 703 do not extend to the corner of the intermediate plate, that is, a portion where the frame body 703a is butted to the frame body 703b in the corner member 706, but are cut at the butting face 706a of the frame body 703a of the corner member 706, whereby a plurality of blanks on which the lip part 722 is not formed are formed in rows in the interior of the corner member. Further, a plurality of lip parts 722 formed in rows on the frame body 703b also do not extend to the corner of the intermediate plate, that is, a portion where the frame body 703b is butted to the frame body 703a in the corner member 706, but are cut at the butting face 706b of the frame body 703b of the corner member 706, whereby a plurality of blanks on which the lip member 722 is not formed are formed in rows in the interior of the corner member.

[0465] In such a manner, by forming a plurality of blanks on which the base member 721 is not formed and a plurality of blanks on which the lip part 722 is not formed, in the interior of the corner member of the frame body, a communicating structure having a shared space part through which a plurality of compartmentalized space layers are communicated can be provided, whereby the plurality of compartmentalized space layers are communicated and the pressure in the plurality of compartmentalized space layers can be equalized.

[0466] The shared space part through which a plurality of compartmentalized space layers are communicated is not limited to the above structure, and another structure may be employed.

[0467] Further, in a case where a shared space part for the plurality of compartmentalized space layers as shown in Fig. 104(a) cannot be formed in the structure of the corner member of the frame body, at least one corner among four corners of the rectangular intermediate plate disposed in the space layer formed between the first and second glass plates is cut to form a notch 743 (that is, a cut away part), and by a shared space part through which a plurality of compartmentalized space layers are communicated, formed in the interior of the corner member by the notch, the plurality of compartmentalized space layers may be communicated.

[0468] That is, in the example shown in Fig. 104(b), a plurality of base members 721 formed in rows on the frame body 703a are formed to extend to the corner of the intermediate plate, that is, a portion where the frame body 703a is butted to the frame body 703b in the corner member 706. Further, a plurality of base members 721 formed in rows on the frame body 703b are also formed to extend to the corner of the intermediate plate, that is, a portion where the frame body 703b is butted to the frame body 703a in the corner member 706.

[0469] Further, a plurality of lip parts 722 formed in rows on the frame body 703a are formed to extend to the corner of the intermediate plate, that is, a portion where the frame body 703a is butted to the frame body 703b in the corner member 706, and a plurality of lit parts 722 formed in rows on the frame body 703b are also formed to extend to the corner of the intermediate plate, that is, a portion where the frame member 703b is butted to the frame member 703a in the corner member 706.

[0470] In the example shown in Fig. 104(b), a plurality of blanks on which the base member 721 is not formed and a plurality of blanks on which the lip part 722 is not formed are not formed in the interior of the corner member as in the example shown in Fig. 104(a), and accordingly by such a structure, a shared space part through which a plurality of compartmentalized space layers are communicated cannot be formed in the interior of the corner member of the frame body. Thus, as mentioned above, a notch 743 (that is, a cut away part) is formed on at least one corner among four corners of the rectangular intermediate plate, whereby a communicating structure having a shared space part through which a plurality of compartmentalized space layers are communicated is provided, and by such a structure, the plurality of compartmentalized space layers are communicated and the pressures in the plurality of compartmentalized space layers can be equalized.

[0471] The shared space part through which the plurality of compartmentalized space layers are communicated is not limited to the above structure, and another structure may be employed.

[0472] Fig. 104 illustrates an example in which the lower side frame body and the left side frame body are connected by assembling them using a corner member 706

at the corner part where they are butted, and the lower side frame body and the right side frame body, the upper side frame body and the left side frame body, and the upper side frame body and the right side frame body, may be connected in the same manner as above. Further, the above communicating structure employing the corner part constituting the frame body may be employed only in one of or in a plurality of corner members used to connect the lower side frame body and the left side frame body of the rectangular multiple glazing sash, to connect the lower side frame body and the right side frame body, to connect the upper side frame body and the left side frame body, and to connect the upper side frame body and the right side frame body.

[0473] For the frame body 713 shown in Figs. 100 to 103, in the same manner as the example shown in Fig. 99, a synthetic resin material or an aluminum material is preferably used. As a synthetic resin material for forming the frame body, a rigid vinyl chloride resin material, an acrylonitrile/styrene resin material or such a resin material containing a glass fiber material may be mentioned as a preferred example, and needless to say, the material is not limited to such a thermoplastic synthetic resin material, and various thermoplastic synthetic resin materials can be used.

[0474] Further, as the frame body-forming material, it is preferred that a frame body consisting of a single member is obtained using one material, however, the frame body is not limited thereto, and a single member made of a composite material using a plural types of materials may also be used. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different resin materials, or may be a frame body having a composite structure made of the above synthetic resin material and aluminum material. Such a composite structure may be obtained by integrally forming desired frame body-forming materials. Particularly a frame body having a spacer part, or a frame body having a spacer part and a projecting leg integrally formed, made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, is more preferred, since when it is used for a sash, a multiple glazing sash which is excellent in the heat insulating property and the durability, which is produced at a low cost, which has a high heat insulation effect, which is less likely to have dew condensation, and which is excellent in the sound insulation property will be obtained.

[0475] Further, in a case where the frame body 713 is formed of a rigid vinyl chloride resin material or another synthetic resin material, a moisture-proof film such as an aluminum foil may be bonded to the outer side (the lower side in the drawing) of the frame body 713 so as to prevent moisture permeation of the frame body 713 from the outside, in the same manner as in the example shown in Fig. 99.

[0476] Further, the examples shown in Figs. 100 to 103 are to illustrate the structure of the lower side frame body of the multiple glazing sash, and it is preferred that the upper side frame body, the left side frame body and the right side frame body of the multiple glazing sash basically have the same structure as the lower side frame body, in the same manner as in the example shown in Fig. 99. Needless to say, the upper side, left side and right side frame bodies of the multiple glazing sash may have a properly changed structure depending upon the specifications.

[0477] Further, in a case where a space part 723 is formed in the frame bodies on the four sides of the multiple glazing sash, a drying agent may be contained only in the frame body on the required side among the four sides or only in a necessary portion, in the same manner as in the case of Fig. 99.

[0478] As an adhesive (a first sealing material and a second sealing material) to be used to bond a glass plate and a side part of the frame body at a portion where they are contacted with each other, used in the multiple glazing sash of the embodiment 8 of the present invention, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate and the side part of the frame body, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate and the frame body. For example, in a case where the side part of the frame body is made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. Further, in a case where the frame body has a projecting leg, as an adhesive to be used to bond the glass plate and the projecting leg, in the same manner as above, a proper adhesive is used so as to obtain excellent adhesion strength between the glass plate and the projecting leg, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate and the projecting leg. For example, in a case where the projecting leg is made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, in the same manner as the above example, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape. For the adhesive, as the case requires, a primer may be used for the purpose of improving the adhesive strength.

(Description of embodiment 9)

[0479] Now, the multiple glazing sash of the embodiment 9 of the present invention will be described in detail with reference to Figs. 105 to 112. The multiple glazing sash having the constitutions of Figs. 105 to 112 is based upon Japanese Patent Application No. 2014-016654,

which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 9.

[0480] Fig. 105 is a front view illustrating a multiple glazing sash 801 according to the embodiment 9, Fig. 106 is a schematic perspective view including a partial cross section illustrating the multiple glazing sash 801 shown in Fig. 105, and Fig. 107 is a cross-sectional view illustrating a scheme of the portion of the circle A in Fig. 106. Further, Fig. 108 illustrates a frame body 813 used for the multiple glazing sash 801 shown in Fig. 105.

<Entire constitution of multiple glazing sash 801 >

[0481] In Figs. 105 and 106, the reference symbol 810 represents a glass plate (first glass plate), 811 a glass plate (second glass plate), 803 an upper side frame body of the multiple glazing sash 801, 804 a side frame body of the multiple glazing sash 801, 805 a lower side frame body of the multiple glazing sash 801 (in this specification, the frame bodies 803, 804 and 805 will sometimes be generally referred to simply as a frame body 813), and 812A, 812B and 812C three intermediate glass plates. The three intermediate glass plate 812A, 812B and 812C are disposed between and to be spaced apart from the glass plates 810 and 811 spaced apart by the frame body 813.

[0482] The glass plate 810 and the glass plate 811 are spaced apart at their periphery by the frame body 813, whereby an air space 860 is formed between the glass plate 810 and the glass plate 811. Further, the air space 860 is sealed to the frame body 813 at the periphery of the glass plates, and as shown in Fig. 108, three intermediate glass plates 812A, 812B and 812C are disposed in the air space 860 to be spaced apart, whereby the air space 860 is divided into four divided air spaces 862.

<Frame body 813>

[0483] As shown in Figs. 107 and 108, the frame body 813 comprises a spacer part 818 and a projecting leg part 821.

[0484] The spacer part 818 has an inner surface part 814 and an outer side part 815 keeping a space between the glass plate 810 and the glass plate 811, side parts 816, 816 connected to the inner surface part 814 and the outer side part 815 and facing the inner side of the glass plates 810, 811, and space parts (containing parts) 817, 817 in which a drying agent 864 is contained.

[0485] A projecting leg part 821 has projecting arms 819, 819 in contact with the inner side of a peripheral edge part of the glass plates 810, 811, and bent projecting arms 820, 820 connected to the projecting arms 819, 819 and facing an edge face part of the glass plates 810, 811.

[0486] The spacer part 818 and the projecting leg part 821 are integrally formed of a frame body-forming material. "Integrally formed" means that a frame body-forming material is formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method.

[0487] The frame body-forming material is preferably a synthetic resin material or an aluminum material. The synthetic resin material for forming a frame body may, for example, be preferably a rigid vinyl chloride resin material, an acrylonitrile/styrene resin material or such a resin material containing a glass fiber material, however, the material is not limited to such a thermoplastic resin material, and various thermoplastic synthetic resin materials may be used.

[0488] Further, the frame body-forming material is not limited to one type, and a plural types of materials may be used to form a composite structure. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different resin materials, or may be a frame body having a composite structure made of the above synthetic resin material and aluminum material. In the case of such a composite structure, the frame body may be obtained by integrally forming any one type of frame body-forming materials. A different synthetic resin material and/or metal material may be partially or entirely bonded to the integrally formed frame body 813. Particularly, a frame body 813 comprising the spacer part 818 and the projecting leg part 821 integrally formed of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material is excellent in the heat insulating property when used for a multiple glazing sash 801, its integral forming is easy, it is excellent in the durability and it is available at a low cost.

[0489] To the frame body 813, three groove parts (holding parts) 822 are provided in rows to an inner surface part 814 of the spacer part 818 to dispose three intermediate glass plates 812A, 812B and 812C. The three groove parts 822 in rows are provided in parallel along the longitudinal direction of the spacer part 818 so that the three intermediate glass plates 812A, 812B and 812C are disposed in parallel. Further, on both sides on an inner surface of each groove part 822, lip parts 823, 823 made of an elastic material are provided so as to support an edge part of the intermediate glass plate 812A, 812B or 812C. Further, at the bottom of each groove part 822, a base member 829 made of an elastic material, a cushioning material or the like is provided so as to protect an edge face part of the intermediate glass plate 812A, 812B or 812C and to secure positioning.

[0490] The lip parts 823, 823 are provided at different levels so that the edge part of the intermediate glass plate 812A, 812B or 812C will easily be inserted, however, they may be provided at the same level. Further, in this example, the space part 817 is divided into four by the groove parts 822, and the four divided space parts 817 may be communicated at the lower part of the spacer part 818.

[0491] The projecting arm 819 of the projecting leg part 821 is provided to the peripheral edge part of the glass plates 810 and 811 spaced apart, for interior decoration.

Further, the bent projecting arms 820, 820 are bent from terminal parts on the opposite side of the projecting arms 819, 819 from side parts 816, 816 of the spacer part 818 to the glass plate 810, 811 side, extend in the lateral direction, and protect and support edge face parts of the glass plates 810 and 811. The bent projecting arms 820, 820 prevent dropping of the glass plates 810, 811, and the lengths of tips of the bent portions of the bent projecting arms 820, 820 are about the thicknesses of the glass plates 810, 811 or lengths such that the bent projecting arms slightly protrude outside the glass plates 810, 811.

[0492] The projecting arms 819 of the projecting leg part 821 and the side parts 816, 816 of the spacer part 818 form continuous faces, whereby the projecting arm 819 and the side part 816 may form a design face at the peripheral part of the multiple glazing sash 801 by considering the color tone, the plane conditions, etc. of the projecting arm 819 and the side part 816, 816.

[0493] It is preferred to provide a thin plate part 835 on the inner surface part 814 of the spacer part 818. An air hole is formed on the thin plate part 835, and by the air hole formed, the dry state of the divided air spaces 862 is maintained by a drying agent 864.

[0494] Figs. 107 and 108 illustrate the structure of the frame body 813 with reference to the lower side frame body 805 as an example, however, the structures of the frame bodies 803 and 804 are basically the same as the structure of the frame body 805.

<Divided air spaces 862>

[0495] In the four divided air spaces 862, an argon gas having a low thermal conductivity than air is filled to increase the insulation efficiency of the multiple glazing sash 801. Further, the argon gas is dried by a drying agent 864 contained in the space part 817 of the spacer part 818, whereby dew condensation on the glass plates 810 and 811 and the intermediate glass plates 812A, 812B and 812C is prevented. Further, the thickness of the divided air spaces 862 is set to be from 13 mm to 17 mm with which sufficient insulation efficiency will be achieved. That is, the thickness of the divided air spaces 862 is set with margins of 2 mm relative to the optimum value (15 mm) with which the maximum insulation efficiency will be obtained.

<Glass plates 810, 811 >

[0496] The glass plates 810 and 811 are rectangular flat glass plates, and their thicknesses are within a range of from 2 mm to 3 mm for weight saving, and the sizes of the glass plates 810 and 811 are the same or substantially the same.

[0497] Further, the glass plates 810 and 811 may be different in the thickness within the above thickness range. Further, each of the glass plates 810 and 811 is a chemically tempered glass plate having a sufficient strength even when it is thin. That is, by using chemically tempered glass as the glass plates 810 and 811, impact resistance and wind pressure resistance can be achieved even when they have a thickness of from 2 mm to 3 mm.

[0498] A chemically tempered glass plate is a glass plate produced by dipping a glass plate containing a Na component and a Li component such as soda lime silicate glass in a molten salt of e.g. potassium nitrate to replace Na ions and/or Li ions having a small atomic size present on the surface of the glass plate with K ions having a large atomic size present in the molten salt to form a compression stress layer on the surface layer of the glass plate thereby to increase the strength, and has a sufficiently high breaking strength. A chemically tempered glass plate has a sufficiently high breaking strength even when the thickness is at most 2mm. Accordingly, by use of a chemically tempered glass plate as the glass plates 810, 811, sufficient strength as the glass plates 810 and 811 to be disposed on the outside can be guaranteed even when the glass plate 810 and 811 are thin glass plates having a thickness of from 2 mm to 3 mm.

[0499] Further, on the inner side facing the divided air space 862 of the glass plates 810 and 811, a low emissivity film 866 such as a Low-E (Low-Emissivity) film is formed. That is, the glass plate 810, 811 is constituted as a Low-E glass. The low emissivity film 866 such as a Low-E (Low-Emissivity) film may be formed on both or either one of the inner surfaces facing the divided air space 862 of the glass plate 810 (first glass plate) and the glass plate 811 (second glass plate) of the multiple glazing sash.

[0500] Low-E glass comprises a low emissivity film containing tin oxide (SnO_2) as the main component or a low emissivity film containing silver (Ag) as the main component formed on the surface of a glass plate e.g. by a sputtering apparatus, and has a function to lower the emissivity of the heat energy by infrared rays. That is, the Low-E glass hardly transmits heat and thereby has high heat shielding property and heat insulating property. Further, a low emissivity film containing silver as the main component is easily oxidized e.g. by moisture in the air, and accordingly when used for a multiple glazing sash, it is preferably formed on the surface facing the closed air space. Further, a low emissivity film containing tin oxide as the main component has low heat ray reflectivity and low heat shielding property as compared with the low reflectivity film containing silver as the main component, but is advantageous in that it is hardly oxidized and has high mechanical durability and is thereby hardly scared as compared with the low emissivity film containing silver as the main component. Accordingly, a low emissivity film containing tin oxide as the main component may be formed on the outer side of the glass plate 810, 811.

<Intermediate glass plates 812A, 812B, 812C>

[0501] The intermediate glass plates 812A, 812B and

812C are rectangular flat glass plates, and their thicknesses are within a range of from 1 mm to 2 mm for weight saving, and the sizes of the intermediate glass plates 812A, 812B and 812C are the same or substantially the same.

[0502] Further, the intermediate glass plates 812A, 812B and 812C may be different in the thickness within the above thickness range. Further, each of the intermediate glass plates 812A, 812B and 812C is a chemically tempered glass plate having sufficient strength even when it is thin, in the same manner as the glass plates 810 and 811. For example, chemically tempered glass having a thickness of 1 mm to 2 mm has a static flexural strength at the same level as non-tempered glass such as float glass, having a thickness of 3 mm to 6 mm.

[0503] The intermediate glass plates 812A, 812B and 812C preferably have a rectangular shape which is similar to and smaller than the glass plates 810 and 811 so that they can be inserted to the groove parts 822 of the frame body 813. Further, the intermediate glass plates 812A, 812B and 812C may also have a low emissivity film.

<Additional constitution of multiple glazing sash 801 >

[0504] In the multiple glazing sash 801 of the embodiment 9, the side part 816 and the projecting arm 819 of the frame body 813 are bonded to the glass plate 810, 811 at a portion where they face the glass plate 810, 811, by an adhesive layer 830, to maintain airtightness of the divided air spaces 862 formed between the glass plates 810 and 811.

[0505] Further, as shown in Fig. 108, a groove part 824 is formed between a pair of projecting arms 819, 819 on both sides, and the shape of the longitudinal cross section in the longitudinal direction of the projecting leg part 821 is a reverse U-shape. To the groove part 824, a sash roller, a sash roller-bearing member, a latch member or another sash functional member may be provided, and such a sash functional member is shielded from both the exterior side and the interior side of the multiple glazing sash by the frame body 813.

[0506] The height of the side part 816 is preferably within a range of from 5 mm to 15 mm, and the height of the projecting arm 819 is preferably within a range of from 15 mm to 50 mm.

[0507] A concave part 826 is provided on a part of a plane on the glass plate side of the side parts 816, 816, whereby an adhesive injected or applied to between the glass plate 810, 811 and the side part 816 accumulates in the concave part 826 and will not protrude to the divided air space 621 side of the side part 816 and that the thickness of the adhesive layer 830 can be secured at the time of production of the multiple glazing sash 801.

[0508] Further, also on a part of a plane on the glass plate side of the projecting arm 819, a concave part 827 is provided, whereby an adhesive injected or applied to between the glass plate 810, 812 and the projecting arm 819 of the projecting leg part 821 accumulates in the concave part 827 and will not protrude outside the projecting arm 819 (that is, the edge face side of the glass plate 810, 811) and the thickness of the adhesive layer 830 is secured at the time of production of the multiple glazing sash 801.

[0509] An edge part protecting cover 840 shown in Fig. 108 may be provided to the groove part 824. The edge part protecting cover 840 may have any structure so long as it can clog the groove part 824 at the edge face of the multiple glazing sash 801. The edge part protecting cover 840 may have a structural part to support the edge faces of the glass plates 810 and 811.

[0510] The edge part protecting cover 840 has a bottom part 841 to clog the bottom of the groove part 824 in the longitudinal direction of the edge face of the multiple glazing sash 801, guide rib parts 842, 842 the tip of which is bent in a L-shape, provided so that they can be attached to guide convex strips 828, 828 provided on the lower side on the groove part 824 side of the projecting arms 819, 819, as sliding from the lateral direction, and bent parts 843, 843 in contact with outside edge face parts of the glass plates 810 and 811. The example shown in the drawing illustrates an edge part protecting cover 840 of a slide attaching type, but the edge part protecting cover is not limited thereto, and an edge part protecting cover of a structure such that it can be attached by a fitting method from bottom in Fig. 108 to the groove part 824, or of a structure such that it can be attached by another attaching method, may be used.

[0511] On the lower side of the multiple glazing sash 801, in the case of a sliding door, a sash roller for a sash is attached, and thus an edge part protecting cover 840 may be provided on a portion excluding the sash roller. Further, on the upper side and on the sides of the multiple glazing sash 801, an edge part protecting cover 840 is preferably provided. Even when frame bodies 813 are used for four sides of the multiple glazing sash 801 in which the glass plates are rectangular, by providing an edge part protecting cover 840 to a groove part 824 of each frame body 813 on the upper side and on the sides, the groove part 824 can be clogged, and such a multiple glazing sash can be practically used, and such is effective to reduce the number of members in assembling of the multiple glazing sash 801.

[0512] In a case where the multiple glazing sash 801 is a swing window, since a roller sash is not necessary, the lower side, the upper side, the left side and the right side may have the same structure.

[0513] As the adhesive to be used to bond the glass plate 810, 811 and the side part 816, 816, a proper adhesive is used so as to obtain an excellent adhesion strength, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 810, 811 and the spacer part 818.

[0514] For example, in a case where the side parts 816, 816 are made of a rigid vinyl chloride resin material

or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape.

[0515] Further, also as the adhesive to be used to bond the glass plate 810, 811 and the projecting arm 819, 819, a proper adhesive is used so as to obtain excellent adhesion strength, moisture-proof property, durability, favorable bonded surface, etc., and considering simplification of the step of bonding the glass plate 810, 811 and the projecting arm 819, 819. For example, in a case where the projecting arms 819, 819 are made of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material, the adhesive may, for example, be preferably a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt type adhesive, an epoxy type adhesive, a double-coated adhesive tape or a double-coated pressure-sensitive adhesive tape.

[0516] The adhesive to be used to bond the glass plate 810, 811 and the side part 816, and the adhesive to be used to bond the glass plate 810, 811 and the projecting arm 819, are the same, whereby the number of the bonding steps in the assembling steps is reduced. However, depending upon the performance required for the multiple glazing sash 801, different adhesives may be used. Further, the adhesive to be used may be a transparent adhesive, or may be a black or another properly colored adhesive.

<Example of multiple glazing sash 801 applied to sliding window>

[0517] Fig. 109 is a longitudinal sectional view illustrating multiple glazing sashes 801 a and 801 b according to the embodiment applied to a sliding window, and Fig. 110 is a transverse sectional view illustrating the multiple glazing sashes 801 a and 801 b in the sliding window shown in Fig. 109.

[0518] As shown in Fig. 109, to a groove part 824a of a frame body 805, a sash roller 844 is rotatably attached via a sash roller-attaching member 845, and multiple glazing sashes 801 a and 801 b move along moving rails 847 provided on the lower side of a window frame 846.

[0519] An edge part protecting cover 840a is disposed between a lower edge part 848 on both sides of the sash roller-attaching member 845 and a lower edge of a projecting arm 819, and a fin part 849 in contact with the moving rail 847 is provided to the moving rail 847 side of the edge part protecting cover 840a.

[0520] As the sash roller-attaching members 845 for the multiple glazing sashes on both sides, members having different structures are exemplified. Further, to a groove part 824b of a frame body 803, a moving rail 850 provided on the upper side of the window frame 846 is contained. Further, to the groove part 824b, an edge part protecting cover 840b is attached. The edge part protecting cover 840b has a concave part 852, and the concave part 852 has fin parts 851, 851. The fin parts 851, 851 are elastically in contact with the moving rail 850 from both sides of the moving rail 850.

[0521] As shown in Fig. 110, to an edge part protecting cover 840c attached to a groove part 824c of a frame body 804, an airtight material 853 which contacts with an airtight material of the other multiple glazing sash is provided at a meeting portion of the multiple glazing sashes 801 a and 801 b. Further, an airtight material 854 is provided to the window frame 846 at a portion where the side edge part of the multiple glazing sash 801 a or 801 b meets the window frame 846.

[0522] Now, characteristics of the multiple glazing sash 801 of the embodiment 9 will be described.

[First characteristics]

[0523] As shown in Fig. 108, the multiple glazing sash 801 is a multiple glazing sash having five glass plates 810, 811, 812A, 812B and 812C disposed to be spaced apart, assumed to exhibit maximum insulation efficiency, and an argon gas having a lower thermal conductivity than air is filled into four divided air spaces 862 to further improve the insulation efficiency.

[0524] Further, the multiple glazing sash 801 has a glass plate 810 and a glass plate 811 spaced apart at their periphery by a frame body 813, and three intermediate glass plate 812A, 812B and 812C held by three groove parts 822 provided in rows to the frame body 813. Thus, it can be easily produced as compared with the double glazing having a spacer and a sealing material (primary sealing, secondary sealing) as disclosed in Patent Document 3, since the number of members is smaller, and the number of assembling steps is smaller.

[0525] Further, in the multiple glazing sash 801, each of the glass plate 810 and the glass plate 811 is chemically tempered glass having a thickness (t1) of from 2 mm to 3 mm, each of the three intermediate glass plates 812A, 812B and 812C is chemically tempered glass having a thickness (t2) of from 1 mm to 2 mm, and each of the four divided air spaces 862 has a thickness (t3) of from 13 mm to 17 mm.

[0526] Accordingly, the multiple glazing sash 1 has strength at the same level as thick non-tempered glass, even though it is thin, since chemically tempered glass is used for all the glass plates 810, 811, 812A, 812B and 812C. Further, since each of the four divided air spaces 862 has a thickness (t3) of from 13 mm to 17 mm, sufficient insulation efficiency can be obtained.

[0527] As mentioned above, the multiple glazing sash 801 of the embodiment has a total thickness (T) suppressed to be from 59 mm to 80 mm although it has five glass plates 810, 811, 812A, 812B and 812C, since thin chemically tempered glass is used, and the thicknesses of the four divided air spaces 862 are set so that sufficient insulation efficiency can be obtained. Accordingly, weight saving can be achieved as compared with a multiple glaz-

ing having five non-tempered glass plates. Further, the multiple glazing sash 1 of this embodiment can be applied as a window to an opening for a window on a conventional wall in a residence in Japan having a wall thickness of 150 mm.

[0528] Fig. 11 is a longitudinal sectional view illustrating the sliding window shown in Fig. 109 attached to an opening for a window of a wall 868 of a residence via a window frame 46, and Fig. 112 is a transverse sectional view of Fig. 111. In Figs. 111 and 112, the same or similar members as members shown in Figs. 109 and 110 are represented by the same symbols, and their description is omitted. Further, the thickness of the wall 868 is 150 mm.

[0529] A multiple glazing sash 801a is disposed on the interior side of a residence, and the multiple glazing sash 801 b is disposed on the exterior side.

[0530] The upper side part of the window frame 846 is fixed to a lintel 874 by a plurality of wood screws 872 and pegs 873. Further, the lower side part of the window frame 846 is fixed to a sill 876 by a plurality of wood screws 872 and pegs 873. Further, the sides on both sides of the window frame 846 are fixed to a pair of pillars 878 by a plurality of wood screws 872 and pegs 873. The reference symbol 880 represents an outer wall of a residence, and the reference symbol 882 represents a plasterboard.

[0531] As shown in Figs. 111 and 112, by suppressing the thicknesses of the multiple glazing sashes 801 and 801b to be from 59 mm to 80 mm, the multiple glazing sashes 801 a and 801 b can be applied as a sliding window to an opening 870 for a window having a wall thickness of 150 mm.

[Second characteristics]

[0532] The glass plates 810 and 811 have a low emissivity film 866.

[0533] Thus, according to the multiple glazing sash 801 of the embodiment, the insulation efficiency can further be increased by the low emissivity film 866.

[Third characteristics]

[0534] A space part 817 in which a drying agent 864 is contained is provided to at least a part on the air space side of the frame body 813.

[0535] Thus, according to the multiple glazing sash 801 of the embodiment, an argon gas filled into the divided air spaces 862 can be maintained always in a dry state by a drying agent 864, whereby dew condensation on the five glass plates 810, 811, 812A, 812B and 812C constituting the multiple glazing sash 801 can be prevented, and the life of the multiple glazing sash 801 can be extended.

(Description of embodiment 10)

[0536] Now, the embodiment 10 of the present invention will be described in detail with reference to Figs. 113 to 120.

[0537] The multiple glazing sash and the frame body for a multiple glazing sash having the constitutions of Figs. 113 and 120 are based on Japanese Patent Application No. 2014-018548, which the present application is based upon and claims the benefit of priority from, and this embodiment will sometimes be referred to as the embodiment 10.

[First aspect of embodiment 10]

<Entire constitution>

[0538] Fig. 113 is a front view illustrating a multiple glazing sash of a first aspect of the embodiment 10, and Fig. 114 is a 2-2 cross-sectional view illustrating the multiple glazing sash shown in Fig. 113. Further, Fig. 115 is an enlarged view illustrating the portion surrounded by the circular A in Fig. 114, and Fig. 116 is an enlarged view illustrating a substantial part of the multiple glazing sash when assembled.

[0539] A multiple glazing sash 901 of the embodiment 10 of the present invention is a quintuple multiple glazing sash, and has a first glass plate 910 consisting of a two-layer multiple glazing, a second glass plate 920 consisting of a three-layer multiple glazing, and a frame body 930 for holding the first glass plate 910 and the second glass plate 920 with a distance therebetween in parallel with each other.

<First glass plate>

[0540] The first glass plate 910 has two rectangular flat glass plates 910A and 910B spaced apart by a spacer 912, and their peripheral edge being sealed by a sealing member 913. The first glass plate 910 thus constituted has a closed air space 911 between the two glass plates 910A and 910B.

<Second glass plate>

[0541] The second glass plate 920 has three rectangular flat glass plates 920A, 920B and 920C spaced apart by spacers 922A and 922B, and their peripheral edge being sealed by sealing members 923A and 923B. The second glass plate 920 such constituted has closed air spaces 921A and 921 B between adjacent glass plates (between the glass plate 920A and the glass plate 920B, and between the glass plate 920B and the glass plate 920C).

<Frame body>

[0542] The frame body 930 has a rectangular frame

shape corresponding to the outer peripheral shape of the first glass plate 910 and the second glass plate 920, and on its inner peripheral part, holds the peripheral edge portions of the first glass plate 910 and the second glass plate 920 to hold the first glass plate 910 and the second glass plate 920 with a certain distance.

[0543] The frame body 930 comprises a frame-form projecting leg part 931 as the base and a spacer part 932 disposed on an inner peripheral part of the projecting leg part 931.

[0544] The projecting leg part 931 has a concave strip part 933 around the entire circumference of the inner peripheral part. The concave strip part 933 has a pair of inner wall surface parts 933A and 933B and a bottom part 933C. The inner wall surface parts 933A and 933B are provided in parallel with the principal plane of the first glass plate 910 and the second glass plate 920. The bottom 933C is formed at right angles to the principal plane of the first glass plate 910 and the second glass plate 920. The peripheral edge parts of the first glass plate 910 and the second glass plate 920 are fitted to the concave strip part 933 and the glass plates are held by the frame body 930.

[0545] The spacer part 932 is disposed around the entire circumference of the inner peripheral part of the projecting leg part 931 as a convex strip part having a predetermined width and height. The spacer part 932 is disposed on the inner side of the concave strip part 933, and has a pair of side wall parts 932A and 932B and an inner surface part 932C. The side wall parts 932A and 932B are formed in parallel with the inner surface parts 933A and 933B of the concave strip part 933, and the inner surface part 932C is formed in parallel with the bottom part 933C of the concave strip part 933. The first glass plate 910 and the second glass plate 920 are spaced apart by this spacer part 932.

[0546] The spacer part 932 has a hollow structure, and in its space part 932D, a drying agent 934 is contained. On the inner surface part 932C of the spacer part 932, air holes 932E communicated with the space part 932D are formed with a certain distance along the longitudinal direction (the direction of the respective sides).

[0547] A sealing member 936 made of an elastic material is attached to the inner surface parts 933A and 933B of the concave strip part 933 and to the side wall parts 932A and 932B of the spacer part 932.

[0548] The frame body 930 thus constituted has a first groove part 937A and a second groove part 937B formed in its inner peripheral part by the concave strip part 933 and the spacer part 932. The first glass plate 910 and the second glass plate 920 are attached to the frame body 930 by being fitted to the first groove part 937A and the second groove part 937B, respectively.

[0549] The frame body 930 is constituted in a rectangular frame-shape by separately preparing a part constituting the upper side of the frame body 930 (an upper frame body part), a part constituting the lower side (a lower frame body part), a part constituting the left side (a left frame body part) and a part constituting the right side (right frame body part) and assembling the respective parts. On that occasion, the respective parts may be connected by using corner blocks at the respective corner parts. The multiple glazing sash 901 can easily be assembled by such a block construction.

<Assembling of multiple glazing sash>

[0550] The multiple glazing sash 901 is assembled by fitting the first glass plate 910 and the second glass plate 920 to the frame body 930.

[0551] As mentioned above, since the frame body 930 is constituted divisibly into the respective four sides, divided frame body parts for the frame body 930 are attached to the respective sides of the first glass plate 910 and the second glass plate 920 to assemble the multiple glazing sash 901. On that occasion, as shown in Fig. 116, the first glass plate 910 and the second glass plate 920 are fitted respectively to the first groove part 937A and the second groove part 937B to attach the frame body 930.

[0552] In the assembled multiple glazing sash 901, the first glass plate 910 and the second glass plate 920 are held by the frame body 930 to be spaced apart, and a space 938 with a certain thickness is provided between the first glass plate 910 and the second glass plate 920.

[0553] Here, the space 938 between the first glass plate 910 and the second glass plate 920 is closed since the gap between the first glass plate 910 and the second glass plate 920 held by the frame body 930, and the frame body 930, is sealed by the sealing member 936. That is, the space has the same function as the air space in a multiple glazing. Further, this space 938 is communicated with the space part 932D in which the drying agent 934 is contained, via the air holes 932E on the spacer part 932, whereby its dry state can be maintained.

[0554] As mentioned above, according to the multiple glazing sash 901, a sash having the same function as a sash using a five-layer multiple glazing, can be realized by the first glass plate 910 consisting of a two-layer multiple glazing and the second glass plate 920 consisting of a three-layer multiple glazing in combination. The multiple glazing sash 901 of this aspect can easily be produced since multiple glazings with a relatively small number of constituting plates are combined.

[Second aspect of embodiment 10]

[0555] Fig. 117 is an enlarged cross-sectional view illustrating a substantial part of a multiple glazing sash of a second aspect of the embodiment 10.

[0556] This multiple glazing sash 1000 is also a five-layer multiple glazing sash, however, the constitution of the glass plates used is different from that in the multiple glazing sash 901 of the first aspect.

[0557] The multiple glazing sash 1000 shown in Fig. 117 is a five-layer multiple glazing sash constituted by

two first glass plates 1010 consisting of a two-layer multiple glazing and one second glass plate 1020 consisting of a single glass plate. In such a case, in the frame body 930, two spacer parts 932 are provided. Further, when the respective glass plates are attached to the frame body, closed spaces 938 are provided between the respective glass plates (totally two spaces are provided).

[0558] In such a manner, the multiple glazing sash may be constituted by multiple glazings and a single glass plate in combination.

[0559] The multiple glazing sash of the embodiment 10 of the present invention comprises two or more glass plates, at least one being constituted by a multiple glazing. Accordingly, the minimum constitution is a three-layer structure comprising one two-layer multiple glazing and one single glass plate. The upper limit is not particularly limited.

[0560] The number of layers (the number of glass plates) in the multiple glazing used is not particularly limited, however, a multiple glazing with a small number of layers is preferred, since production of a multiple glazing becomes difficult as the number of glass plates increases. Accordingly, use of a two-layer or three-layer multiple glazing is preferred.

[0561] Further, the order of disposition of the glass plates is not particularly limited, however, it is preferred to dispose a glass plate with a low strength on the inner side and to dispose a glass plate with a high strength on the outer side.

[Third aspect of embodiment 10]

[0562] Fig. 118 is an enlarged cross-sectional view illustrating a substantial part of a multiple glazing sash of a third aspect of the embodiment 10.

[0563] This multiple glazing sash 1100 is also a five-layer multiple glazing sash, however, the constitution of the glass plates and the constitution of the frame body are different from those in the multiple glazing sash 901 of the first aspect.

[0564] The multiple glazing sash 1100 shown in Fig. 118 is a five-layer multiple glazing sash constituted by one first glass plate 1110 consisting of a three-layer multiple glazing, and two second glass plates 1120 consisting of a single glass plate.

[0565] Further, a frame body 1130 of the multiple glazing sash 1100 of this aspect does not have a concave strip part in a projecting leg part 1131, and has a structure such that the two outside glass plates (in this aspect, two second glass plates 1120 consisting of a single glass plate) are bonded to side wall parts 1132A and 1132B of a spacer part 1132 by an adhesive 1140 and held (the glass pate disposed in the inside (in this aspect, one first glass plate 1110 consisting of a three-layer multiple glazing) is held by the frame body 1130 as being fitted to a groove part provided between the spacer parts 1132).

[0566] As mentioned above, the structure for holding the glass plate is not limited to a structure of holding the glass plate by fitting it to a groove part, and may be a structure of holding the glass plate by bonding it to side wall parts of the spacer part. In such a case, the means of bonding the glass plate to the spacer part is not limited to an adhesive, and may be a pressure-sensitive adhesive tape.

[0567] Fig. 119 is a cross-sectional view illustrating a modified example of a frame body of the multiple glazing sash of the third aspect.

[0568] As shown in the drawing, the frame body 1130 in this example has extensions 1131Aand 1131 B on side surfaces of a projecting leg part 1131. The extensions 1131A and 1131 B form a plane with side wall parts 1132A and 1132B of the spacer part 1132 to which the two outside glass plates are to be bonded, so that the glass plates can be bonded.

[0569] In such a manner, by the projecting leg part 1131 having the extensions 1131A and 1131B, the area to which the outside two glass plates can be bonded is enlarged, whereby the outside two glass plates are held firmly.

[0570] Further, by the projecting leg part 1131 having the extensions 1131A and 1131 B, an outer peripheral groove part 1131C may be provided to an outer peripheral part of the projecting leg part 1131. This outer peripheral groove part 1131C may be used as an attaching portion to which a sash roller, a sash roller-bearing member, a latch member or another sash functional member is attached. Further, as the case requires, the projecting leg part 1131 may be covered.

[0571] In the example shown in Fig. 119, bent parts 1131A1 and 1131B1 are provided to tip parts of the extensions 1131 A and 1131 B, however, the bent parts 1131A1 and 1131B1 may not be provided. By the bent parts 1131A1 and 1131B1, edge faces of glass plates bonded to the extensions 1131 A and 1131 B can be protected.

[Another aspect of embodiment 10]

<Sealing member>

[0572] Fig. 120 is a cross-sectional view illustrating another aspect of the sealing member.

[0573] As a sealing member, a sealing member 950 the cross-sectional shape of which is a U-shape may be used in conformity with the inner peripheral shape of a groove part to which a glass plate is fitted, whereby an edge face of the glass plate can be protected, in addition to sealing.

[0574] Further, lip parts 952A and 952B in a fin-form made of an elastic material may be provided to inner wall surfaces (inner wall surface parts 933A and 933B of the concave strip part 933 and/or side wall parts 932A and 932B of the spacer part 932) facing each other of the groove part to which a glass plate is fitted, so that the lip parts 952A and 952B function as a sealing member. The lip parts 952A and 952B are provided along the longitu-

dinal direction of the groove part, and sandwich a glass plate fitted to the groove part from both sides. Further, simultaneously, they seal the gap between the frame body and the glass plate.

[0575] Further, the lip parts 952A and 952B may be provided at the same level, however, they are preferably provided at different levels as shown in Fig. 120, whereby a glass plate is easily fitted to the groove part.

[0576] Further, at the bottom of the groove part to which the lip parts 952A and 952B are provided, a sear-form cushioning member 954 made of an elastic material is preferably disposed, whereby an edge face of a glass plate fitted to the groove part can be protected, and positioning can be secured.

[0577] Otherwise, the gap between the glass plate and the frame body may be sealed by a gasket or a grazing channel.

<Glass plate>

[0578] As the multiple glazing used as the first glass plate and/or the second glass plate, a multiple glazing commonly used for buildings may be used. Further, as the single glass plate used as the second glass plate, a glass plate commonly used for buildings may be used.

[0579] By using chemically tempered glass as the glass plate constituting the multiple glazing and as the glass plate constituting the single glass plate, reduction in thickness of the sash can be achieved while sufficient strength is secured.

[0580] Further, heat insulating property can be further increased by using a multiple glazing having an inert gas such as an argon gas or a krypton gas filled in an air space. Further, the same effect will be obtained by using a multiple glazing (vacuum glazing) in which the air space is in a vacuum.

[0581] Further, to a space between the first glass plate and the second glass plate held by the frame body, an inert gas such as an argon gas or a krypton gas may be filled, whereby the heat insulating property can further be increased.

[0582] Further, as the first glass plate and/or the second glass plate, a glass plate having a low emissivity film (a Low-E film) may be used, whereby the heat insulating property can further be increased.

[0583] Further, the glass plate is not limited to a colorless and transparent glass plate, and a colored or semi-transparent glass plate may be used.

<Frame body>

[0584] The frame body is composed of a projecting leg part and a spacer part, and the projecting leg part and the spacer part are preferably integrally formed. Particularly, it is preferred that the frame body is composed of upper, lower, right and left side frame body members and they are formed by an integral forming method such as an extrusion method, a co-extrusion method or an injection molding method, whereby the frame body can easily be produced.

[0585] The material constituting the frame body is not particularly limited, and in a case where the projecting leg part and the spacer part are integrally formed, a synthetic resin material is preferred, and a thermoplastic synthetic resin material is particularly preferred. The thermoplastic synthetic resin material may, for example, be a rigid vinyl chloride resin material, an acrylonitrile/styrene resin material or such a resin material containing a glass fiber material. A frame body integrally formed of a rigid vinyl chloride resin material or an acrylonitrile/styrene resin material is excellent in the heat insulating property when used for a sash, its integral forming is easy, it is excellent in the durability and it is available at a low cost. Otherwise, an aluminum material may be used for the frame body.

[0586] Further, the frame body may have a composite structure using a plural types of materials. For example, the frame body may be a frame body having a composite structure partly made of different synthetic resin materials formed by a co-extrusion method using different synthetic resin materials. Further, the frame body may have a structure to which a partly different material is bonded.

[0587] Further, with respect to the spacer part provided to the frame body, its width may be adjusted to adjust the space between the glass plates held. As mentioned above, the space between the glass plates is closed and has the same function as the air space in the multiple glazing. The insulation efficiency varies depending upon the thickness of the space, and accordingly the width of the spacer part is preferably set to obtain an optimum insulation efficiency.

[0588] Further, the frame body parts produced for the respective four sides, preferably have a screw hole for easy assembling. The screw hole is provided, for example, to an outer peripheral part of the projecting leg part 931 of the frame body 930, as shown in Fig. 120. In the example shown in the drawing, a pair of screw holes 939 are provided along the longitudinal direction of the frame body 930. In the case of such a frame body 930 having the screw holes 939, parts constituting the respective sides (upper frame body part, lower frame body part, left frame body part and right frame body part) can be connected to corner blocks by means of the screw holes 939 (they can be fixed to the corner blocks by screws using the screw holes) at corner parts. Further, in a case where the respective frame body parts of the frame body 930 are directly connected, they can be connected to each other by screws using the screw holes 939.

<Adhesive>

[0589] In a case where the glass plate is attached to the frame body by bonding, the adhesive is selected considering the adhesion strength, the moisture-proof property, durability, bonding steps, etc. For example, in a case where the spacer part is made of a synthetic resin ma-

terial such as a rigid vinyl chloride resin or an acrylonitrile/styrene resin, the adhesive may, for example, be a silicone type adhesive, a polysulfide type adhesive, a butyl type adhesive, a hot melt adhesive or an epoxy type adhesive.

[0590] Further, the adhesive may be a transparent adhesive, or may be a black or another properly colored adhesive. By using a transparent adhesive, the frame body may form a design face of the multiple glazing sash. Further, by using a black or another properly colored adhesive, the resulting adhesive layer may form a design face of the multiple glazing sash.

[0591] Further, the glass plate may be bonded by using a double-coated adhesive tape.

INDUSTRIAL APPLICABILITY

[0592] According to the embodiment 1 of the present invention, it is possible to provide a multiple glazing sash for a residence and another building, which is a multiple type multiple glazing sash having a total number of glass plates and an interplate of at least 3, particularly at least 4, having two glass plates and at least one intermediate plate disposed to be spaced apart from each other, which can reduce the number of members, which can reduce the number of assembling steps and which can meet various specifications.

[0593] According to the embodiment 2 of the present invention, it is possible to provide a multiple glazing sash of a multiple glazing type of triple or more, having a total number of glass plates and an intermediate plate of 3 or more, having two glass plates and at least one intermediate plate disposed to be spaced apart from each other, in which a projecting leg part can be provided to a peripheral part of the multiple glazing for interior decoration, the thickness of which can be reduced, which has high design property and open feeling, and of which the number of members and the number of assembling steps can be reduced. Assembling of the multiple glazing sash can be simplified by reduction in the number of members and the number of assembling steps. Particularly, it is useful as a sash for an inside window to be disposed on the interior side of a window of an existing residence, building or the like to form a double window so as to increase the sound insulation property, the heat insulating property and the security.

[0594] According to the embodiment 3 of the present invention, the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, and improvement in the viewability and the open feeling and improvement in the heat insulating property can be achieved, the multiple glazing sash can be downsized, and improvement in the design property can be achieved, and such a multiple glazing sash is useful for windows for residences and other buildings. Particularly, it is useful as a sash of an inside window to be disposed on the interior side of a window of an existing residence, building or the like to form a double window so as to increase the sound insulation property, the heat insulating property and the security.

[0595] According to the embodiment 4 of the present invention, even when a three-layer or more multiple glazing (multiple glazing sash) having at least two air spaces, having two glass plates and at least one intermediate plate disposed to be spaced apart from each other, has two air spaces, or three air spaces or even more, installation of gas feed openings of a filler gas into the air spaces is simplified by a corner block consisting of members formed into one piece, filling of a filler gas into the at least two air spaces can be carried out simultaneously, and production of a gas-containing multiple glazing (multiple glazing sash) can be simplified. Further, by using a corner block integrally formed of a synthetic resin material, a gas-containing multiple glazing (multiple glazing sash) with a reduced number of members and a reduced number of assembling steps can be provided, whereby a cost reduction can be achieved.

[0596] According to the embodiment 5 of the present invention, a moisture-proof layer is formed on at least a part of an inner surface of a groove part formed by a pair of projecting legs on both sides of a projecting leg part and an outer side part of a spacer part of a frame body, whereby a multiple glazing sash excellent in the moisture resistance can be provided. Further, according to the multiple glazing sash of the present invention, the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, improvement in the viewability and the open feeling and improvement in the heat insulating property can be achieved, the multiple glazing sash can be downsized, and improvement in the design property can be achieved, and such a multiple glazing sash is useful for windows of residences and other various buildings.

[0597] According to the embodiment 6 of the present invention, in production of a multiple glazing sash, an operation of bonding first and second glass plates to a frame body can smoothly and simply carried out, and further, a multiple glazing sash having a good-looking and desired line-shape boundary line can be produced by virtue of the linearity of the edge of the first adhesive layer, regardless of formation of bubbles and looking of the boundary line in the second adhesive layer. Further, according to the process for producing a multiple glazing sash of the present invention, the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, improvement in the viewability and the open feeling and improvement in heat insulating property can be achieved, the multiple glazing sash can be downsized, and improvement in the design property can be achieved, and such a multiple glazing sash is useful for windows of residences and other buildings.

[0598] According to the embodiment 7 of the present invention, in a multiple glazing sash using a frame body having the above structure, an edge part of glass plates

on both sides can be protected and further, even if the adhesion strength of the adhesive layer on the glass plates on both sides bonded to the frame body is weak by any chance, the glass plates can be held so that they will not fall down. Further, the edge face protecting cover is fitted by utilizing a groove part formed on an inner side of a peripheral edge part of the frame body disposed between the first glass plate and the second glass plate, whereby the edge of the multiple glazing sash looks good, and the design of the front face can be refined.

[0599] According to the embodiment 8 of the present invention, in a space layer formed by disposing a first glass plate and a second glass plate to be spaced apart by a frame body, at least one intermediate plate is disposed to form a plurality of compartmentalized space layers, and the plurality of compartmentalized space layers are communicated by a communicating structure provided to the frame body, whereby the pressures in the respective compartmentalized space layers can be equalized, warpage and displacement of the intermediate plate by a variation in the air pressure, a temperature change, a variation in the window pressure, etc. can be prevented, and long term durability of even a multiple glazing sash having more layers can be improved, and such a multiple glazing sash of the present invention is useful for windows of residences and other various buildings.

[0600] According to the embodiment 9 of the present invention, the multiple glazing sash has a constitution such that five glass plates are disposed to be spaced apart, assumed to exhibit maximum heat insulating property, and an argon gas having a lower thermal conductivity than air is filled into the four divided air spaces, thus further improving insulation efficiency. Further, since the multiple glazing sash has a constitution such that three intermediate glass plates are held by three groove parts provided in rows to the frame body, the number of members is small and the number of assembling steps is small, and such a multiple glazing sash can easily be produced as compared with the double glazing sash in Patent Document 3 having a spacer and a sealing material (primary sealing, secondary sealing). Further, each of the first and second glass plates is chemically tempered glass having a thickness of from 2 mm to 3 mm, each of the three intermediate glass plate is chemically tempered glass having a thickness of from 1 mm to 2 mm, the thickness of each of the four divided air spaces 862 is from 13 mm to 17 mm, and chemically tempered glass is used for all the glass plates, and accordingly the strength of each of the glass plates is maintained to be at the same level as thick non-tempered glass even though it is thin, and further, since the thickness of each of the four divided air spaces is from 13 mm to 17 mm, sufficient insulation efficiency can be achieved, the entire thickness of the multiple glazing sash can be suppressed to be from 59 mm to 80 mm, and downsizing of such a multiple glazing sash can be achieved as compared with a multiple glazing having five non-tempered glass plates. Further, the multiple glazing sash 1 according to the embodiment can be applied as a window to an opening for a window on a conventional wall of a residence in Japan having a wall thickness of 150 mm. Further, according to one embodiment of the embodiment 9, the insulation efficiency can further be increased by a low emissivity film.

[0601] According to the embodiment 10 of the present invention, the number of members and the number of assembling steps can be reduced, assembling of the multiple glazing sash can be simplified, improvement in the viewability and the open feeling and improvement in the heat insulating property can be achieved, the multiple glazing sash can be downsized, and improvement in the design property can be achieved, and such a multiple glazing sash is useful for windows of residences and other buildings. Particularly, it is useful as a sash for an inside window to be disposed on the interior side of a window of an existing residence, building or the like, to form a double window so as to increase the sound insulation property, the heat insulating property and the security.

[0602] The entire disclosures of Japanese Patent Application No. 2013-069833 filed on March 28, 2013, No. 2013-69834 filed on March 28, 2013, No. 2013-073369 filed on March 29, 2013, No. 2013-073370 filed on March 29, 2013, No. 2013-073371 filed on March 29, 2013, No. 2013-073372 filed on March 29, 2013, No. 2013-271908 filed on December 27, 2013, No. 2013-271909 filed on December 27, 2013, No. 2014-016654 filed on January 31, 2014, No. 2014-018458 filed on February 3, 2014, No. 2014-018548 filed on February 3, 2014, No. 2014-018549 filed on February 3, 2014 and No. 2014-038959 filed on February 28, 2014 including specifications, claims, drawings and summaries are incorporated herein by reference in their entireties.

REFERENCE SYMBOLS

[0603]

1, 10, 40: multiple glazing sash, 2: glass plate, 3a: lower side frame body of multiple glazing sash, 3b: side frame body of multiple glazing sash, 3c: upper side frame body of multiple glazing sash, 4: intermediate plate, 5: air space, 6: corner member, 11: first glass plate, 12: second glass plate, 13: frame member, 14: air space, 15: intermediate plate, 16: intermediate plate-holding part, 17: first sealing material, 18: second sealing material, 21: base member, 22: lip part, 23: space part, 24: communicating part, 25: backup material, 26: caulking material, 27: projecting leg, 28: concave part, 29: bent projecting leg, 30: first shared space part, 31: second shared space part, 32: communicating part, 33: wall body, 34: groove part, 35: lip part, 36: locking part, 37: notch part, 38: member, 41: first glass plate, 42: second glass plate, 43: intermediate plate, 44: air space, 45: frame body,-46: spacer part, 47: inner surface part of spacer part, 48: space part of spacer part, 49: side

part of spacer part, 51: projecting leg, 52: bent projecting leg, 53: projecting leg part, 54: adhesive layer, 55: groove part (intermediate plate-holding part), 56: lip part, 57: base member, 58: thin plate part of spacer part, 60a, 60b: multiple glazing sash, 61: lower side frame body, 62: groove part of frame body, 63: sash roller, 64: sash roller-attaching member, 65: window frame, 66: moving rail, 67: lower edge part, 68: projecting leg, 69: edge part protecting cover, 70: fin part, 71: upper side frame body, 72: groove part of frame body, 73: window frame, 74: moving rail, 75: fin part, 76: concave part, 77: edge part protecting cover, 80: side frame body, 81: groove part of frame body, 82: edge part protecting cover, 83: meeting part airtight material, 85: jamb airtight material, 86: moisture-proof layer, S: outer side part of frame member.

101, 101a, 101b: multiple glazing sash, 102: glass plate, 103: upper side frame body of multiple glazing sash, 104: side frame body of multiple glazing sash, 105: lower side frame body of multiple glazing sash, 110: first glass plate, 111: second glass plate, 112, 112a, 112b, 112c: intermediate plate, 113: frame body, 114: inner surface part of spacer part, 115: outer side part of spacer part, 116: side part of spacer part, 117: space part, 118: spacer part, 119: projecting leg, 120: bent projecting leg, 121: projecting leg part, 122: groove part, 123: lip part, 124, 124a, 124b: groove part of projecting leg part, 125: air space, 126: concave part on inner surface part of spacer part, 127: concave part of projecting leg of projecting leg part, 128: guide convex strip, 129: base part, 130: adhesive layer, 131: glazing channel, 132: sealing material, 133: backup material, 134, 137: concave part, 135: thin plate part, 136: bent tip part, 140: edge part protecting cover, 141: bottom part, 142: guide rib part, 143: bent part, 144: sash roller, 145: sash roller-attaching member, 146: window frame, 147, 150: moving rail, 149, 151: fin part, 152: concave part of edge part protecting cover, 153: meeting part airtight material, 154: jamb airtight material, 155: groove part, 156: lip part, 157: locking part, 158: notch part, 159: member.

201, 201a, 201b: multiple glazing sash, 202: glass plate, 203: upper side frame body of multiple glazing sash, 204: side frame body of multiple glazing sash, 205: lower side frame body of multiple glazing sash, 206: inner surface part, 207: outer side part, 208: side part, 209: space part, 210: spacer part, 211: projecting leg, 212: bent projecting leg, 213: projecting leg part, 214: adhesive layer, 215, 217: concave part, 216: thin plate part, 220, 220a, 220b, 220c: groove part of projecting leg part, 221: concave part of side part of spacer part, 222: concave part of projecting leg, 224: guide convex strip, 225: air space, 230, 230a, 230b, 230c: edge part protecting cover, 231: bottom part, 232: guide rib part, 233: bent part, 234: sash roller, 235: sash roller-attaching member, 236: window frame, 237, 240: moving rail, 239, 241: fin part, 242: concave part of edge part protecting cover, 243: meeting part airtight material, 244: jamb airtight material, 245: bent tip part, 250: insertion groove part, 251: lip part, 252: base part, 260: intermediate plate.

301: multiple glazing (multiple glazing sash), 302: first glass plate, 303: second glass plate, 304 (304a, 304b, 304c): spacer part, 305, 330: corner block for multiple glazing, 306 (306a, 306b): intermediate plate, 307, 308, 309: airspace, 311: spacer part, 312: projecting leg part, 313 (313a, 313b): frame body, 317: inner surface part of spacer part, 318: outer side part of spacer part, 319: side part of spacer part, 320 (320a, 320b, 320c, 320d): space part of spacer part, 321: projecting leg of projecting leg part, 322: bent projecting leg, 323: groove part of spacer part, 324: lip part, 325: groove part of projecting leg part, 326: opening of space part of spacer part, 327: locking piece, 328: claw, 329: opening, 330: corner block for multiple glazing, 331 (331 a, 331 b, 331 c, 331 d): connecting part, 332 (332a, 332b, 332c, 332d): gas inlet, 333 (333a to 333l): gas feed pipe part, 334 (334a, 334b): gas feed opening, 335: side face part of corner block, 336: groove part, 337: wall part, 338: surface of wall part, 339: long hole, 340: convex strip part, 341: neck, 342: opening, 343 (343a, 343b, 343d): branched gas passage, 344: void part, 345: bottom base, 346: packing material, 350a, 350b: cut edge face of frame body, 351 a, 351b: side face part of corner block, 352a, 352b: corner face part.

401, 401a, 401b: multiple glazing sash, 402, 402a, 402b: glass plate, 403: frame body of multiple glazing sash, 403a: upper side frame body, 403b: side frame body, 403c: lower side frame body, 404, 404a, 404b, 404c, 404d: air space, 405, 405a, 405b, 405c: intermediate plate, 406: inner surface part of spacer part, 407: outer side part of spacer part, 408: side part of spacer part, 409: space part of spacer part, 410: spacer part, 411: projecting leg of projecting leg part, 412: bent projecting leg of projecting leg part, 413: projecting leg part, 414: groove part of spacer part, 415: lip part, 416: base part, 417: groove part of frame body, 418: moisture-proof layer, 419: thin plate part of spacer part, 420: concave part of side part of spacer part, 421: adhesive layer, 422: concave part of projecting leg, 423: bent tip part of projecting leg, 424: concave part of projecting leg, 425: sealing medium, 426: guide convex strip of projecting leg part, 427: concave part of projecting leg, 430, 430a, 430b, 430c: edge part protecting cover, 431: bottom part of edge part protecting cover, 432: guide rib part, 433: bent part of edge part protecting cover, 440: sash roller, 441: sash roller-attaching member, 443: window frame, 444, 448: moving rail, 445: lower edge part of sash roller-attaching member, 446, 449: fin part, 447: concave part of edge part protecting cover, 450: meeting part airtight material, 51: jam

airtight material.

501, 501a, 501b: multiple glazing sash, 502, 502a, 502b: glass plate, 503: frame body of multiple glazing sash, 503a: upper side frame body, 503b: side frame body, 503c: lower side frame body, 504, 504a, 504b, 504c, 504d: air space, 05, 505a, 505b, 505c: intermediate plate, 506: inner surface part of spacer part, 507: outer side part of spacer part, 508, 508a, 508b: side part of spacer part, 509: space part of spacer part, 510: spacer part, 511, 511a, 511b: projecting leg of projecting leg part, 512: bent projecting leg of projecting leg part, 513: projecting leg part, 514: groove part of spacer part, 515: lip part, 516: base part, 517: groove part of frame body, 518: concave part, 520: concave part of side part of spacer part, 521: adhesive layer, 522: concave of projecting leg, 523: bent tip part of projecting leg, 524: concave part of projecting leg, 525: sealing medium, 530, 530a, 530b: first adhesive layer, 531, 531a, 531b: second adhesive layer.

601: multiple glazing sash, 602: glass plate, 602a: first glass plate, 602b: second glass plate, 603: frame body of multiple glazing sash, 603a: upper side frame body, 603b: side frame body, 603c: lower side frame body, 604, 604a, 604b, 604c, 604d: air space, 605, 605a, 605b, 605c: intermediate plate, 606: inner surface part of spacer part, 607: outer side part of spacer part, 608: side part of spacer part, 609: space part of spacer part, 610: spacer part, 611: projecting leg of projecting leg part, 612: bent projecting leg of projecting leg part, 613: projecting leg part, 614: groove part of spacer part, 615: lip part, 616: base part, 617: groove part of frame body, 618: concave part, 620a: concave part of side part of spacer part, 620b: concave part of projecting leg of projecting leg part, 621: adhesive layer, 622: locking part of frame body, 623: bent tip part of projecting leg, 624: concave part of projecting leg part, 625: sealing medium, 630: edge part protecting cover, 631: bottom part of edge part protecting cover, 632: rib part of edge part protecting cover, 633: closely fitting part of edge part protecting cover, 634: curved part of edge part protecting cover, 640: meeting part airtight material.

701, 710: multiple glazing sash, 702: glass plate, 703a: lower side frame body of multiple glazing sash, 703b: side frame body of multiple glazing sash, 703c: upper side frame body of multiple glazing sash, 704: intermediate plate, 705: air space, 706: corner member, 711: first glass plate, 712: second glass plate, 713: frame body, 714: space layer, 715: intermediate plate, 716: intermediate plate-holding part, 717: first sealing material, 718: second sealing material, 721: base member, 722: lip part, 723: space part, 724: spacer part, 725, 727: flow path, 726: communicating part, 728: shared space part, 731: projecting leg, 732: bent projecting leg, 733: concave part, 750: inner surface part of frame body, 751: outer side part of frame body, 752: side part of frame body, 753: space part in which drying agent is contained of frame body, 754: spacer part of frame body, 755: projecting leg of frame body, 756: projecting leg part of frame body, S: outer side part of frame body 13.

801, 801a, 801b: multiple glazing sash, 803: upper side frame body, 804: side frame body, 805: lower side frame body, 810, 811: glass plate, 812A, 812B, 812C: intermediate glass plate, 813: frame body, 814: inner surface part, 815: outer side part, 816: side part, 817: space part, 818: spacer part, 819: projecting arm, 820: bent projecting arm, 821: projecting leg part, 822: groove part, 823: lip part, 824, 824a, 824b, 824c: groove part, 826: concave part, 827:concave part, 828: guide convex strip, 829: base part, 830: adhesive layer, 835: thin plate part, 840, 840a, 840b, 840c: edge part protecting cover, 841: bottom part, 842: guide rib part, 843: bent part, 844: sash roller, 845: sash roller-attaching member, 846: window frame, 847: moving rail, 848: lower edge part of sash roller-attaching member, 849: fin part, 850: moving rail, 851: fin part, 852:concave part, 853, 854: airtight material, 860: air space, 862: divided air space, 864: drying agent, 866: low emissivity film, 868: wall, 870: opening for window, 872: wood screw, 873: peg, 874: lintel, 876: sill, 878: pillar, 880: outer wall, 882: plasterboard.

901: multiple glazing sash, 910: first glass plate (two-layer multiple glazing), 910A, 910B: glass plate constituting first glass plate, 911: air space of first glass plate, 912: spacer of first glass plate, 913: sealing member, 920: second glass plate (three-layer multiple glazing), 920A, 920B, 920C: glass plate constituting second glass plate, 921A, 921B: air space of second glass plate, 922A, 922B: spacer of second glass plate, 923A, 923B: sealing member, 930: frame body, 931: projecting leg part of frame body, 932: spacer part of frame body, 932A, 932B: side wall part of spacer part, 932C: inner surface part of spacer part, 932D: space part of spacer part, 932E: air hole of spacer part, 933: concave strip part of projecting leg part, 933A, 933B: inner surface part of concave strip part, 933C: bottom part of concave strip part, 934: drying agent, 936: sealing member, 937A: first groove part, 937B: second groove part, 938: space, 950: sealing member, 952A, 952B: lip part, 954: cushioning member, 1000: multiple glazing sash, 1010: first glass plate (two-layer multiple glazing), 1020: second glass plate (single glass plate), 1100: multiple glazing sash, 1110: first glass plate (multiple glazing), 1120: second glass plate (single glass plate), 1130: frame body, 1131: projecting leg part of frame body, 1131A, 1131B: extension of projecting leg part, 1131A1, 1131B1: bent part of extension, 1131C: outer peripheral groove part of projecting leg part, 1132: spacer part of frame body, 1132A, 1132B: side wall part of spacer part, 1140: adhesive.

Claims

1. A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

2. A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, an intermediate plate-holding part in which the intermediate plate is to be disposed is selected from among the plurality of intermediate plate-holding parts, and the intermediate plate is disposed in the selected intermediate plate-holding part to adjust the thicknesses of a plurality of compartmentalized air spaces to be formed, or the number of the intermediate plate to be disposed in the air space.

3. A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, a space part in which a drying agent is contained is provided to at least a part on the air space side of the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

4. A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, the intermediate plate is disposed in the intermediate plate-holding part, and projecting legs are provided to at least a part on the first glass plate side and the second glass plate side of the frame member.

5. A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and at least one intermediate plate made of a chemically tempered glass plate is disposed in the intermediate plate-holding part.

6. The multiple glazing sash according to Claim 5, wherein the thickness of the chemically tempered glass plate is at most 2 mm.

7. A multiple glazing sash having a first glass plate and a second glass plate, a frame member being disposed on a periphery between the glass plates to space the glass plates apart, an air space being formed, the air space being sealed at the periphery of the glass plates, and at least one intermediate plate being disposed in the air space, wherein a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, the intermediate plate is disposed in the intermediate plate-holding part, and projecting legs are provided to at least a part on the first glass plate side and the second glass plate side of the frame member, and a spacer part having a space part in which a drying agent is contained is provided to at least a part on the air space side of the frame member.

8. The multiple glazing sash according to any one of Claims 1 to 7, wherein at least two intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to the frame member, and at least one intermediate plate is disposed in the air space by the at least two intermediate plate-holding parts to compartmentalize the air space into at least two compartmentalized air spaces.

9. The multiple glazing sash according to any one of Claims 1 to 8, wherein the frame member comprises a spacer part having an inner surface part and an outer surface part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer surface part and

facing the inner side of the first and second glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
a plurality of intermediate plate-holding parts for holding at least a part of a peripheral part of the intermediate plate are provided in rows to a middle part of the inner surface part on the air space side of the spacer part of the frame member, and the intermediate plate is disposed in the intermediate plate-holding part.

10. The multiple glazing sash according to any one of Claims 1 to 9, wherein the frame member is composed of at least two separate members, and the two members are integrated via an interjacent moisture-proof layer.

11. A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, an air space being formed, and at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates,
wherein the frame body comprises a spacer part having an inner surface part and
an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
an intermediate plate-holding part is provided to a middle part of the inner surface part of the spacer part, and the intermediate plate is disposed in the intermediate plate-holding part to be spaced apart from the first and second glass plates.

12. A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, an air space being formed, and at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates,
wherein the frame member comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
a groove part is provided to a middle part of the inner surface part of the spacer part, and by inserting the edge part of the intermediate plate into the groove part, the intermediate plate is disposed to be spaced apart from the first and second glass plates.

13. The multiple glazing sash according to Claim 11 or 12, wherein the projecting leg part of the frame body has projecting legs facing the inner side of the peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the glass plates.

14. The multiple glazing sash according to any one of Claims 11 to 13, wherein the air space formed to be spaced apart from the first and second glass plates at their periphery by the frame body, is divided into a plurality of air spaces by the at least one intermediate plate.

15. The multiple glazing sash according to any one of Claims 11 to 14, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

16. The multiple glazing sash according to any one of Claims 11 to 15, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a thermoplastic synthetic resin material.

17. The multiple glazing sash according to any one of Claims 11 to 16, wherein a lip part is provided to at least one inner surface of the groove part provided on the air space side of the inner surface part of the spacer part.

18. The multiple glazing sash according to any one of Claims 11 to 17, wherein the intermediate plate is a chemically tempered glass plate having a thickness of at most 2 mm.

19. The multiple glazing sash according to any one of Claims 11 to 18, wherein the side part of the spacer part and the projecting leg of the projecting leg part form a continuous face.

20. The multiple glazing sash according to any one of Claims 11 to 19, wherein the projecting leg of the projecting leg part and the side part of the spacer part, and the glass plate, are bonded at a portion where they face each other, by an adhesive.

21. The multiple glazing sash according to any one of Claims 11 to 20, wherein the projecting leg of the projecting leg part and the side part of the spacer part form a design face of the multiple glazing sash at a peripheral part of the glass plate.

22. The multiple glazing sash according to any one of Claims 11 to 21, wherein the first glass plate and the second glass plate are rectangular, and the first glass plate and the second glass plate are spaced apart at their four peripheral edge sides, by the frame body.

23. A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, and an air space being provided between the first and second glass plates,
wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the first and second glass plates, and a space part in which a drying agent can be contained, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

24. A multiple glazing sash having a first glass plate and a second glass plate being spaced apart at their periphery by a frame body, and an air space being provided between the first and second glass plates,
wherein the frame body comprises a spacer part keeping a space between the first and second glass plates, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, located outside the spacer part opposite from the air space, and
the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

25. The multiple glazing sash according to Claim 23 or 24, wherein the projecting leg part of the frame body has projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the first and second glass plates.

26. The multiple glazing sash according to any one of Claims 23 to 25, wherein the cross sectional shape of the projecting leg part of the frame body is a substantially U-shape.

27. The multiple glazing sash according to any one of Claims 23 to 26, wherein the projecting leg of the projecting leg part and the side part of the spacer part, and each of the first and second glass plates, are bonded at a portion where they face each other, by an adhesive.

28. The multiple glazing sash according to any one of Claims 23 to 27, wherein the frame body-forming material is a synthetic resin.

29. The multiple glazing sash according to Claim 28, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a thermoplastic synthetic resin material by an extrusion method or a co-extrusion method.

30. The multiple glazing sash according to any one of Claims 23 to 29, wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section.

31. The multiple glazing sash according to any one of Claims 23 to 30, wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section, has a pair of projecting legs and bent projecting legs on both sides, and has a groove part formed between the pair of projecting legs on both sides.

32. The multiple glazing sash according to Claim 31, wherein an edge part protecting cover is provided to the groove part.

33. The multiple glazing sash according to any one of Claims 23 to 32, wherein the projecting leg of the projecting leg part and the side part of the spacer part form a design face of the multiple glazing sash at a peripheral part of the first or second glass plate.

34. The multiple glazing sash according to any one of Claims 23 to 33, wherein the first and second glass plates are rectangular, and the first and second glass plates are spaced apart at their four peripheral edge sides, by the frame body.

35. The multiple glazing sash according to any one of Claims 23 to 34, wherein each of the first and second glass plates is a glass plate having an allowable stress in its plane of at least 47 MPa.

36. The multiple glazing sash according to any one of Claims 23 to 35, wherein each of the first and second glass plates is a glass plate having a thickness of from 2 mm to 3 mm.

37. The multiple glazing sash according to any one of Claims 23 to 36, wherein the gas filled in the air space is an argon gas, and the thickness of the air space is from 13 mm to 17 mm.

38. The multiple glazing sash according to any one of Claims 23 to 37, wherein at least one of the first and

second glass plates has a low emissivity film.

39. The multiple glazing sash according to any one of Claims 23 to 38, wherein at least one intermediate plate is disposed to be spaced apart in the air space, and the frame body has an intermediate plate-holding part for holding the intermediate plate on the inner surface part of the spacer part.

40. A frame body for a multiple glazing sash to space a first glass plate and a second glass plate apart at their periphery,
which comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the first and second glass plates, and a space part in which a drying agent can be contained, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
wherein the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

41. A frame body for a multiple glazing sash to space a first glass plate and a second glass plate apart at their periphery,
which comprises a spacer part for keeping a space between the first and second glass plates, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, located outside the spacer part opposite from the air space, and
wherein the spacer part and the projecting leg part of the frame body are integrally formed of a frame body-forming material.

42. The frame body for a multiple glazing sash according to Claim 40 or 41, wherein the projecting leg part of the frame body has projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the first and second glass plates.

43. The frame body for a multiple glazing sash according to any one of Claims 40 to 42, wherein the cross sectional shape of the projecting leg part of the frame body is a substantially U-shape.

44. The frame body for a multiple glazing sash according to any one of Claims 40 to 43, wherein the frame body-forming material is a synthetic resin.

45. The frame body for a multiple glazing sash according to Claim 44, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a thermoplastic synthetic resin material by an extrusion method or a co-extrusion method.

46. The frame body for a multiple glazing sash according to any one of Claims 40 to 45, wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section.

47. The frame body for a multiple glazing sash according to any one of Claims 40 to 46, wherein the frame body has a substantially bilaterally symmetrical structure relative to the center line of the longitudinal cross section, has a pair of projecting legs and bent projecting legs on both sides, and has a groove part formed between the pair of projecting legs on both sides.

48. A corner block for a multiple glazing having a first glass plate and a second glass plate being spaced apart at their periphery by a spacer part, an air space being formed, at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates, and at least two air spaces being formed, said corner block to be disposed at a corner part where the spacer parts are butted,
wherein the corner block is provided with connecting parts for being connected to edge parts of the respective spacer parts, a plurality of gas inlets for injecting a filler gas into the at least two air spaces to be communicated with the corresponding at least two air spaces, and a gas feed opening for introducing a filler gas into the gas inlets.

49. The corner block for a multiple glazing according to Claim 48, wherein a gas feed pipe part and the gas feed opening are provided as being communicated with each of the plurality of gas inlets, and a filler gas supplied from the gas feed opening is filled into each air space via the gas feed pipe part and the gas inlet.

50. The corner block for a multiple glazing according to Claim 48, wherein a gas feed pipe part is provided as being communicated with each of the plurality of gas inlets, a branched gas passage is provided to the middle of each gas feed pipe, a converged gas feed pipe as being communicated with the branched gas passage, and the gas feed opening as being communicated with the gas feed pipe, are provided, and a filler gas supplied from the gas feed opening is filled into each air space via the gas feed pipe part on the gas feed opening side, the branched gas passage, the gas feed pipe on the gas inlet side and the gas inlet.

51. The corner block for a multiple glazing according to

any one of Claims 48 to 50, which has side face parts facing the first glass plate and the second glass plate of the multiple glazing and extending toward tip directions of joint parts of the corner part where the spacer parts are butted, on its side faces.

52. The corner block for a multiple glazing according to any one of Claims 48 to 51, which is integrally formed of a synthetic resin.

53. The corner block for a multiple glazing according to any one of Claims 48 to 52, the multiple glazing having a first glass plate and a second glass plate being spaced apart at their periphery by a spacer part, an air space being formed, at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates, and at least two air spaces being formed, said corner block to be disposed at a corner part where the spacer parts are butted,
wherein the corner block for a multiple glazing has a void part communicated with the respective air spaces at a portion where the corner part of the intermediate plate is located, the corner block is provided with connecting parts for being connected to edge parts of the respective spacer parts, gas inlets for injecting a filler gas into the at least two air spaces, and a gas feed opening for introducing a filler gas into the gas inlets, and a filler gas is filled into each of the at least two air spaces via the gas inlet and the void part.

54. A multiple glazing having an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by spacer parts, at least one intermediate plate being disposed in the air space to be spaced apart from the first glass plate and the second glass plate, and at least two air spaces being formed, wherein on at least one of corner parts where the spacer parts are butted, the joint parts of the spacer parts are connected by the corner block for a multiple glazing as defined in any one of Claims 48 to 53.

55. The multiple glazing according to Claim 54, wherein the first glass plate, the second glass plate and the intermediate plate are rectangular, the first glass plate, the second glass plate and the intermediate plate are spaced apart at their four peripheral edge sides by the spacer parts, and the corner block for a multiple glazing as defined in any one of Claims 48 to 53 is disposed on at least one corner part where the spacer parts are butted.

56. The multiple glazing according to Claim 54 or 55, wherein the side parts on both sides of the corner block for a multiple glazing and the first glass plate and the second glass plate, are bonded at a portion where they face each other by an adhesive.

57. A multiple glazing sash having an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by a frame body, and at least one intermediate plate being disposed in the air space to be spaced apart from the first glass plate and the second glass plate, wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first glass plate and the second glass plate, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
a groove part is provided to a middle part of the inner surface part of the spacer part, and the edge part of the intermediate plate is inserted into the groove part thereby to dispose the intermediate plate to be spaced apart from the first and second glass plates, and
on at least one of corner parts where the spacer parts are butted, the joint parts of the spacer parts are connected by the corner block for a multiple glazing as defined in any one of Claims 48 to 53.

58. The multiple glazing sash according to Claim 57, wherein the projecting leg part has projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and bent projecting legs connected to the projecting leg and facing an edge face part of the glass plates.

59. A multiple glazing sash having a first glass plate and a second glass plate to be spaced apart at their periphery by a frame body, and an air space being formed, wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having a pair of projecting legs facing the inner side of a peripheral edge part of the first and second glass plates on both sides, and
a moisture-proof layer is formed on at least a part of an inner surface of a groove part formed of the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part of the frame body.

60. The multiple glazing sash according to Claim 59, wherein the moisture-proof layer is a layer obtained by applying a moisture-proof coating and curing it.

61. The multiple glazing sash according to Claim 60, wherein the moisture-proof coating is a fluorinated resin coating.

62. The multiple glazing sash according to Claim 59, wherein the moisture-proof layer is a layer obtained by bonding a moisture-proof film-form body.

63. The multiple glazing sash according to Claim 62, wherein the moisture-proof film-form body is a metal-coated film, a ceramic-coated film, a metal and ceramic composite-coated film, a metal tape, a moisture-proof resin film or a moisture-proof resin-coated film.

64. The multiple glazing sash according to Claim 63, wherein the metal-coated film is an aluminum-coated film.

65. The multiple glazing sash according to Claim 63, wherein the metal tape is an aluminum metal tape or a stainless steel metal tape.

66. The multiple glazing sash according to any one of Claims 59 to 65, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material.

67. The multiple glazing sash according to any one of Claims 59 to 66, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a rigid polyvinyl chloride material or an acrylonitrile/styrene resin material.

68. The multiple glazing sash according to any one of Claims 59 to 67, wherein the cross sectional shape of the groove part is a substantially U-shape.

69. The multiple glazing sash according to any one of Claims 59 to 68, wherein the moisture-proof layer is formed on a region of the pair of projecting legs on both sides of the projecting leg part and a region of the outer side part of the spacer part, on the inner surface of the groove part.

70. The multiple glazing sash according to any one of Claims 59 to 69, wherein the projecting leg of the projecting leg part and the side part of the spacer part, and the glass plate, are bonded at a portion where they face each other, by an adhesive.

71. The multiple glazing sash according to any one of Claims 59 to 70, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material by an extrusion method or a co-extrusion method.

72. The multiple glazing sash according to any one of Claims 59 to 71, wherein the plurality of glass plates are rectangular, and the plurality of glass plates are spaced apart at their four peripheral edge sides by the frame body.

73. The multiple glazing sash according to any one of Claims 59 to 72, having an air space being formed by disposing a first glass plate and a second glass plate to be spaced apart at their periphery by a frame body, and at least one intermediate plate being disposed in the air space to be spaced apart from the first and second glass plates,
wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first and second glass plates, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained, and
a projecting leg part having a pair of projecting legs facing the inner side of a peripheral edge part of the first and second glass plates, and
a moisture-proof layer is formed on at least a part of an inner surface of a groove part formed of the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part of the frame body.

74. A process for producing a multiple glazing sash, which comprises a bonding step of disposing a first glass plate and a second glass plate, and a frame body having a spacer part and a projecting leg part, at a periphery of the glass plates so that an air space is formed between the first glass plate and the second glass plate, and applying an adhesive to at least a part of a region where the frame body faces the first glass plate and the second glass plate and bonding them to seal the air space,
wherein the bonding step comprises:

a step of covering at least a part of a region in which the frame body is to be disposed of the first glass plate to form a first adhesive layer having a predetermined width,
a step of covering at least a part of a region in which the frame body is to be disposed of the second glass plate to form a first adhesive layer having a predetermined width,
a step of forming a second adhesive layer narrower than the first adhesive layer having a predetermined width on a region facing the first glass plate of the frame body,
a step of forming a second adhesive layer narrower than the first adhesive layer having a predetermined width on a region facing the second glass plate of the frame body,
a step of contacting the first adhesive layer and the second adhesive layer to bond the first glass

plate and the frame body, and
a step of contacting the first adhesive layer and the second adhesive layer to bond the second glass plate and the frame body.

75. A process for producing a multiple glazing sash, which comprises a bonding step of disposing a first glass plate and a second glass plate, and a frame body having a spacer part and a projecting leg part, at a periphery of the glass plates so that an air space is formed between the first glass plate and the second glass plate, and applying an adhesive to at least a part of a region where the frame body faces the first glass plate and the second glass plate and bonding them to seal the air space,
wherein the bonding step comprises:

a step of covering at least a part of a region in which the frame body is to be disposed of the first glass plate to form a first adhesive layer having a predetermined width,
a step of covering at least a part of a region in which the frame body is to be disposed of the second glass plate to form a first adhesive layer having a predetermined width,
a step of covering at least a part of the first adhesive layer surface formed on the first glass plate to form a second adhesive layer having a predetermined width,
a step of covering at least a part of the first adhesive layer surface formed on the second glass plate to form a second adhesive layer having a predetermined width,
a step of bonding the first glass plate and the frame body by means of the first adhesive layer and the second adhesive layer, and
a step of bonding the second glass plate and the frame body by means of the first adhesive layer and the second adhesive layer.

76. The process for producing a multiple glazing sash according to Claim 74, wherein the first adhesive layer is formed on the first and second glass plate, and the second adhesive layer is formed on a side face part of the spacer part and a projecting leg of the projecting leg part of the frame body, so that the second adhesive layer is located within a predetermined width of the first adhesive layer, and when the first glass plate and the second glass plate, and the frame body, are bonded, the second adhesive layer is covered with the first adhesive layer.

77. The process for producing a multiple glazing sash according to any one of Claims 74 to 76, wherein the first adhesive layer is formed with a predetermined width from an edge part on the air space side of the frame body toward an edge face direction around the glass plate, on the first glass plate and the second glass plate.

78. The process for producing a multiple glazing sash according to any one of Claims 74 to 77, wherein the width of the first adhesive layer and the width of the second adhesive layer are determined so that $(m+n) \geqq a > b$ is satisfied, where m is the height of a side part of the spacer part of the frame body, n is the height of a projecting leg of the projecting leg part, (m+n) is the total height, "a" is the width of the first adhesive layer, and b is the width of the second adhesive layer.

79. The process for producing a multiple glazing sash according to any one of Claims 74 to 78, wherein the second adhesive layer is a layer formed of a double-coated adhesive tape.

80. The process for producing a multiple glazing sash according to any one of Claims 74 to 79, wherein the first adhesive layer is formed on a peripheral part of the first and second glass plates, stepping over the spacer part and the projecting leg part of the frame body.

81. The process for producing a multiple glazing sash according to any one of Claims 74 to 80, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material.

82. The process for producing a multiple glazing sash according to any one of Claims 74 to 81, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a rigid polyvinyl chloride material or an acrylonitrile/styrene resin material.

83. A multiple glazing sash produced by the process as defined in any one of Claims 74 to 82.

84. An edge face protecting cover for a multiple glazing sash having a first glass plate and a second glass plate, a frame body having a groove part on an inner side of its peripheral edge part being disposed, and an air space being formed between the first glass plate and the second glass plate, said edge face protecting cover having a bottom part for clogging the bottom of the groove part of the frame body, lib parts to be engaged with locking parts provided in the groove part of the frame body, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate.

85. The edge face protecting cover for a multiple glazing sash according to Claim 84, wherein each of the closely fitting parts has a curved part in contact with an edge part of the first glass plate or the second glass plate.

86. The edge face protecting cover for a multiple glazing sash according to Claim 84 or 85, which has a bottom part for clogging the bottom of the groove part of the frame body, a pair of lib parts standing on the bottom part, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate on both edge sides of the bottom part.

87. The edge face protecting cover for a multiple glazing sash according to any one of Claims 84 to 86, wherein the tips of the curved parts of the closely fitting parts are bent toward surface directions of the first glass plate and the second glass plate, to elastically press the surfaces of the first glass plate and the second glass plate.

88. The edge face protecting cover for a multiple glazing sash according to any one of Claims 84 to 87, which is made of a rigid synthetic resin material.

89. A multiple glazing sash having a first glass plate and a second glass plate, a frame body having a groove part on an inner side of its peripheral edge part being disposed, and an air space being formed between the first glass plate and the second glass plate, wherein locking parts to which an edge face protecting cover is attached, are provided to the groove part of the frame body, and to the groove part, an edge face protecting cover having a bottom part for clogging the bottom of the groove part, lib parts to be engaged with the locking parts provided to the groove part, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate, is attached.

90. The multiple glazing sash according to Claim 89, wherein the frame body comprises a spacer part having an inner surface part and an outer side part keeping a space between the first glass plate and the second glass plate, side parts connected to the inner surface part and the outer side part and facing the inner side of the glass plates, and a space part in which a drying agent is contained,
a projecting leg part having a pair of projecting legs facing the inner side of a peripheral edge part of the first and second glass plates on both sides, and
a groove part formed of the pair of projecting legs on both sides of the projecting leg part and the outer side part of the spacer part.

91. The multiple glazing sash according to Claim 89 or 90, wherein the closely fitting parts of the edge face protecting cover have curved parts in contact with edge parts of the first glass plate and the second glass plate.

92. The multiple glazing sash according to any one of Claims 89 to 91, wherein the edge face protecting cover has a bottom part for clogging the bottom of the groove part of the frame body, a pair of lib parts standing on the bottom part, and closely fitting parts to be closely fitted to edge parts of the first glass plate and the second glass plate on both edge sides of the bottom part.

93. The multiple glazing sash according to any one of Claims 89 to 92, wherein the tips of the curved parts of the closely fitting parts of the edge face protecting cover are curved toward surface directions of the first glass plate and the second glass plate, to elastically press the surfaces of the first glass plate and the second glass plate.

94. The multiple glazing sash according to any one of Claims 89 to 93, wherein the spacer part and the projecting leg part of the frame body are integrally formed of a synthetic resin material.

95. The multiple glazing sash according to any one of Claims 89 to 94, wherein the edge face protecting cover is made of a rigid synthetic resin material.

96. A multiple glazing sash having a first glass plate and a second glass plate, a frame body being disposed on a periphery between the glass plates to space apart the glass plates, a space layer being formed, and the space layer being sealed at the periphery of the glass plates, wherein at least one intermediate plate is disposed in the space layer to form a plurality of compartmentalized space layers, and at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated by a communicating structure provided to the frame body.

97. The multiple glazing sash according to Claim 96, wherein the plurality of compartmentalized space layers are communicated by the communicating structure provided to the frame body, and the pressures in the plurality of compartmentalized space layers are equalized.

98. The multiple glazing sash according to Claim 96 or 97, wherein a spacer part having a space part in which a drying agent is contained is provided to at least a part of the frame body, an intermediate plate-holding part for holding at least a part of a peripheral part of the intermediate plate is provided to the spacer part, and the intermediate plate-holding part has a communicating structure by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated.

99. The multiple glazing sash according to any one of Claims 96 to 98, wherein a spacer part having a

space part in which a drying agent is contained is provided to at least a part of the frame body, and the spacer part has a communicating structure consisting of a flow path or a shared space part by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated.

100. The multiple glazing sash according to any one of Claims 96 to 99, wherein the frame body has a corner part connecting a vertical frame body part and a horizontal frame body part disposed on peripheral parts on four sides of the first glass plate and the second glass plate which are rectangular, and has a communicating structure by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated at the corner part.

101. The multiple glazing sash according to any one of Claims 96 to 100, wherein the frame body has a corner part connecting an upper frame body part, a lower frame body part and left and right frame body parts disposed on peripheral parts on four sides of the first glass plate and the second glass plate which are rectangular, and has a communicating structure by which at least two compartmentalized space layers among the plurality of compartmentalized space layers are communicated by a notch formed on at least one corner of the intermediate plate, located on the corner part of the intermediate plate.

102. The multiple glazing sash according to any one of Claims 96 to 101, wherein in the space layer, at least one intermediate plate is disposed to form a plurality of compartmentalized space layers, and the plurality of compartmentalized space layers are communicated by the communicating structure provided to the frame body.

103. A multiple glazing sash having a first glass plate and a second glass plate spaced apart at their periphery by a frame body, an air space being formed, the air space being sealed to the frame body at the periphery of the glass plates, three intermediate glass plates being disposed in the air space to be spaced apart, and the air space being divided into four divided air spaces,

wherein three holding parts for holding at least a part of a peripheral part of the three intermediate glass plates are provided in rows with a distance from one another to the frame body, and

each of the first glass plate and the second glass plate is chemically tempered glass having a thickness of from 2 mm to 3 mm, each of the three intermediate glass plates is chemically tempered glass having a thickness of from 1 mm to 2 mm, each of the four divided air spaces has a thickness of from 13 mm to 17 mm, and an argon gas is sealed in the four divided air spaces.

104. The multiple glazing sash according to Claim 103, wherein at least one of the first glass plate and the second glass plate has a low emissivity film.

105. The multiple glazing sash according to Claim 103 or 104, wherein a containing part in which a drying agent is contained is provided to at least a part on the air space side of the frame body.

106. A multiple glazing sash having a first glass plate consisting of a multiple glazing, a second glass plate consisting of a multiple glazing or a single glass plate, and a frame body for holding the first glass plate and the second glass plate with a distance therebetween in parallel with each other.

107. The multiple glazing sash according to Claim 106, wherein the frame body comprises a projecting leg part, and

a spacer part for spacing the first glass plate and the second glass plate apart, provide on an inner peripheral part of the projecting leg part.

108. The multiple glazing sash according to Claim 107, which further has a sealing member for sealing a gap between the frame body, and the first glass plate and the second glass plate.

109. The multiple glazing sash according to Claim 107 or 108, wherein lip parts made of an elastic material are provided to facing wall surfaces of adjacent spacer parts, and the first glass plate or the second glass plate disposed between the spacer parts is sandwiched between the lip parts and held.

110. The multiple glazing sash according to any one of Claims 107 to 109, wherein the projecting leg part has a concave strip part into which the first glass plate or the second glass plate is inserted, on an inner peripheral part, and the spacer part is disposed in the concave strip part.

111. The multiple glazing sash according to Claim 110, wherein lip parts made of an elastic material are provided to an inner wall surface of the concave strip part and a wall surface of the spacer part facing the inner wall surface of the concave strip part, and the first glass plate or the second glass plate disposed between the spacer part and the inner wall surface of the concave strip part is sandwiched between the lip parts and held.

112. The multiple glazing sash according to any one of Claims 107 to 111, wherein the spacer part further has a space part in which a drying agent is contained,

and an air hole communicated with the space part.

113. The multiple glazing sash according to any one of Claims 106 to 112, wherein the frame body further has a screw hole.

Fig. 1

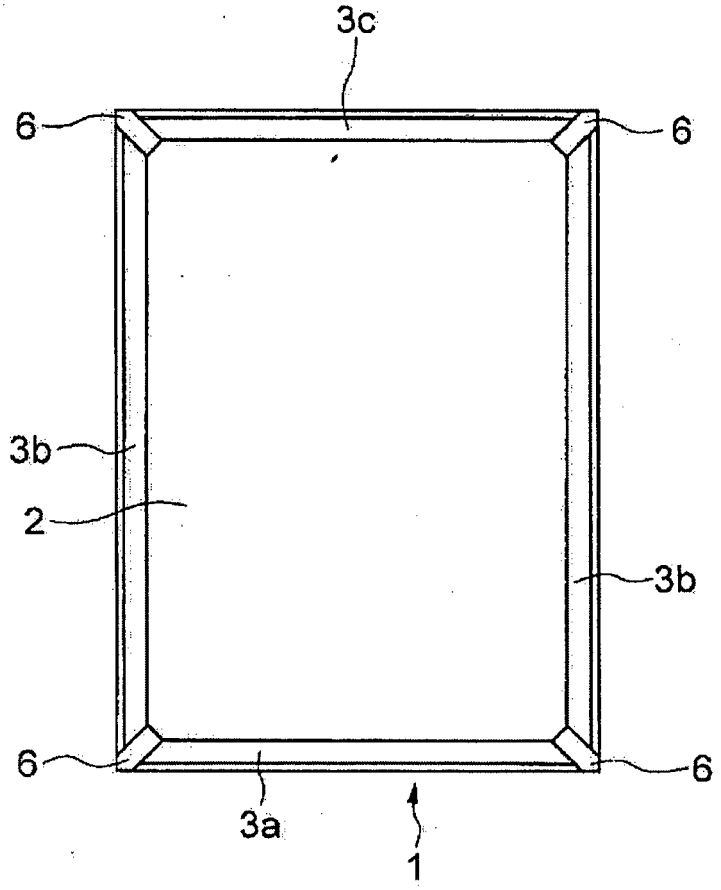

Fig. 2

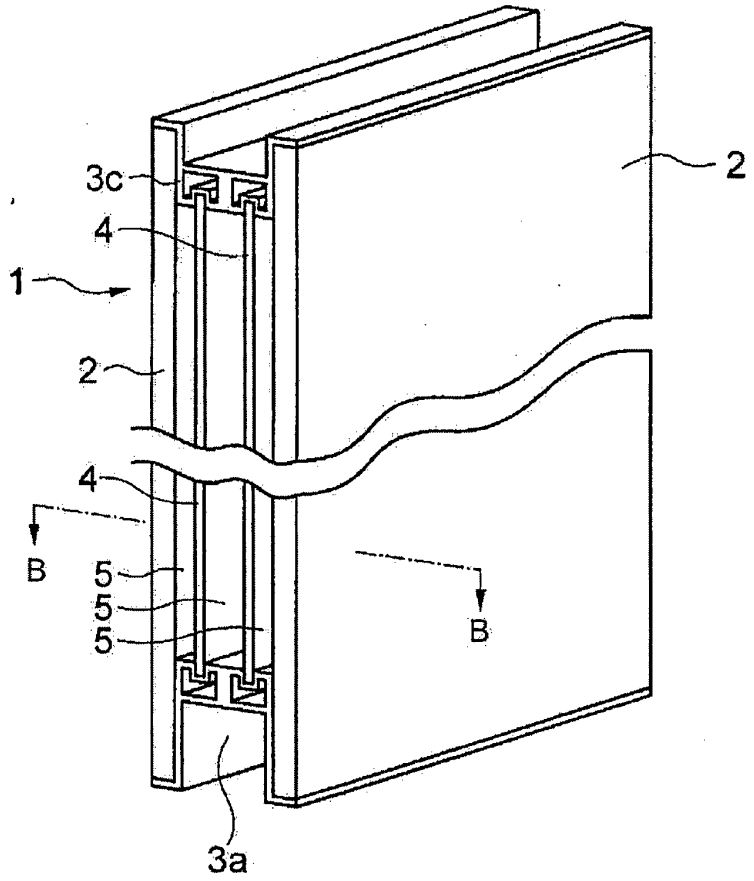
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Fig. 3

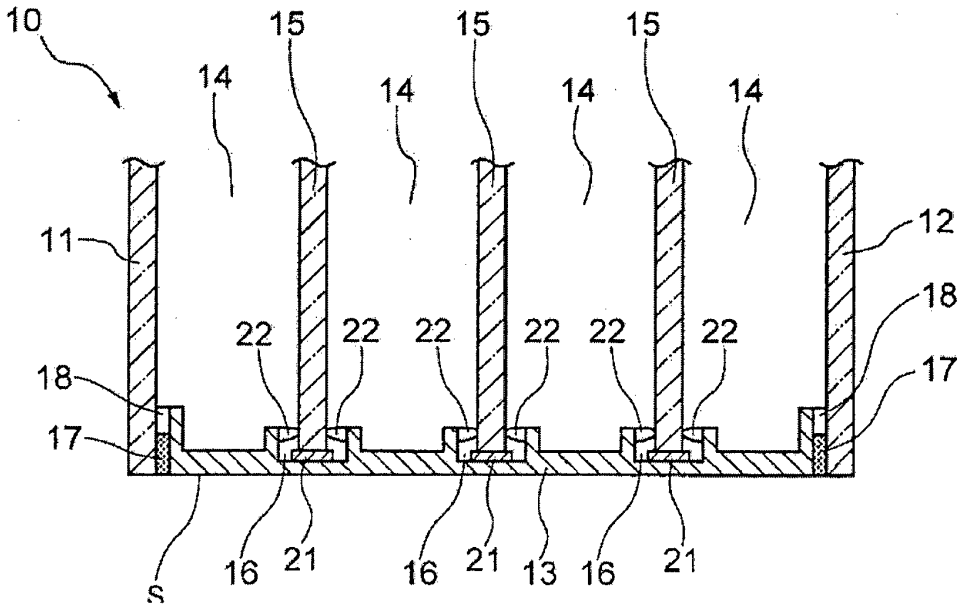
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Fig. 4

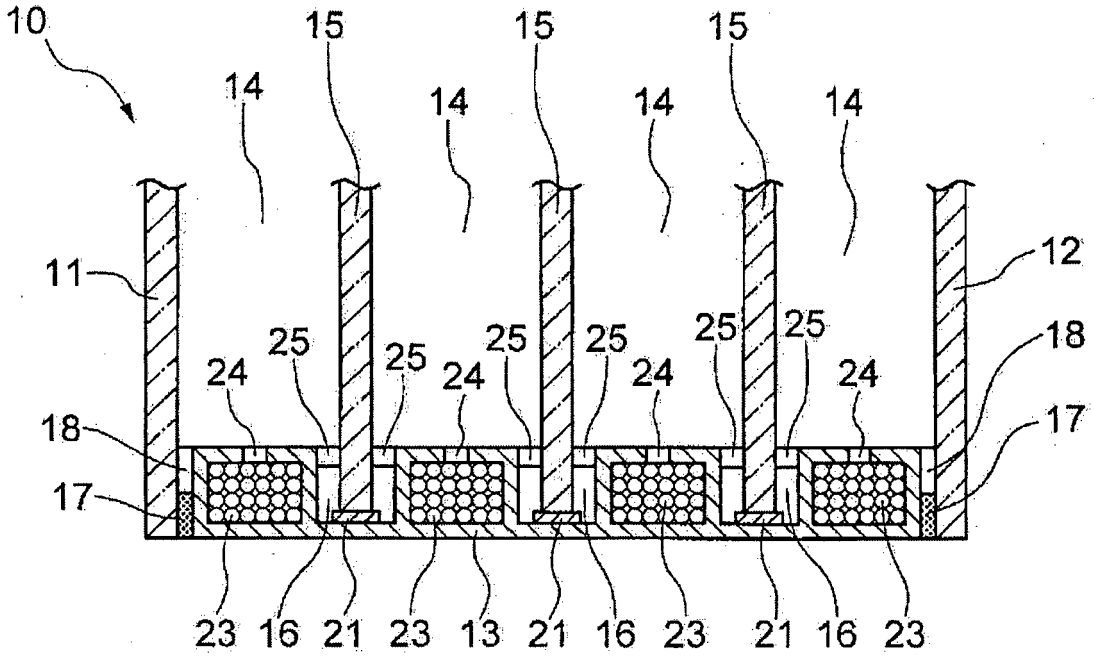
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Fig. 5

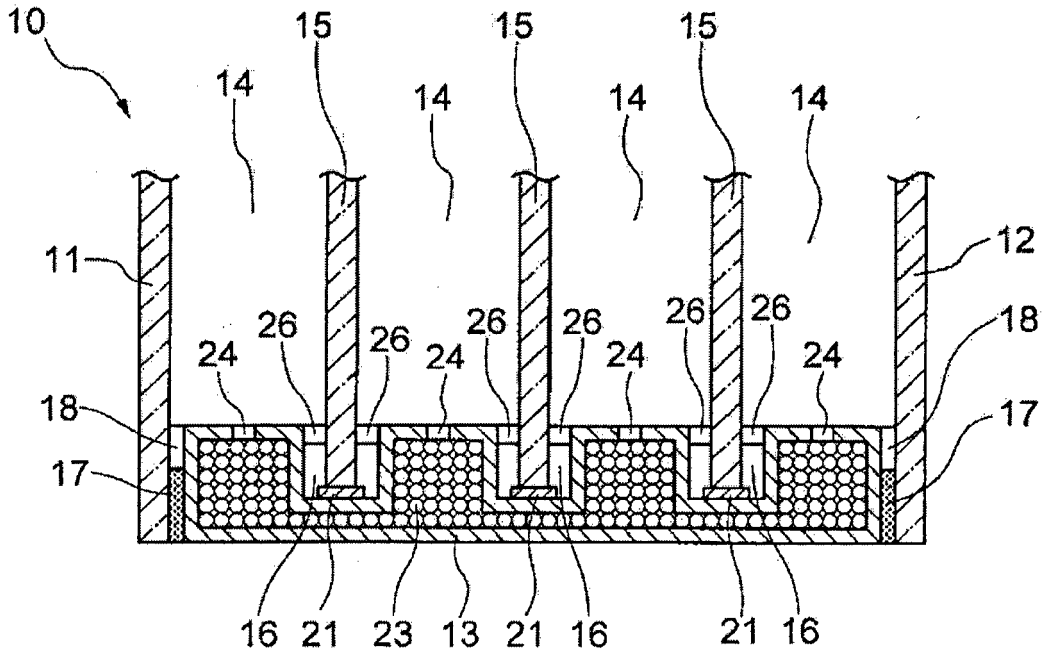
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Fig. 6

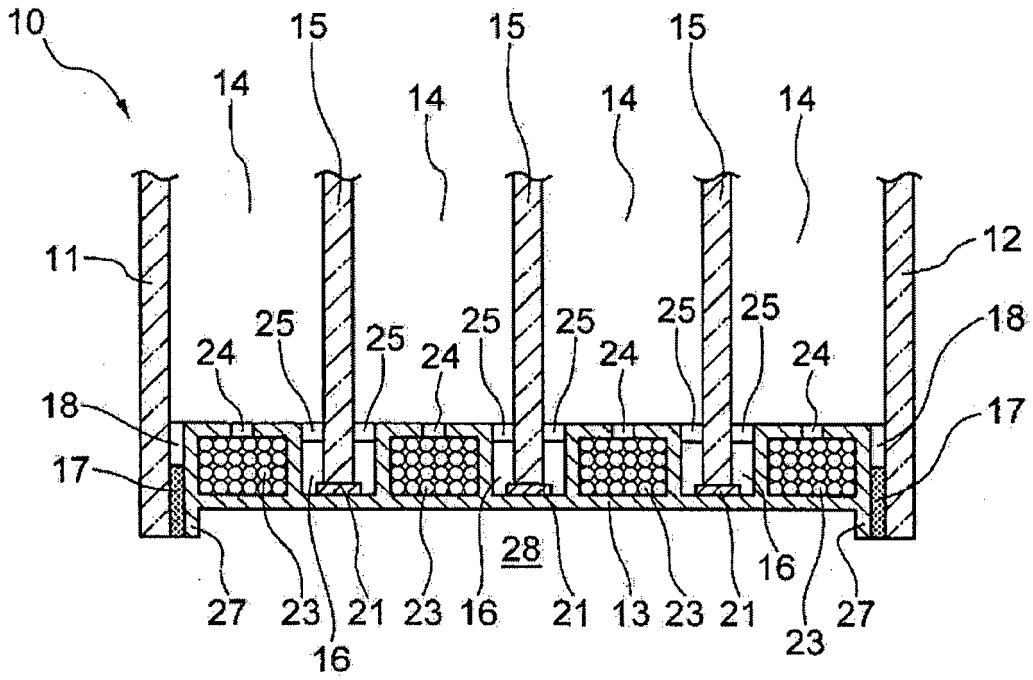
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Fig. 7

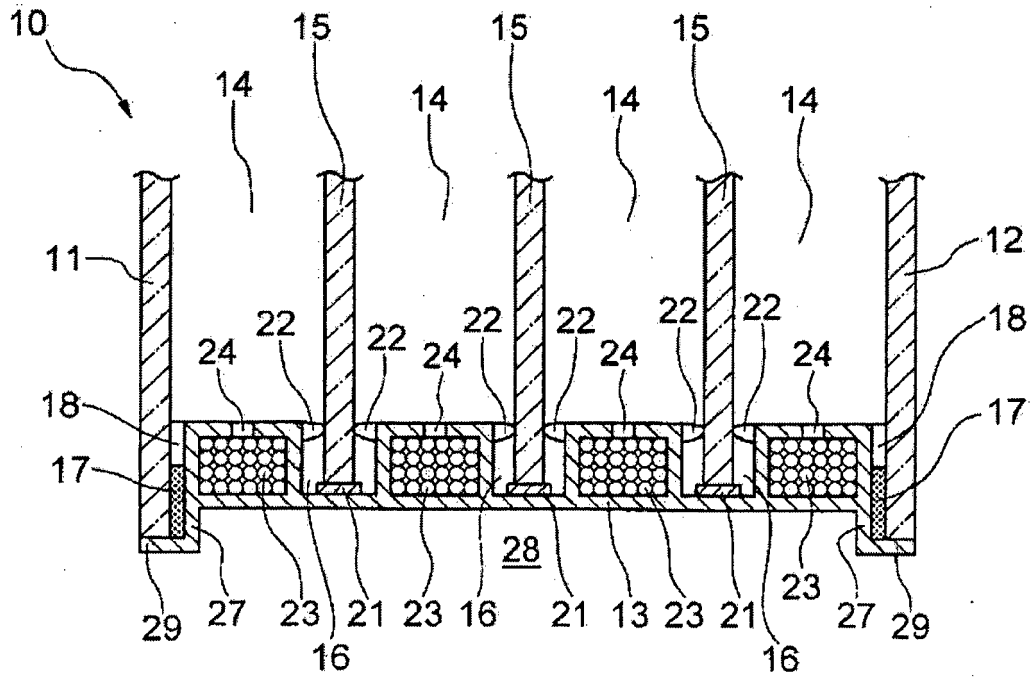
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Fig. 8

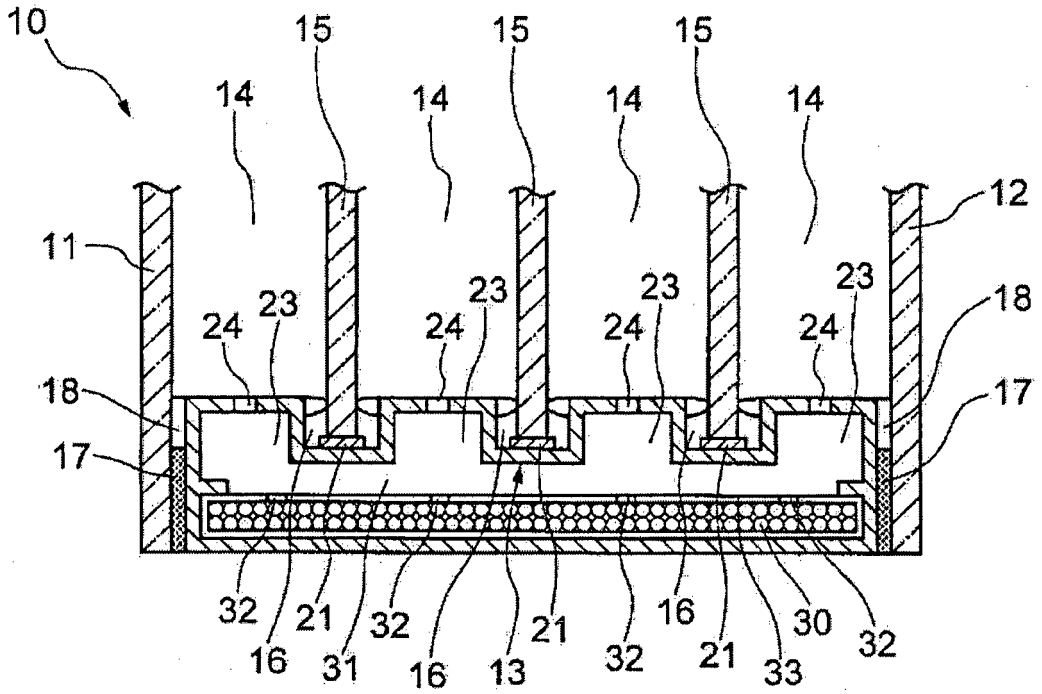
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Fig. 9

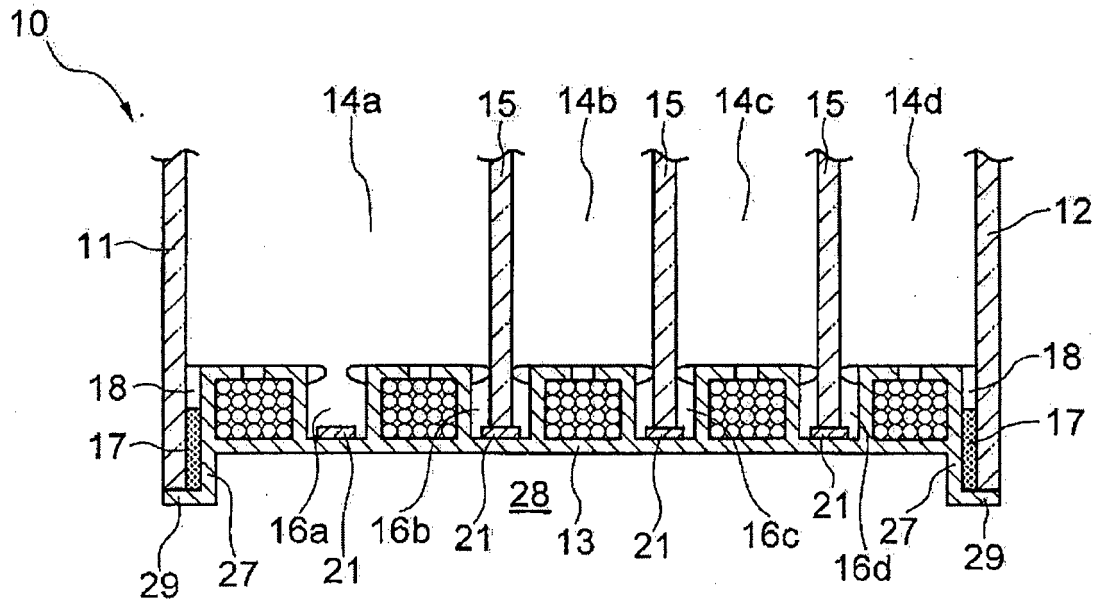
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Fig. 10

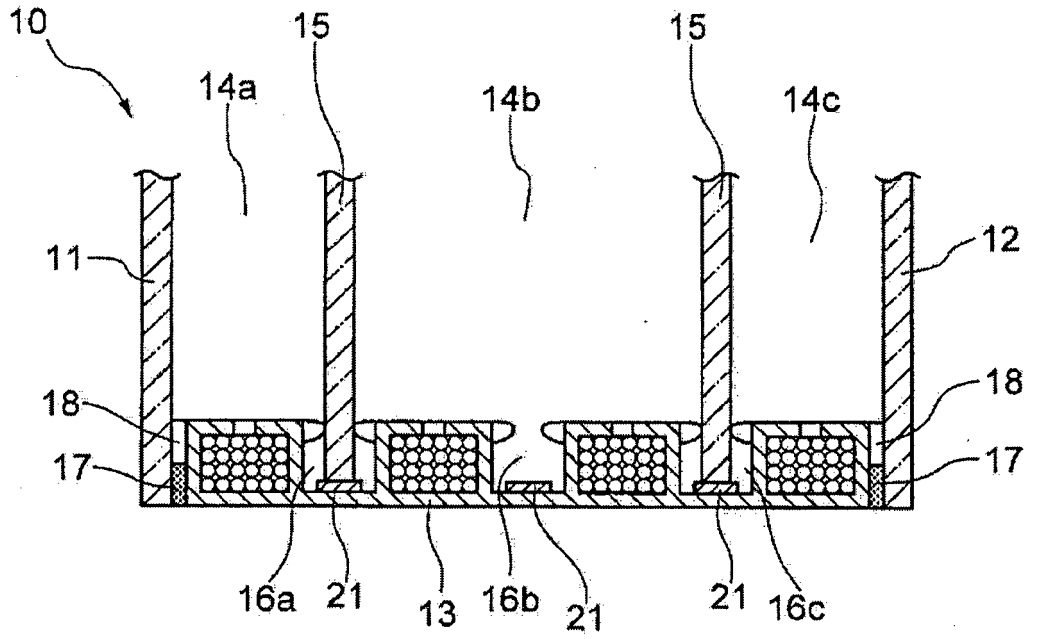
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Fig. 11

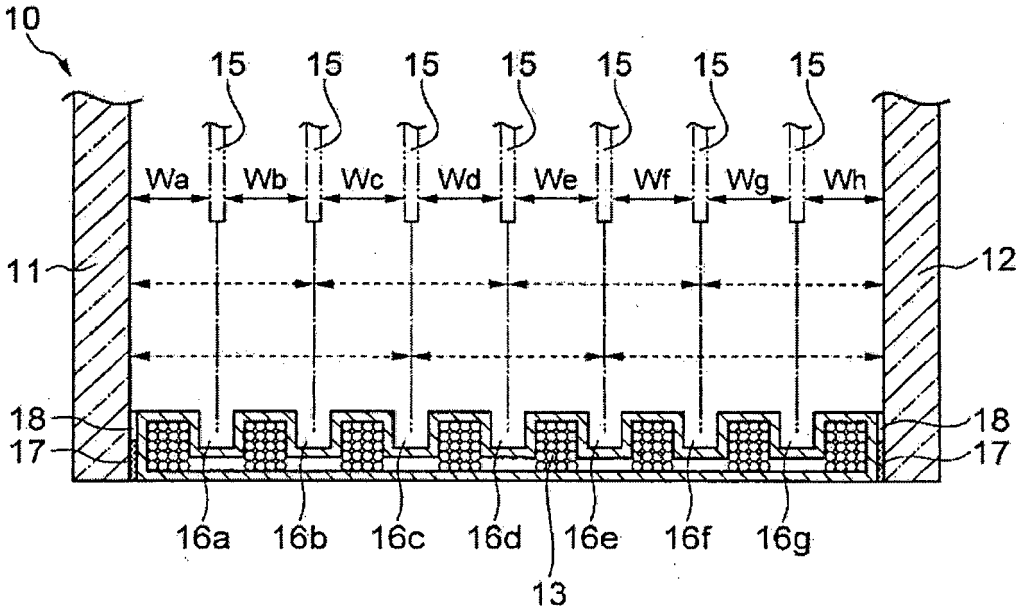
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Fig. 12

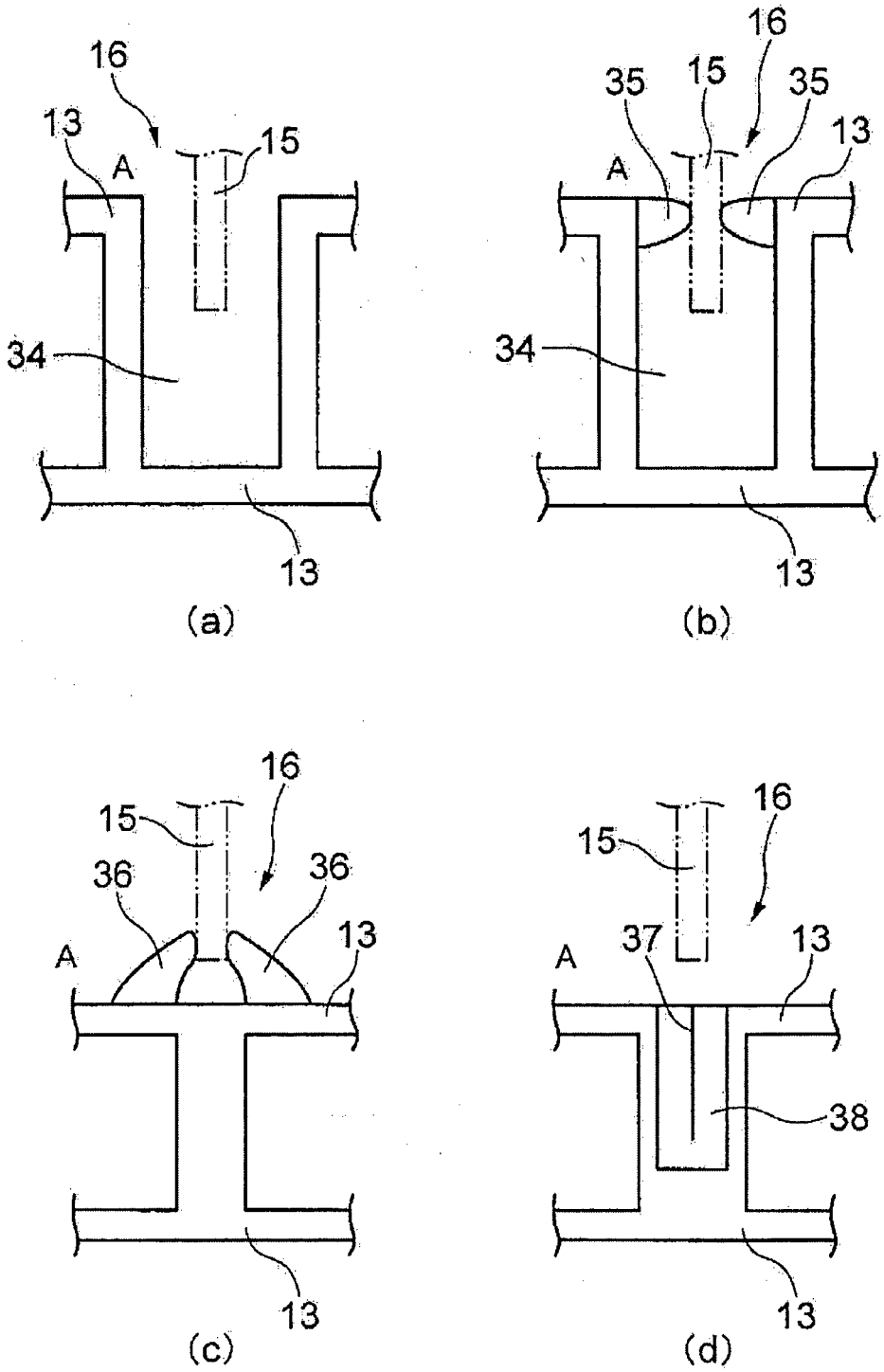
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Fig. 13

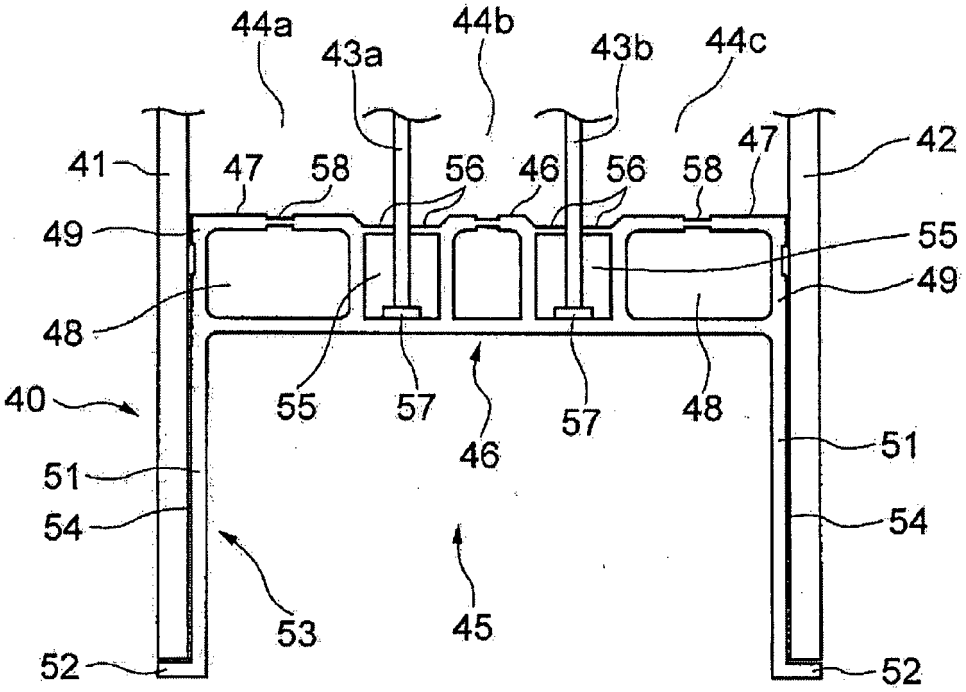
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Fig. 14

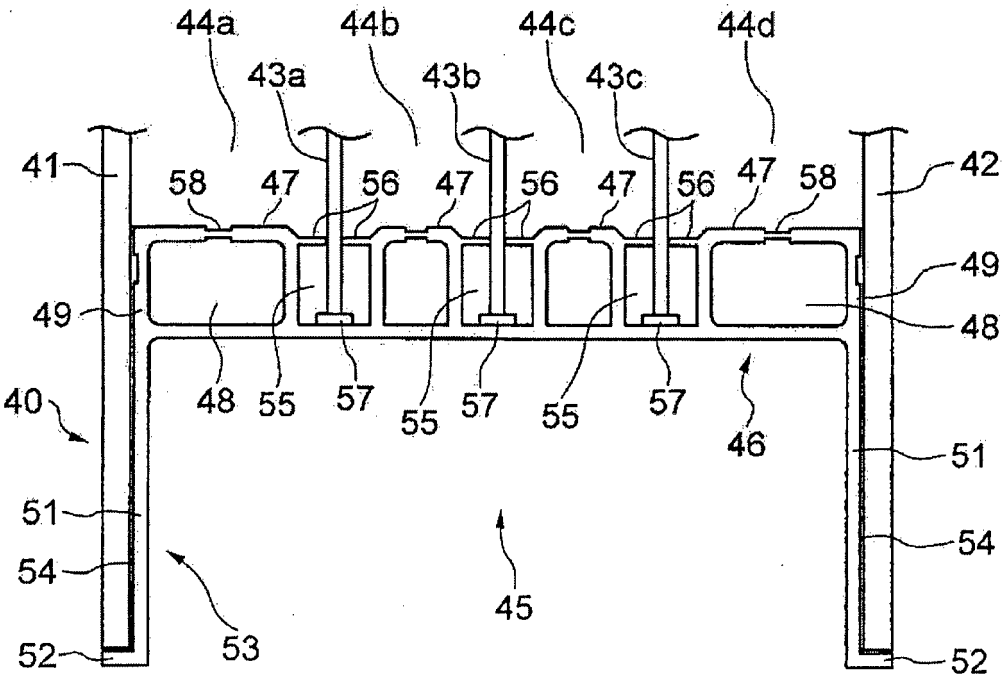
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Fig. 15

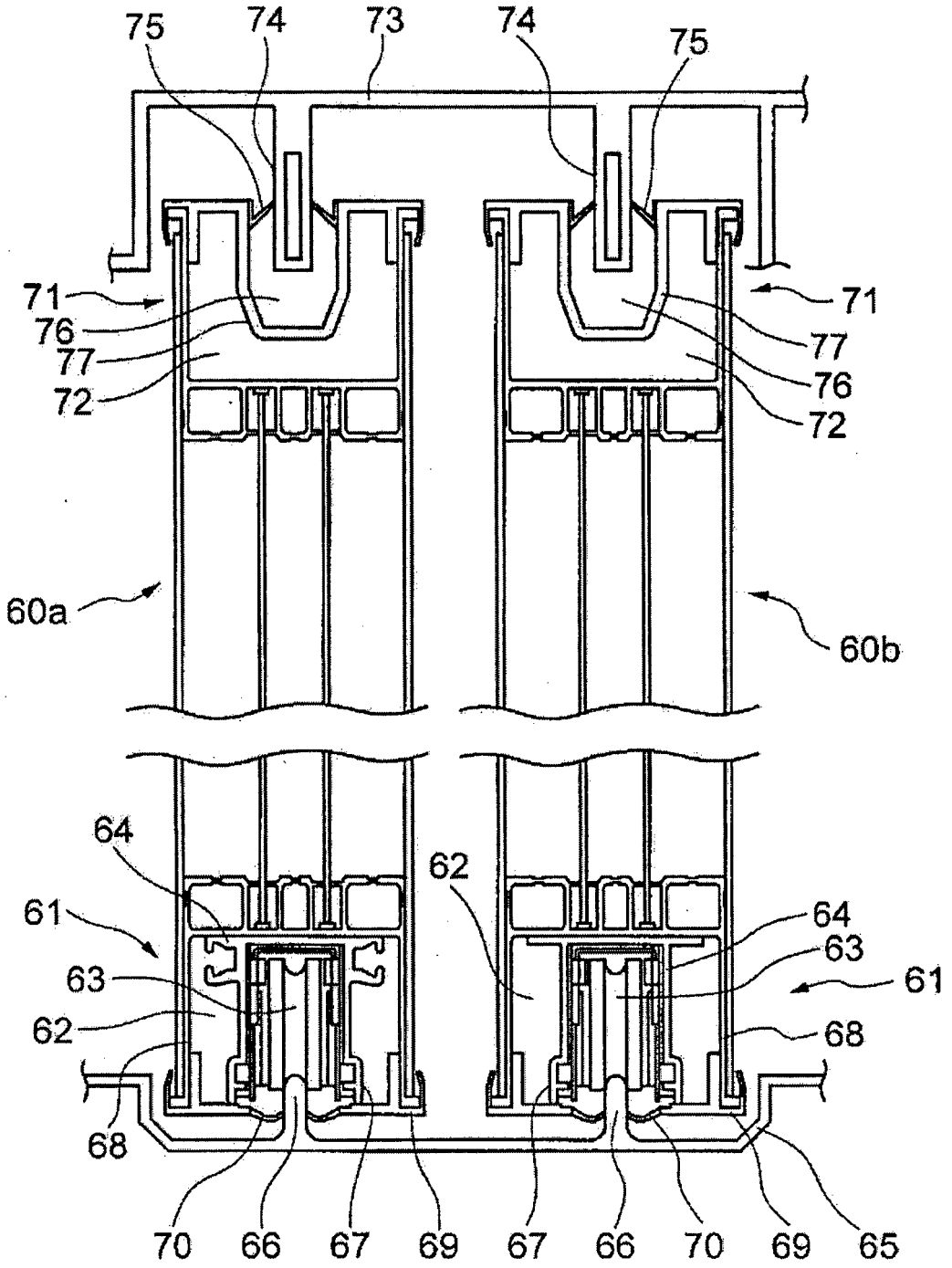
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Fig. 16

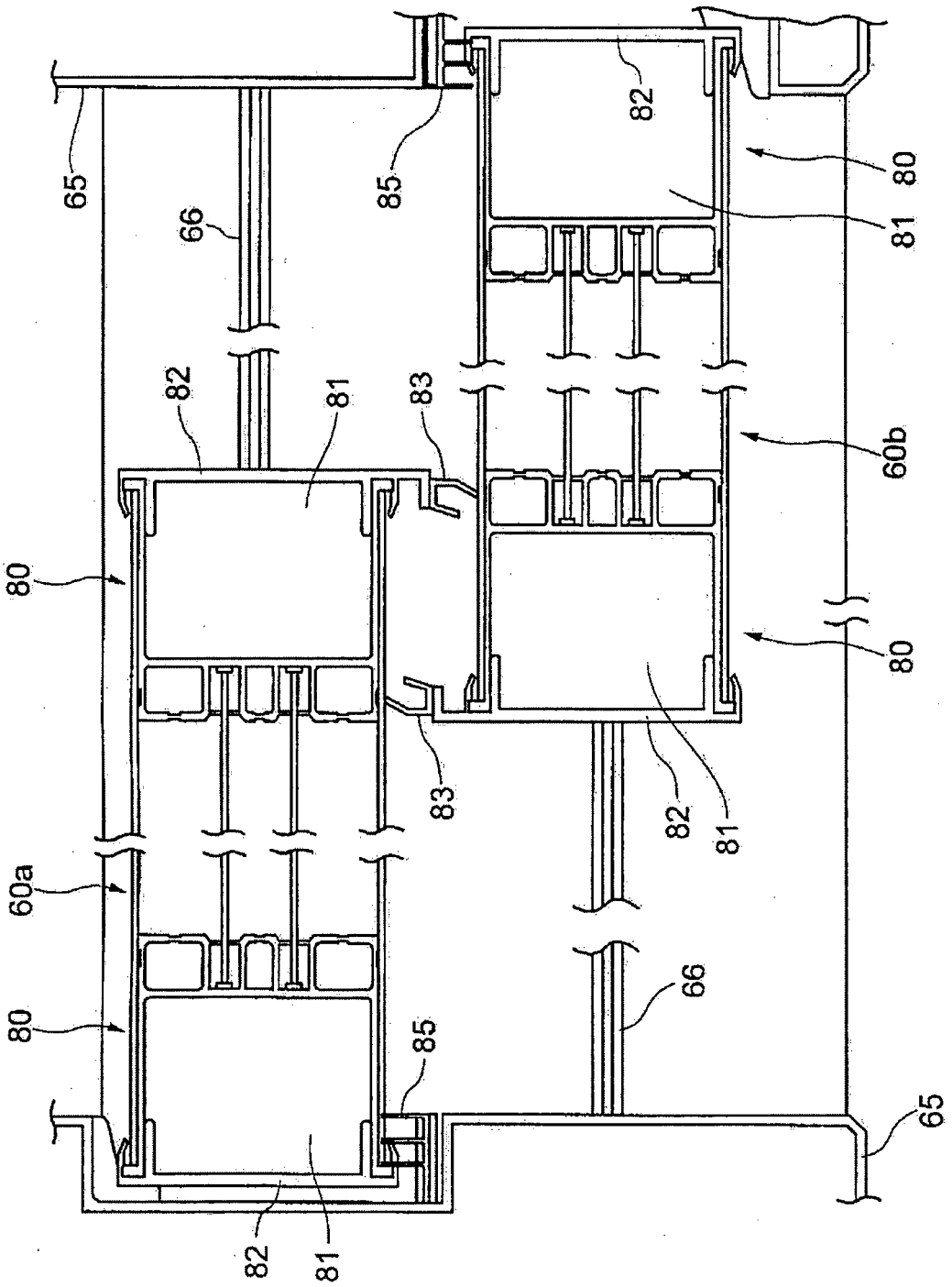
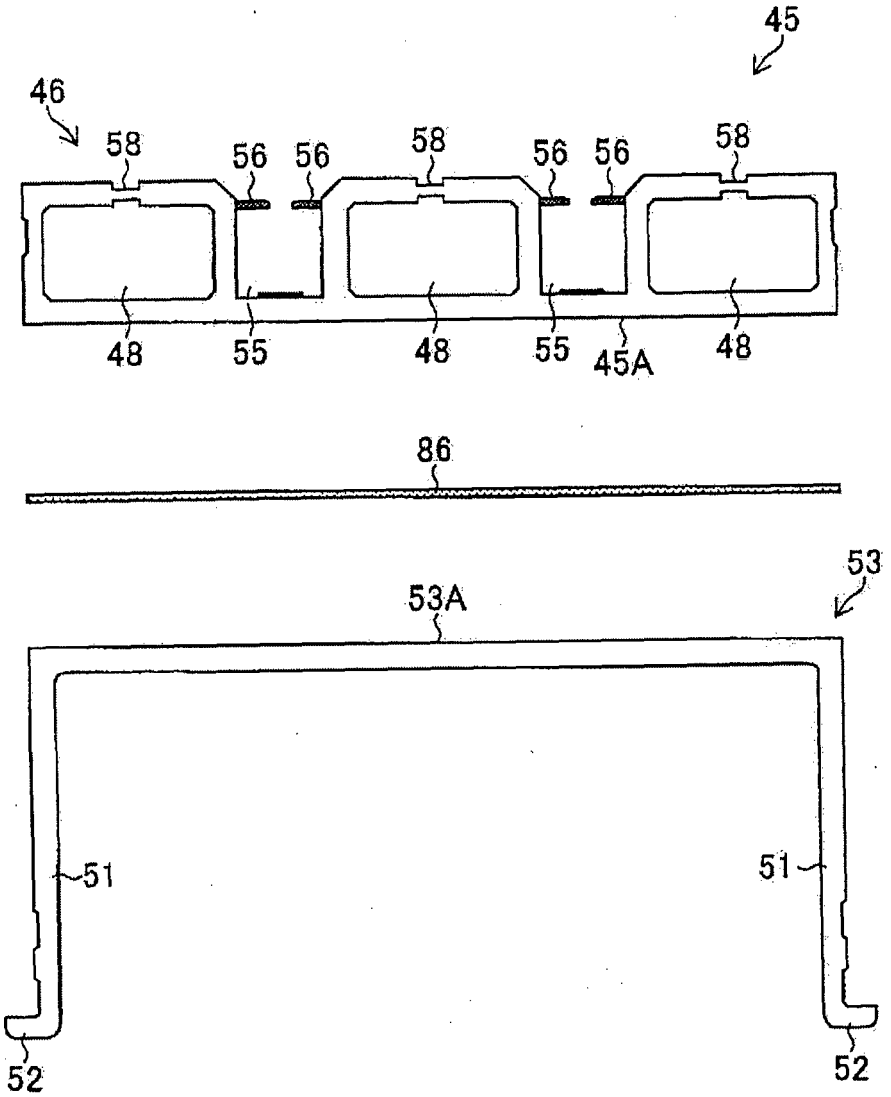


Fig. 17



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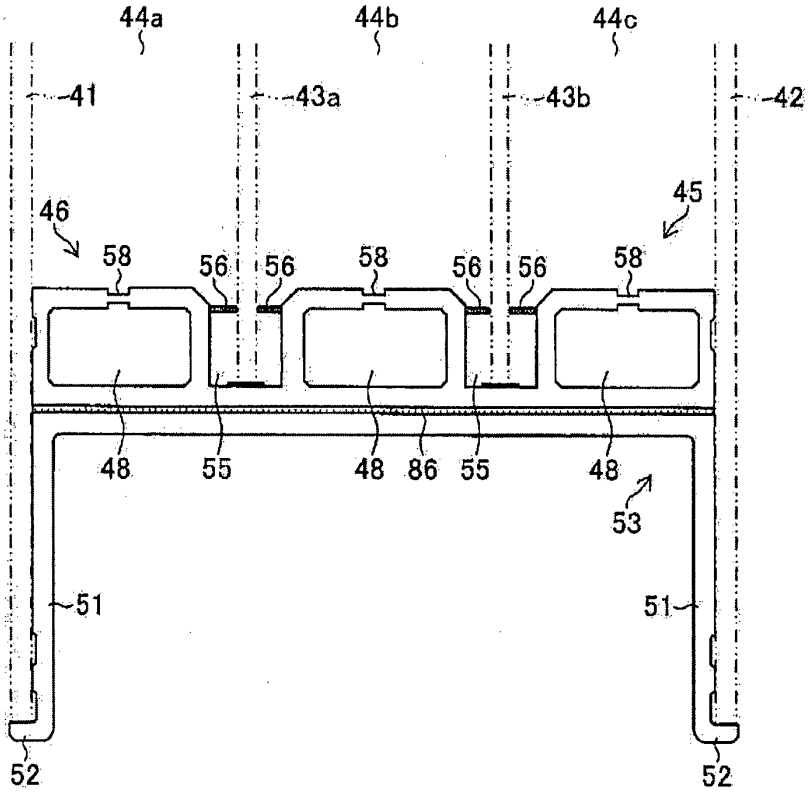
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Fig. 19

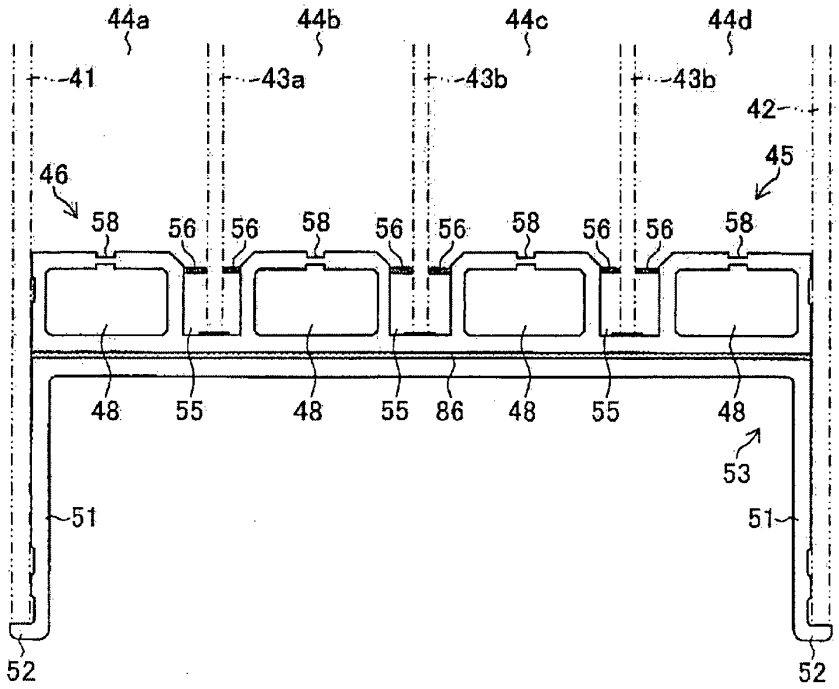
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Fig. 20

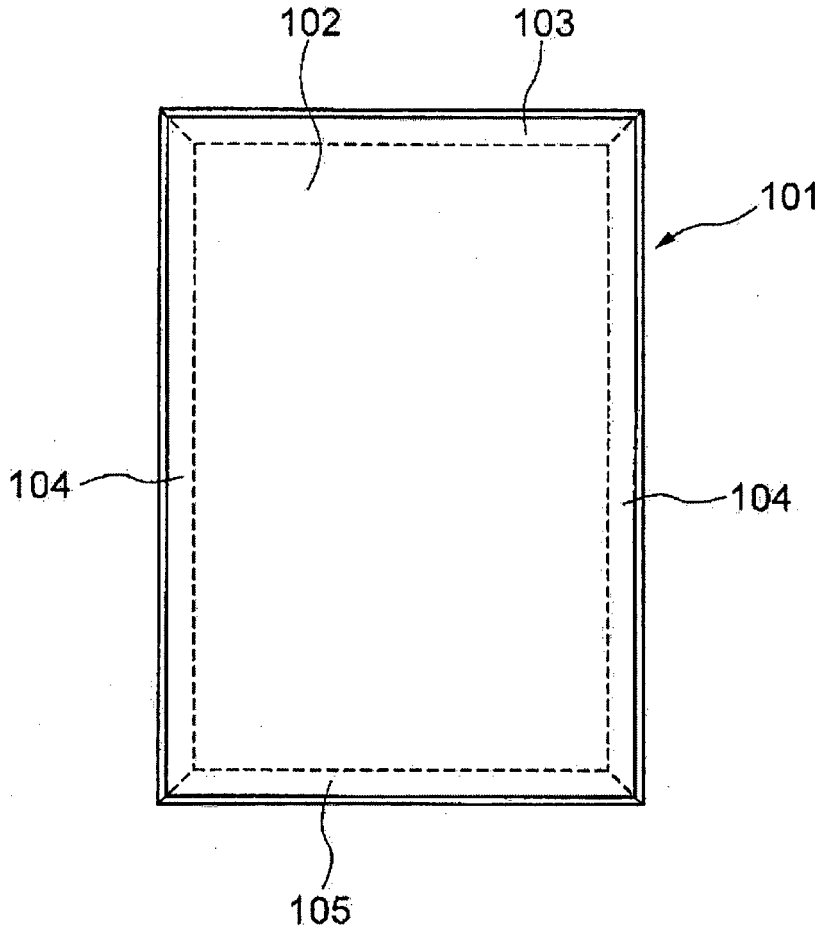
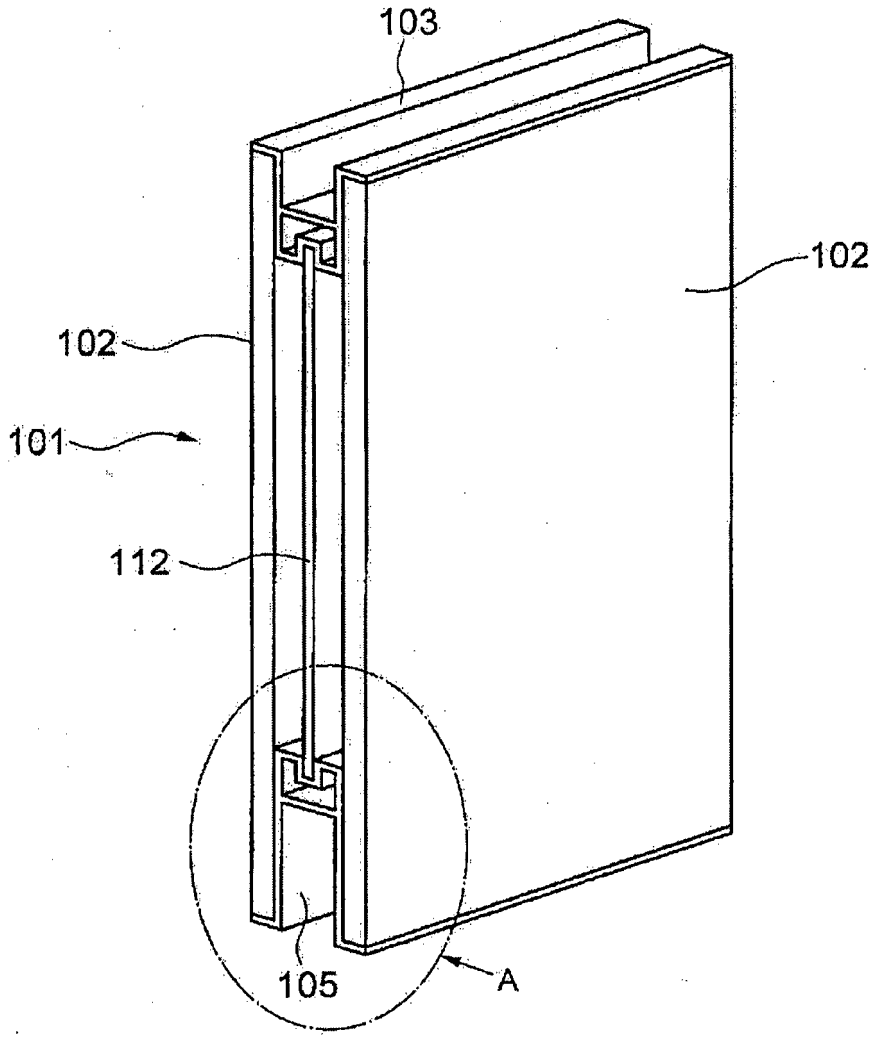


Fig. 21



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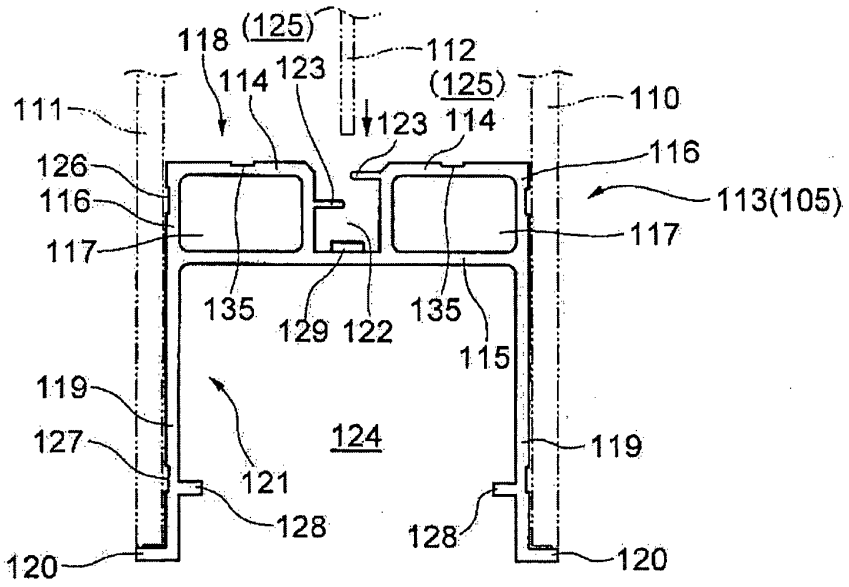
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Fig. 23

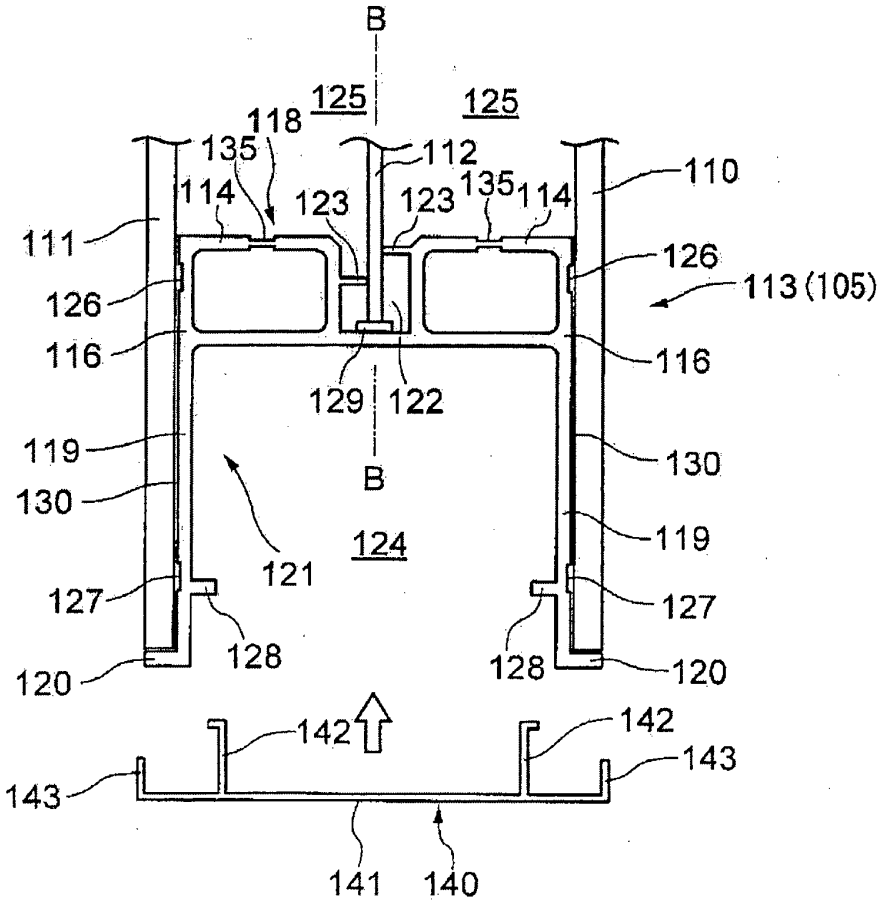
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Fig. 24

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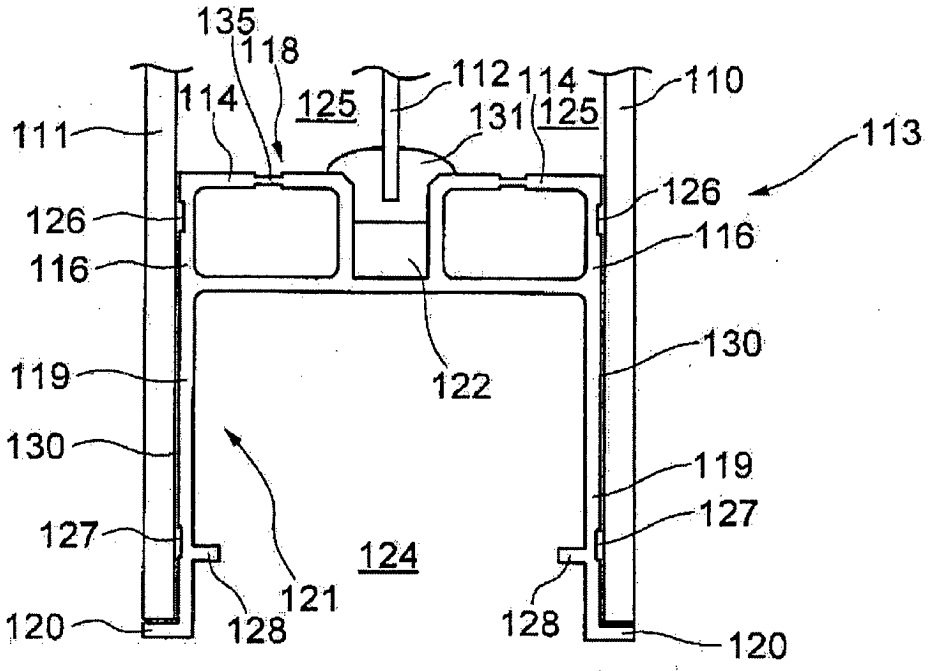
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(b)

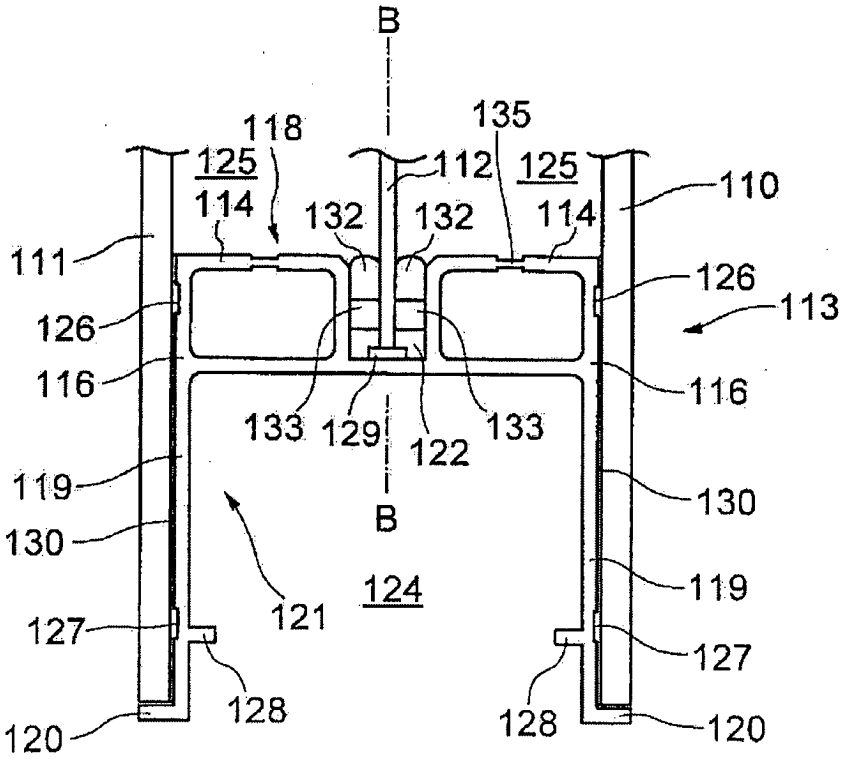
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Fig. 25

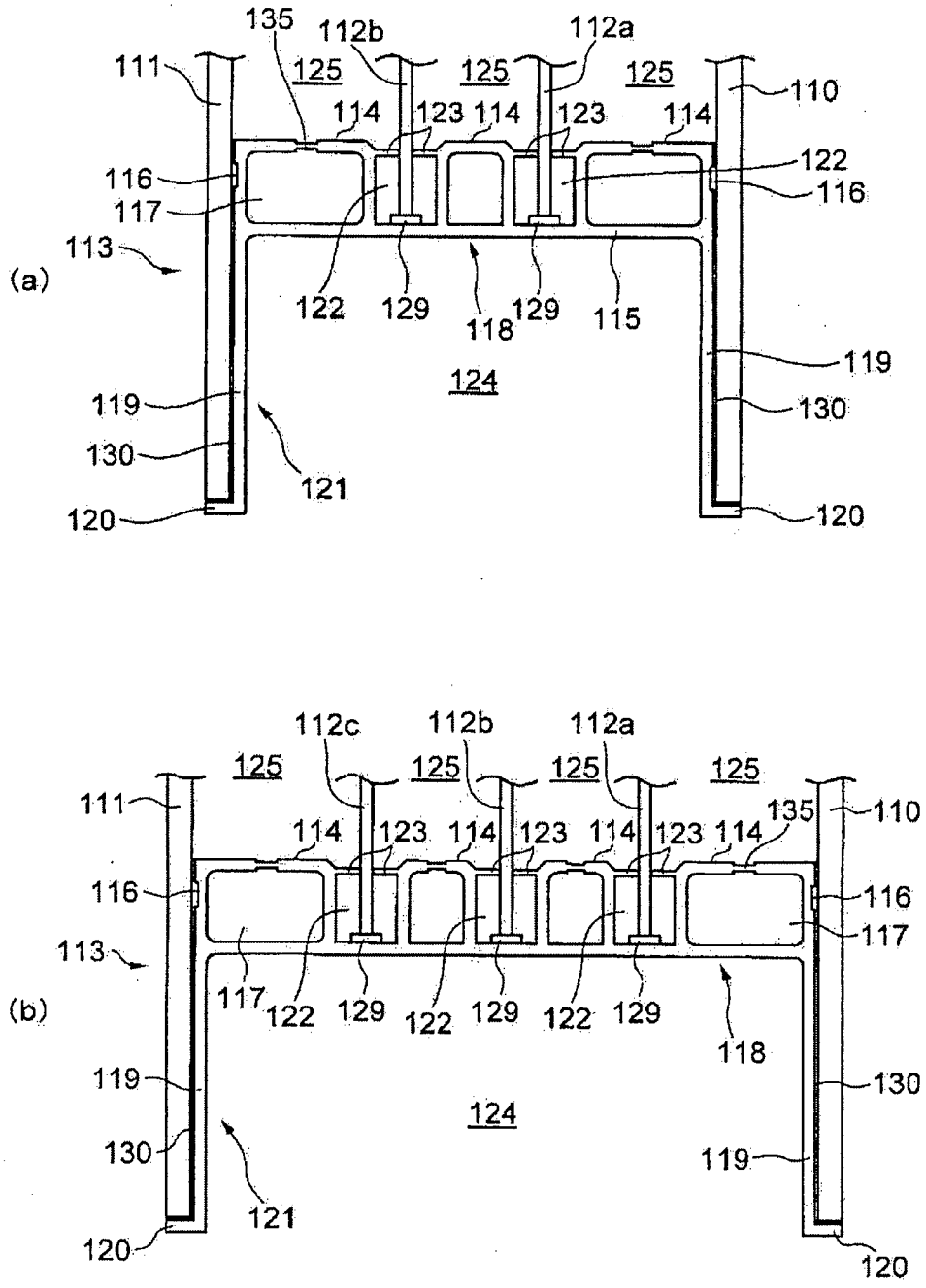
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Fig. 26

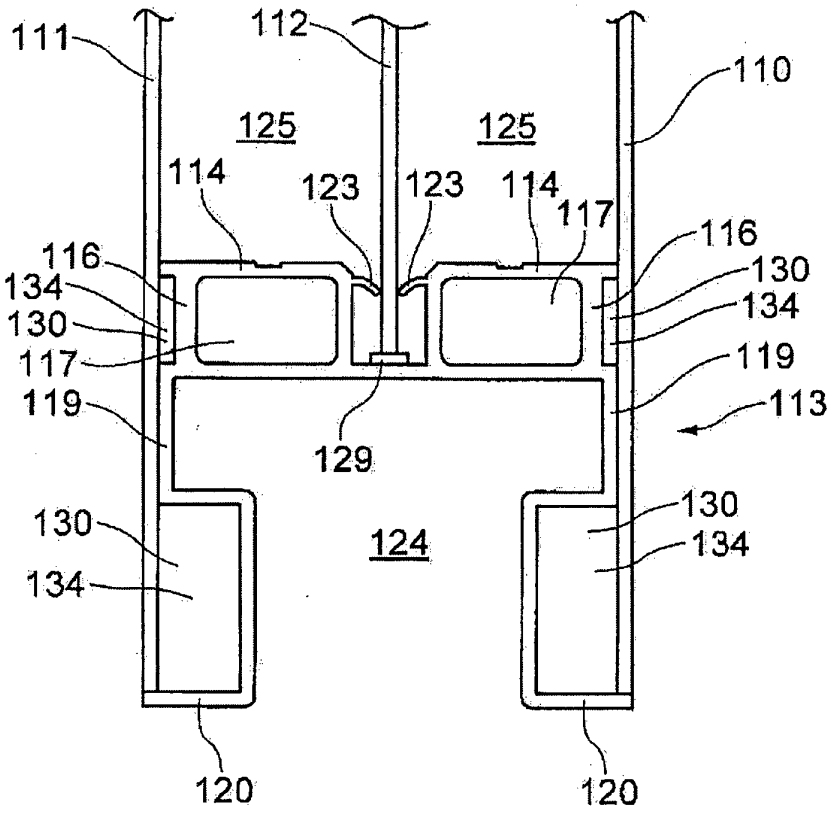
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Fig. 27

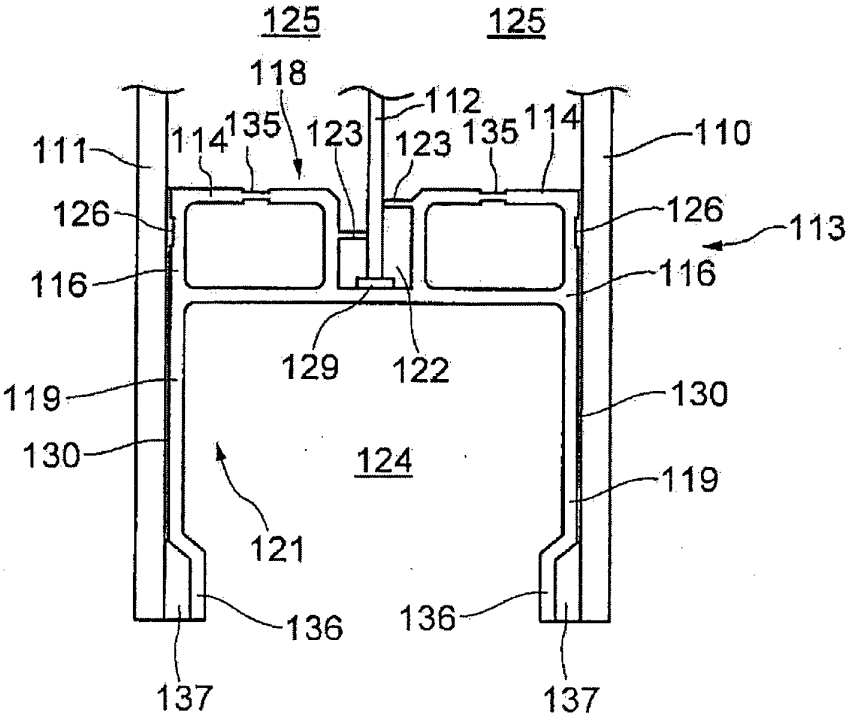
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Fig. 28

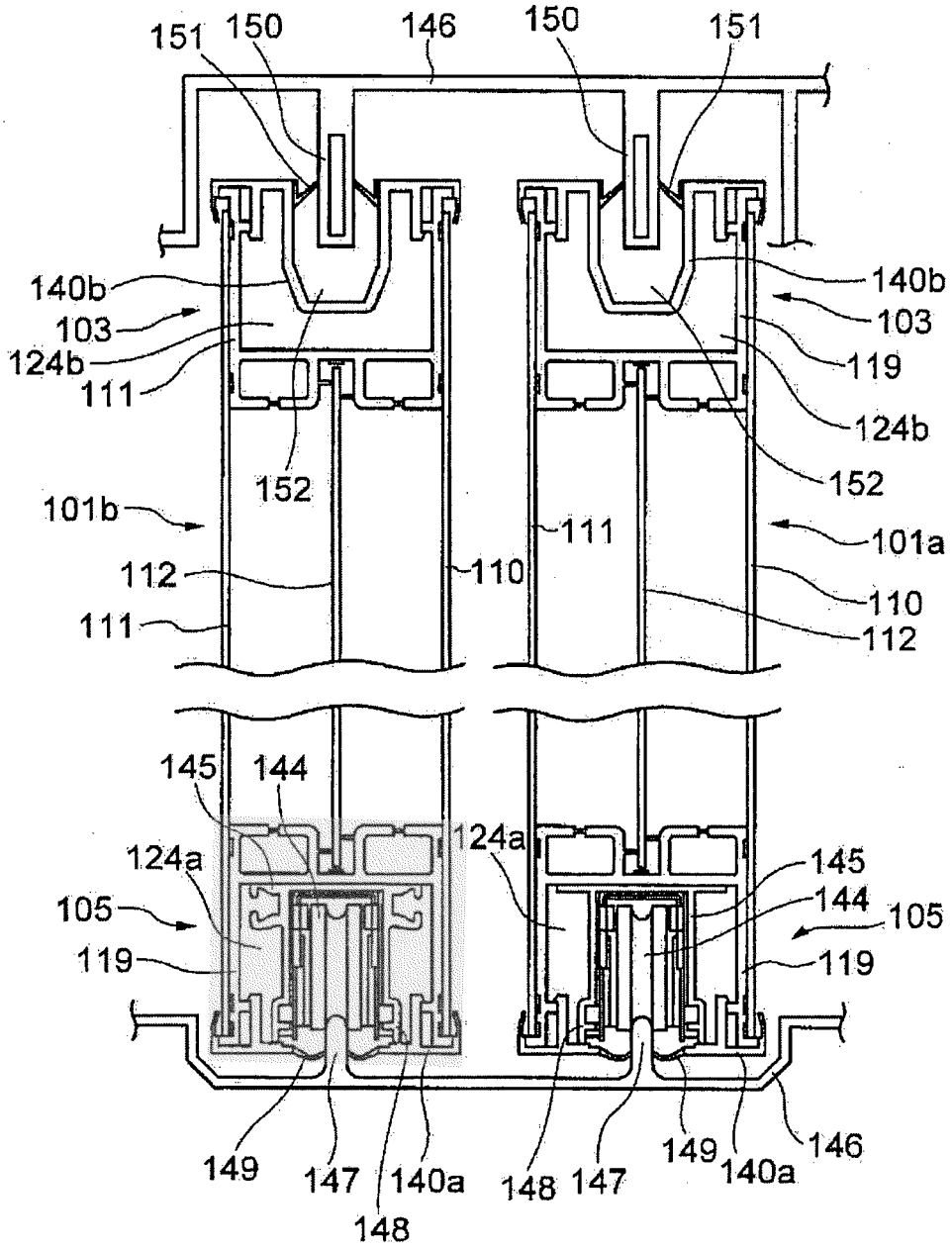
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Fig. 29

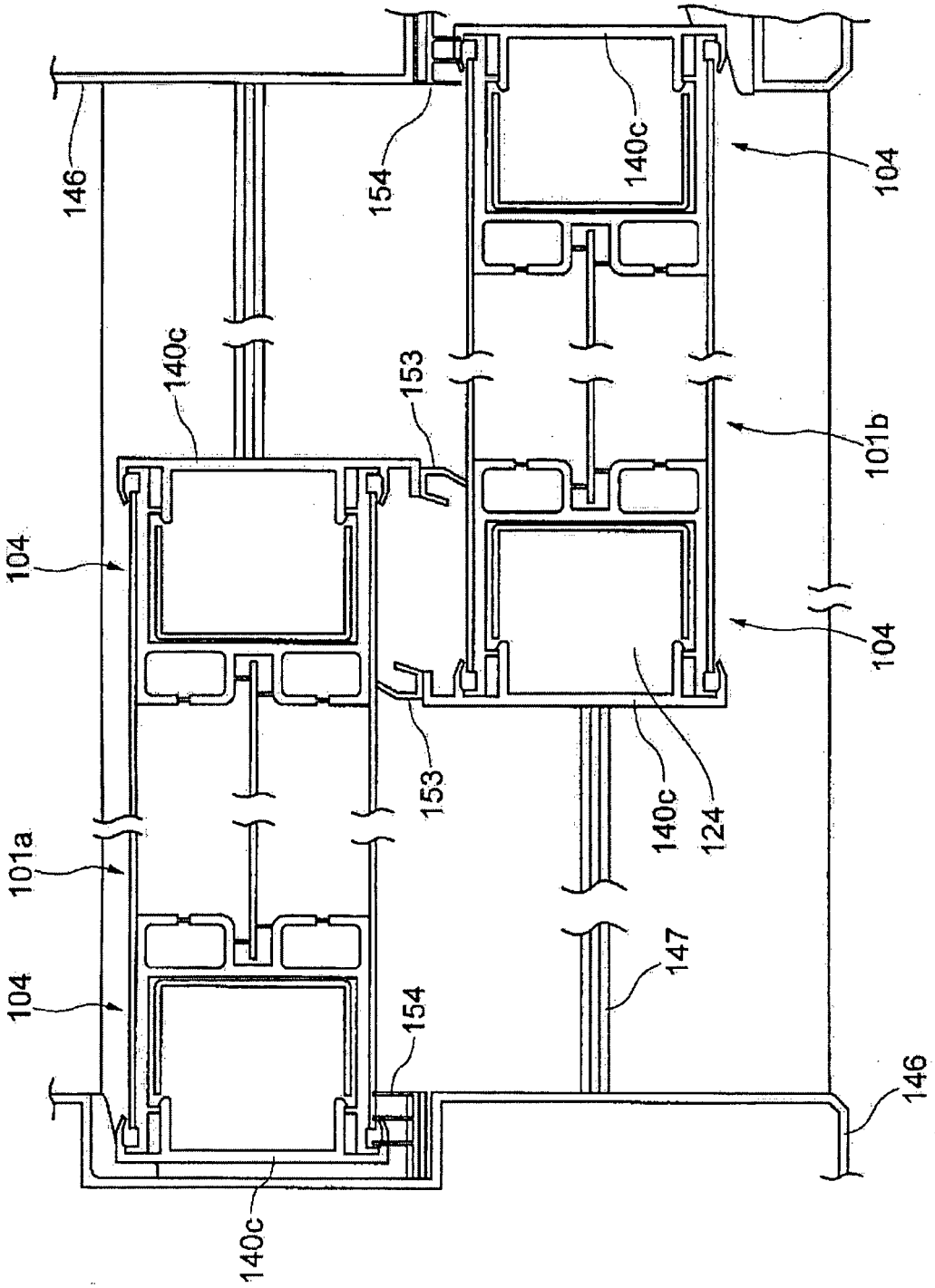
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Fig. 30

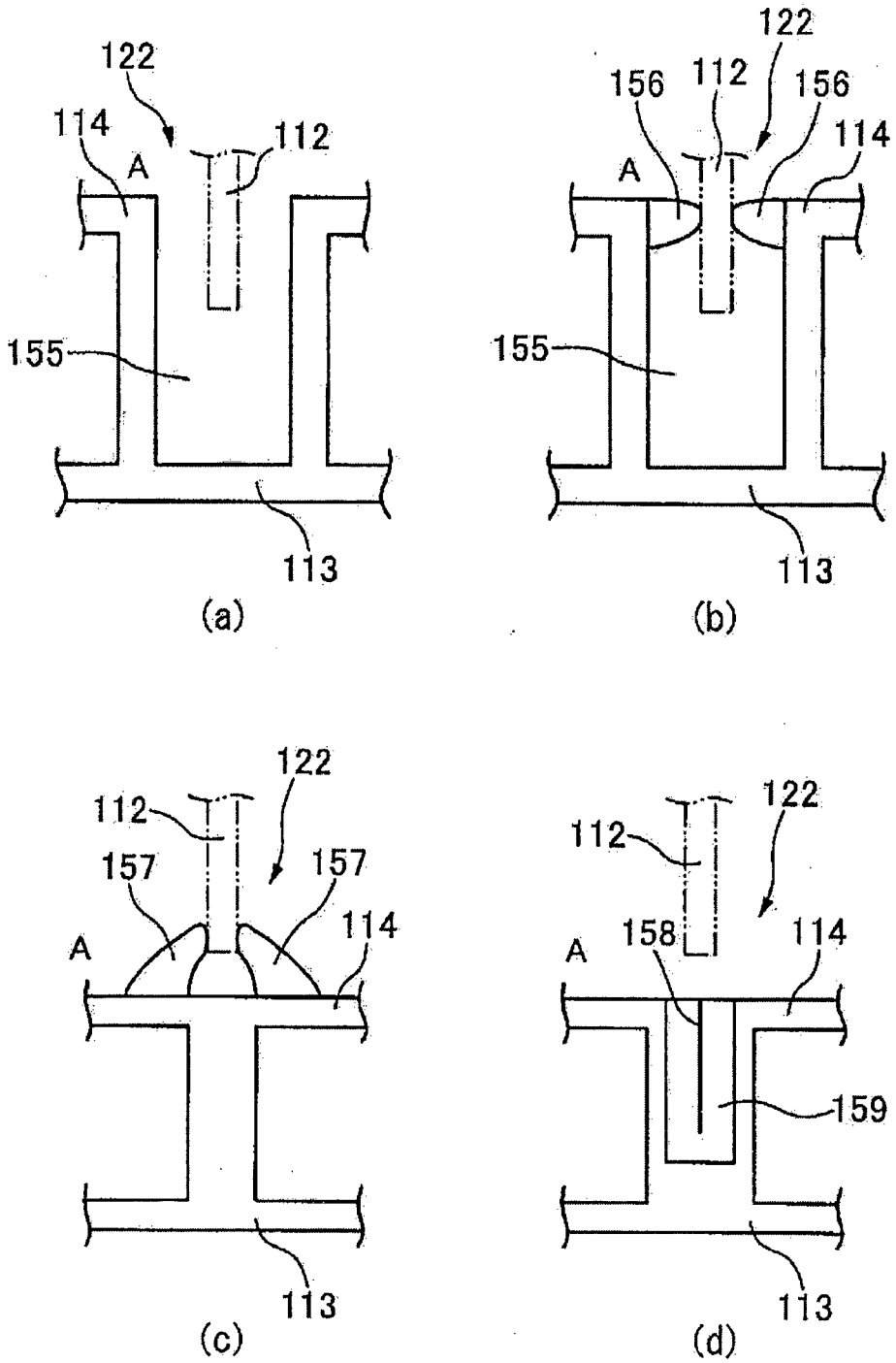
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Fig. 31

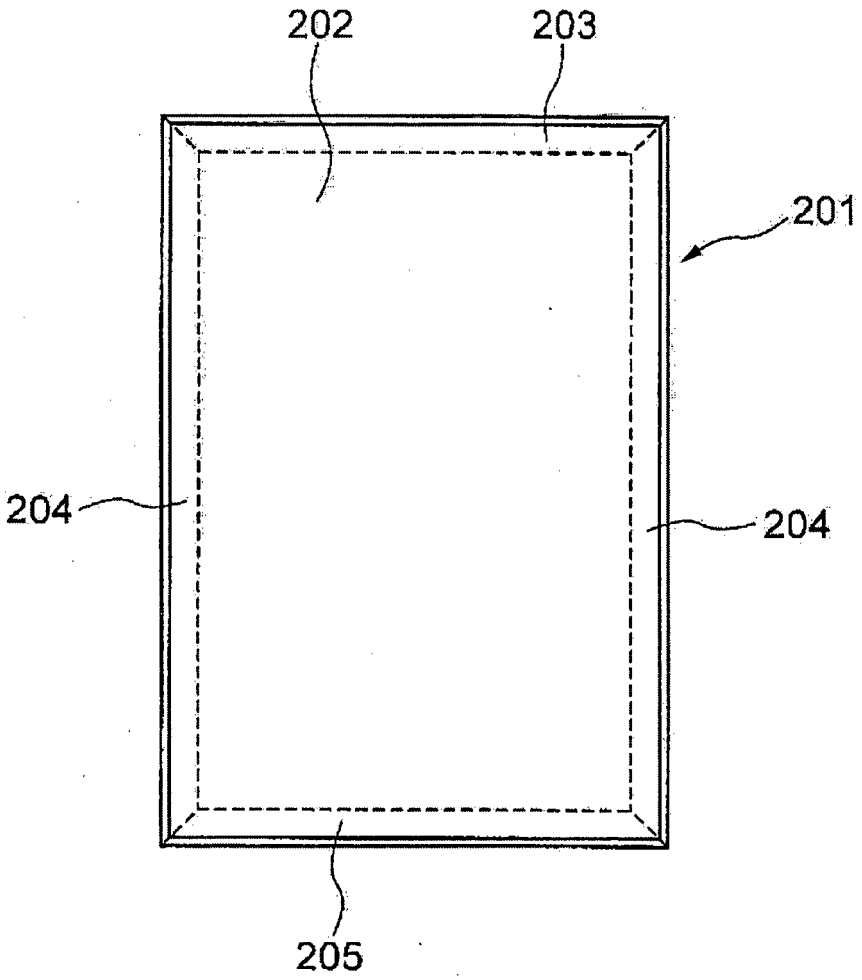

Fig. 32

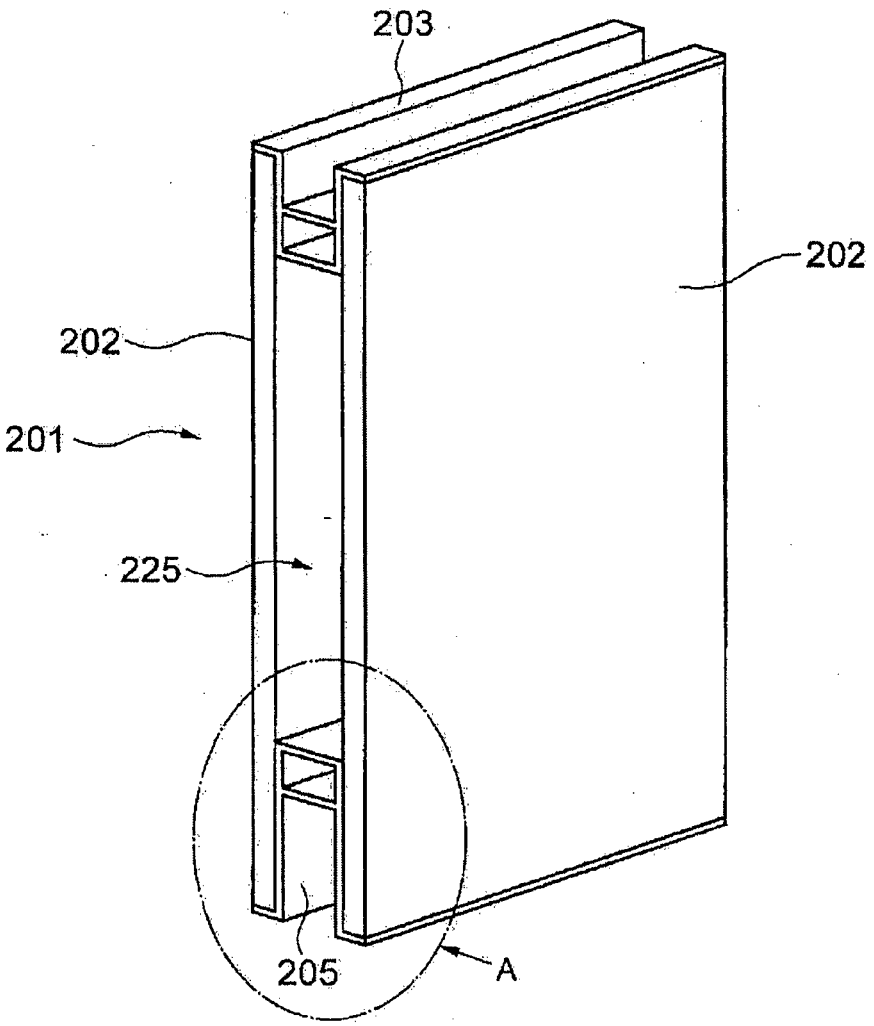

Fig. 33

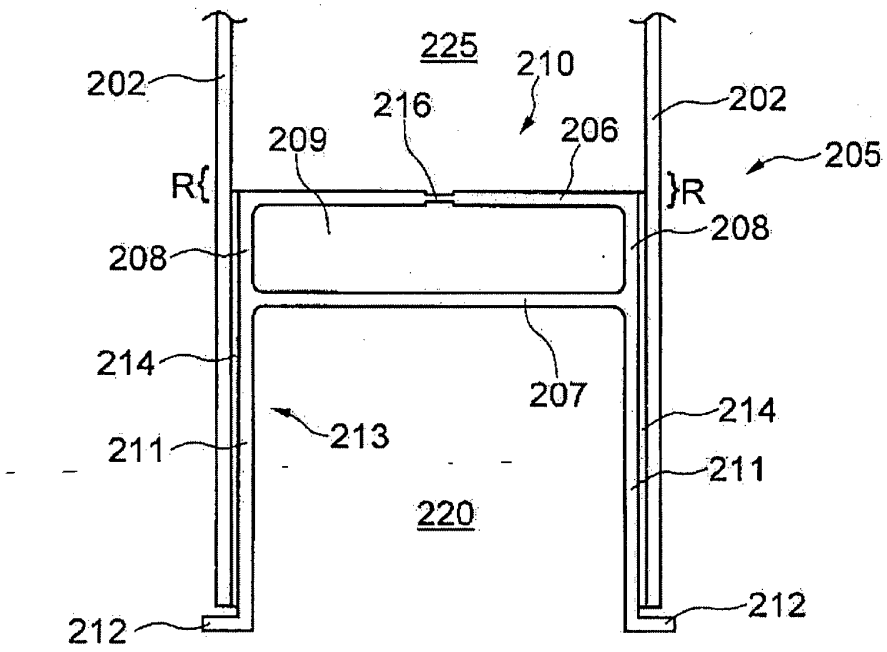
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Fig. 34

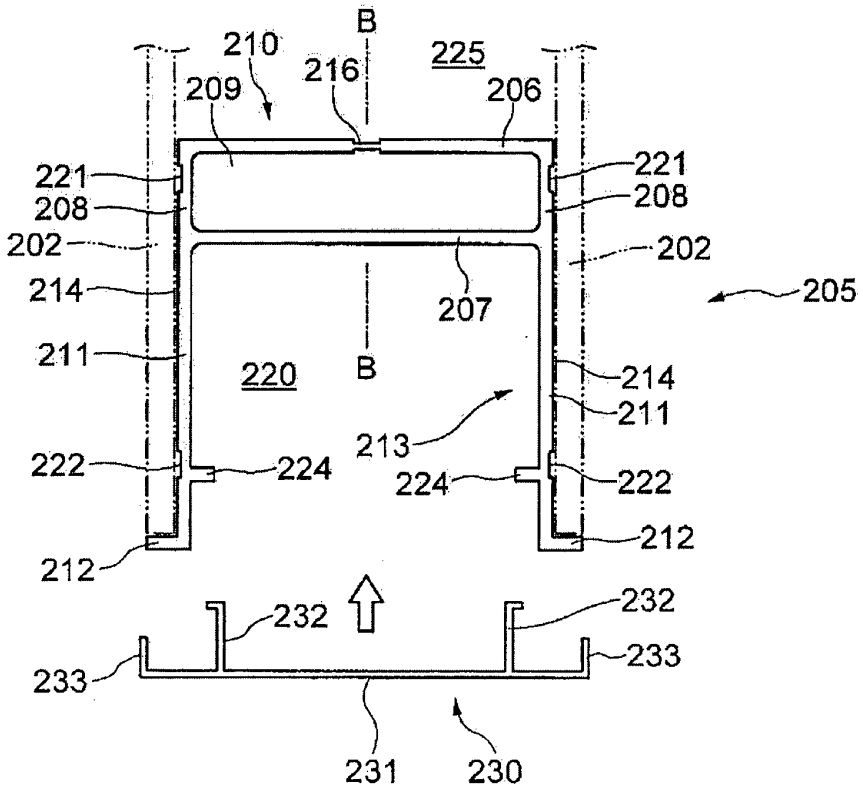
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Fig. 35

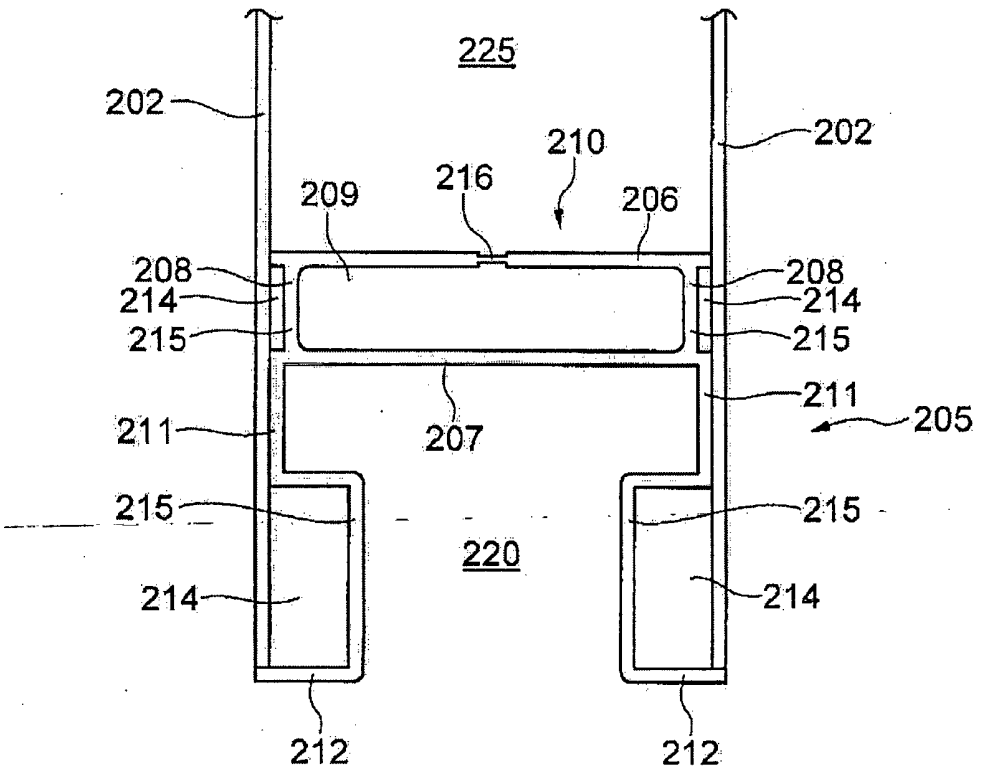
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Fig. 36

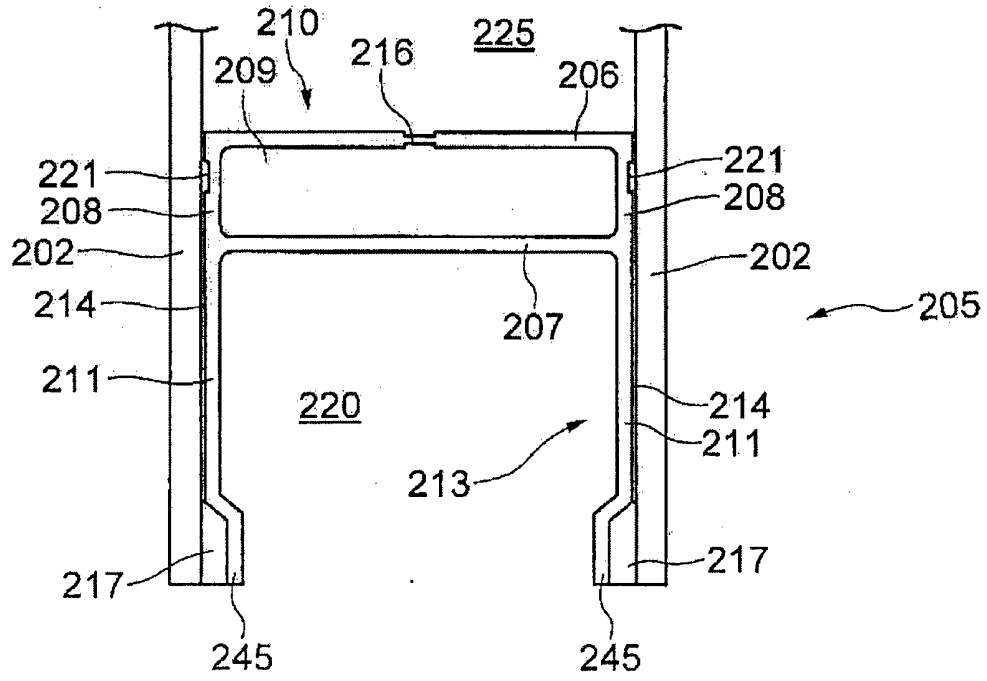
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Fig. 37

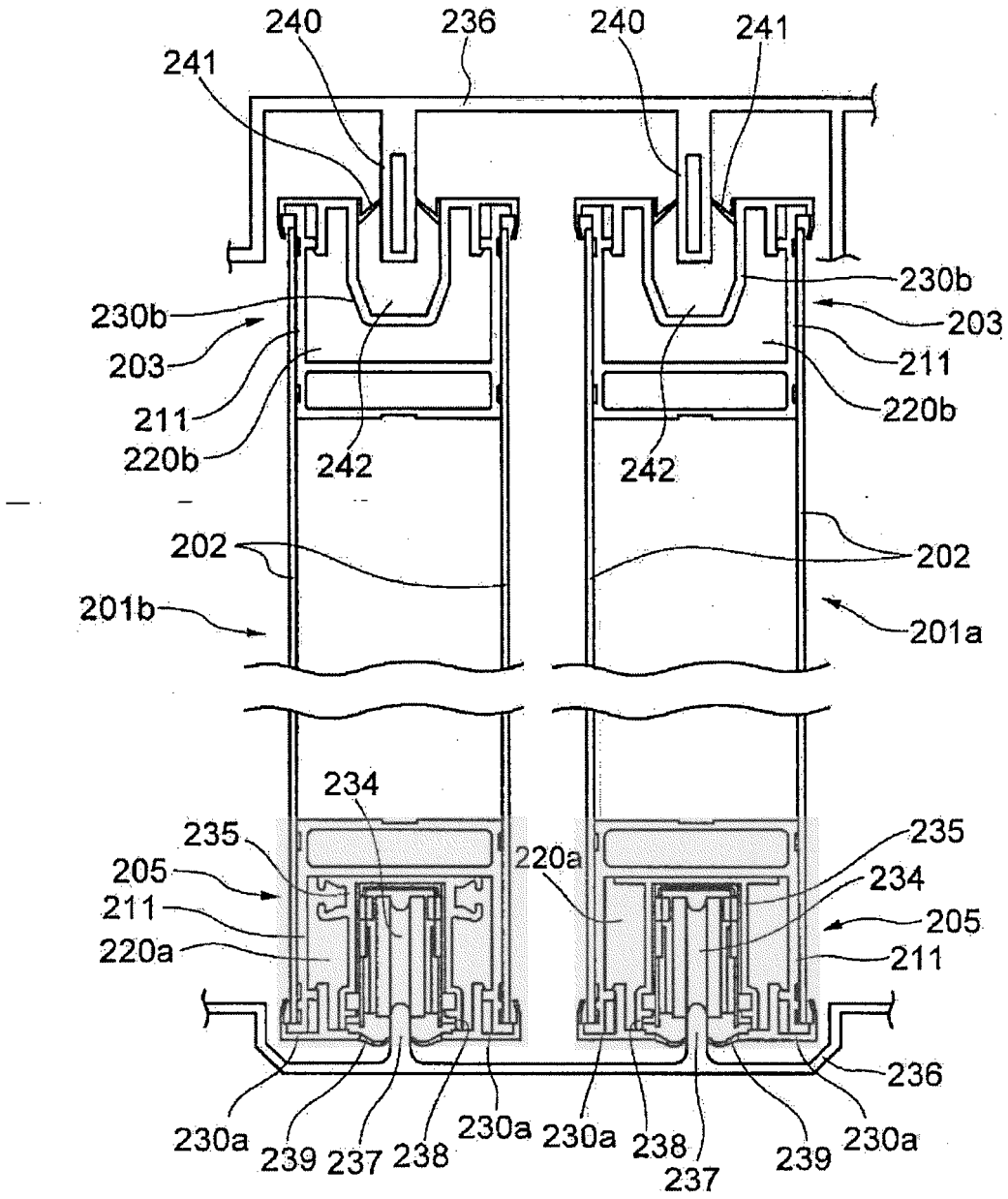
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Fig. 38

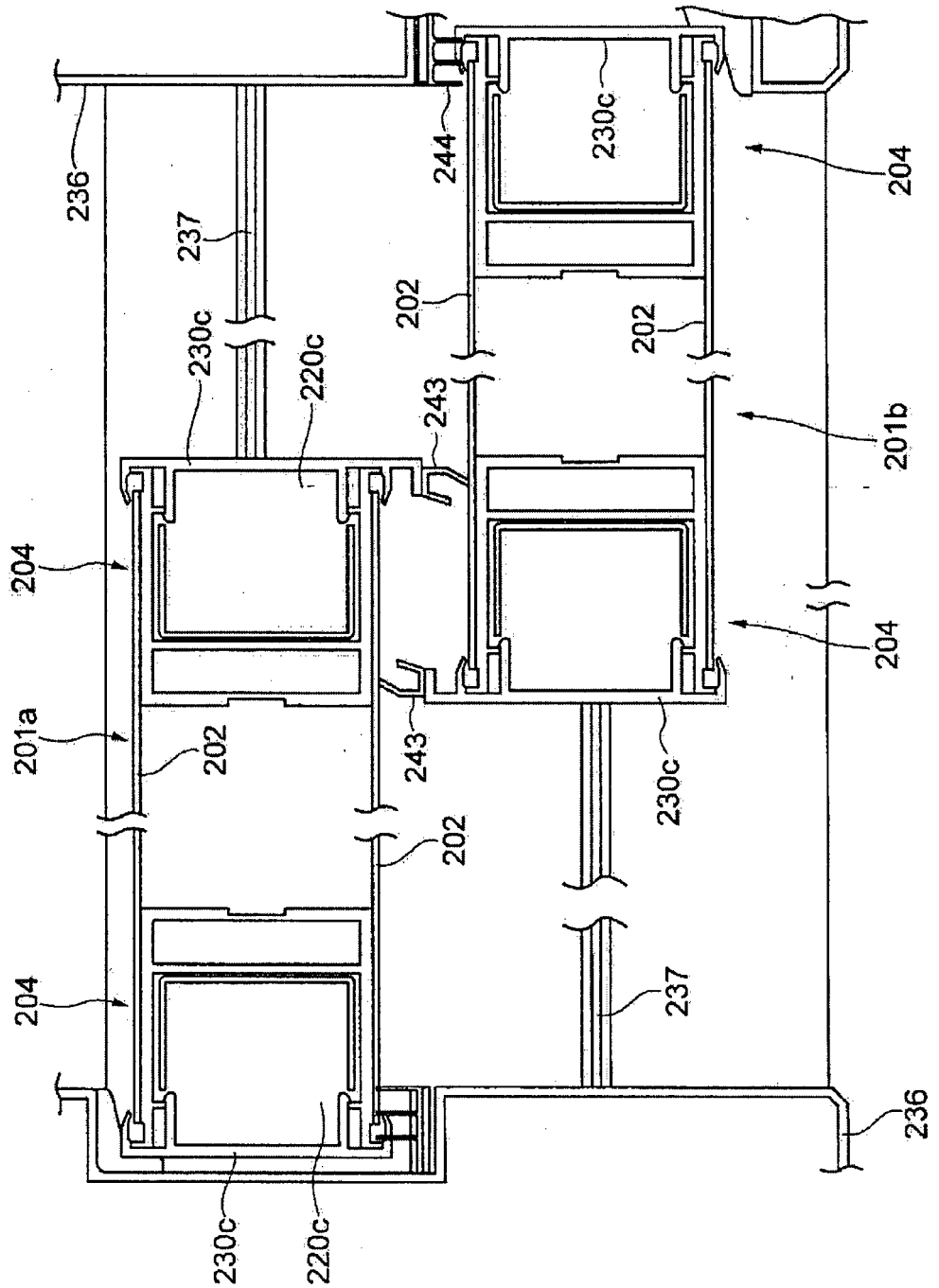
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Fig. 39

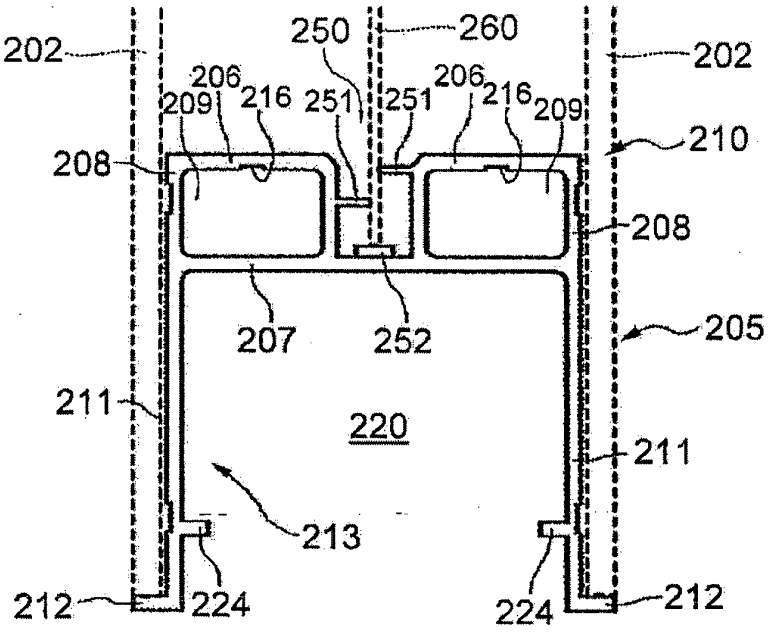

Fig. 40

	Glass constitution	Glass size	◆Air space temp.: 25°C→-10°C (ΔT=35°C) Stress MPa		◆Air space temp.: 25°C→60°C (ΔT=35°C) Stress MPa	
			Maximum stress on the exterior side (in-plane)	Maximum stress on the air space side (in-plane)	Maximum stress on the exterior side (in-plane)	Maximum stress on the air space side (in-plane)
No. 1	1.3+29.4+1.3	1197×800	3.5	1.8	1.4	2.7
No. 2	2.0+29.4+2.0	1197×800	5.6	2.8	2.2	4.2
No. 3	3.0+29.4+3.0	1197×800	8.3	4.3	3.3	6.2
No. 4	1.3+29.4+1.3	2400×1500	0.9	0.5	0.3	0.8
No. 5	2.0+29.4+2.0	2400×1500	1.5	0.7	0.6	1.1
No. 6	3.0+29.4+3.0	2400×1500	2.2	1.1	0.9	1.7
No. 7	1.3+29.4+1.3	500×350	20.4	11.1	8.3	15.3
No. 8	2.0+29.4+2.0	500×350	27.1	15.4	11.4	19.6
No. 9	3.0+29.4+3.0	500×350	27.0	16.2	20.0	18.5
No. 10	1.3+63.9+1.3	500×350	18.0	32.7	-	-
No. 11	2.0+63.9+2.0	500×350	20.4	35.2	-	-
No. 12	1.3+63.9+1.3 (Adhesion thickness 1mm)	500×350	18.3	32.3	-	-
No. 13	2.0+63.9+2.0 (Adhesion thickness 1mm)	500×350	21.1	34.2	-	-
No. 14	1.3+63.9+1.3 (Adhesion width 15mm)	500×350	19.0	34.7	-	-
No. 15	2.0+63.9+2.0 (Adhesion width 15mm)	500×350	21.9	36.7	-	-
No. 16	1.3+63.9+1.3 (Adhesion width 10mm)	500×350	21.9	33.3	-	-
No. 17	2.0+63.9+2.0 (Adhesion width 10mm)	500×350	25.3	34.6	-	-
No. 18	2.0+63.9+2.0 (Adhesion width 5mm) (Adhesion thickness 5mm)	500×350	46.8	21.4	-	-

Fig. 41

(A) Adhesion width: 20 mm

Adhesion thickness mm	Adhesive average stress MPa	Adhesion interface maximum stress MPa	Glass stress MPa	
			Maximum stress on the exterior side (in-plane)	Maximum stress on the air space side (in-plane)
0.5	0.34	0.72	20.4	35.2
1.0	0.29	0.55	21.1	34.2
1.5	0.28	0.45	21.8	33.1
2.0	0.23	0.40	22.5	31.8
3.0	0.23	0.35	23.9	29.2
4.0	0.21	0.31	25.4	26.6
5.0	0.19	0.29	26.7	24.3

(B) Adhesion width: 15 mm

Adhesion thickness mm	Adhesive average stress MPa	Adhesion interface maximum stress MPa	Glass stress MPa	
			Maximum stress on the exterior side (in-plane)	Maximum stress on the air space side (in-plane)
0.5	0.48	0.90	21.9	36.7
1.0	0.46	0.75	23.3	34.2
1.5	0.43	0.65	24.7	31.6
2.0	0.34	0.58	26.2	29.0
3.0	0.34	0.48	28.9	24.3
4.0	0.26	0.41	31.0	20.7
5.0	0.22	0.35	32.6	17.9

(C) Adhesion width: 10 mm

Adhesion thickness mm	Adhesive average stress MPa	Adhesion interface maximum stress MPa	Glass stress MPa	
			Maximum stress on the exterior side (in-plane)	Maximum stress on the air space side (in-plane)
0.5	0.94	1.70	25.3	34.6
1.0	0.77	1.25	28.9	28.1
1.5	0.63	1.00	32.0	22.7
2.0	0.51	0.79	34.4	18.7
3.0	0.37	0.58	37.6	18.3
4.0	0.28	0.41	39.3	18.7
5.0	0.24	0.34	40.4	18.9

(D) Adhesion width: 5 mm

Adhesion thickness mm	Adhesive average stress MPa	Adhesion interface maximum stress MPa	Glass stress MPa	
			Maximum stress on the exterior side (in-plane)	Maximum stress on the air space side (in-plane)
0.5	1.66	2.70	38.0	19.4
1.0	0.87	1.35	42.7	21.6
1.5	0.56	0.81	44.9	22.3
2.0	0.36	0.60	45.3	22.5
3.0	0.28	0.42	46.1	22.3
4.0	0.21	0.35	46.5	21.8
5.0	0.16	0.29	46.8	21.4

Fig. 42

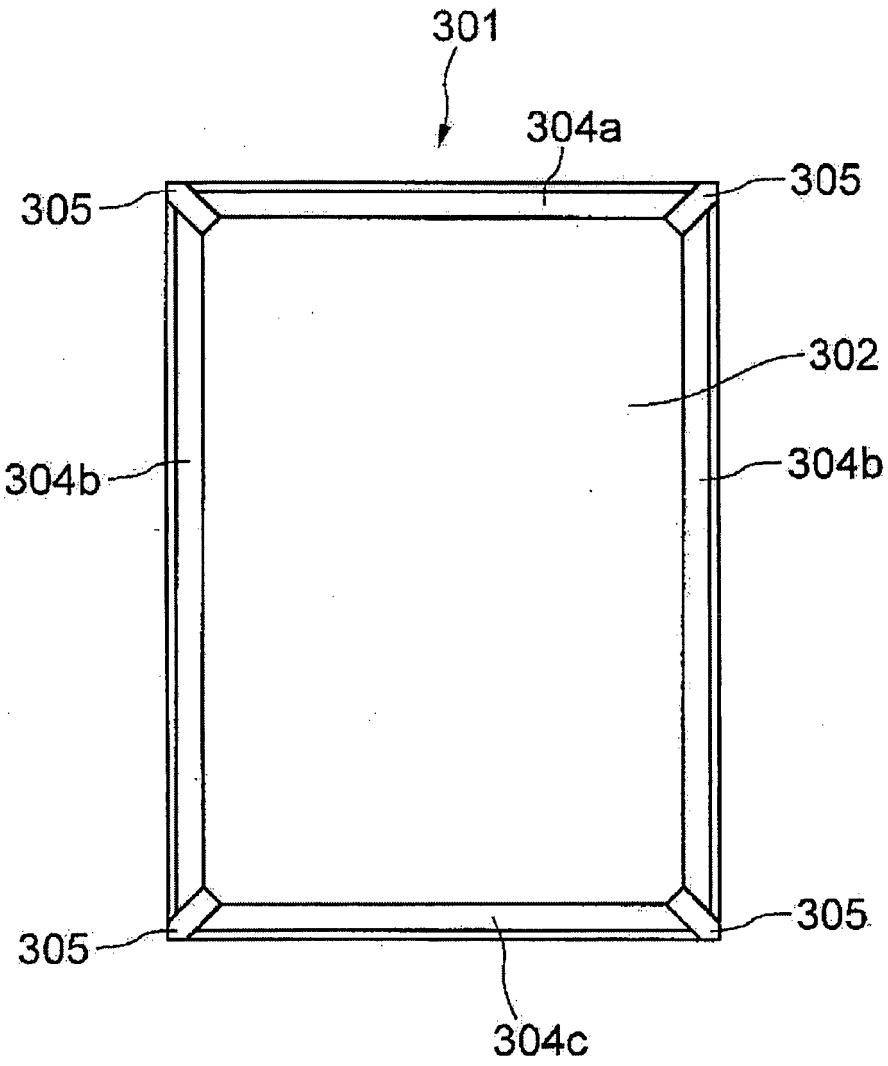

Fig. 43

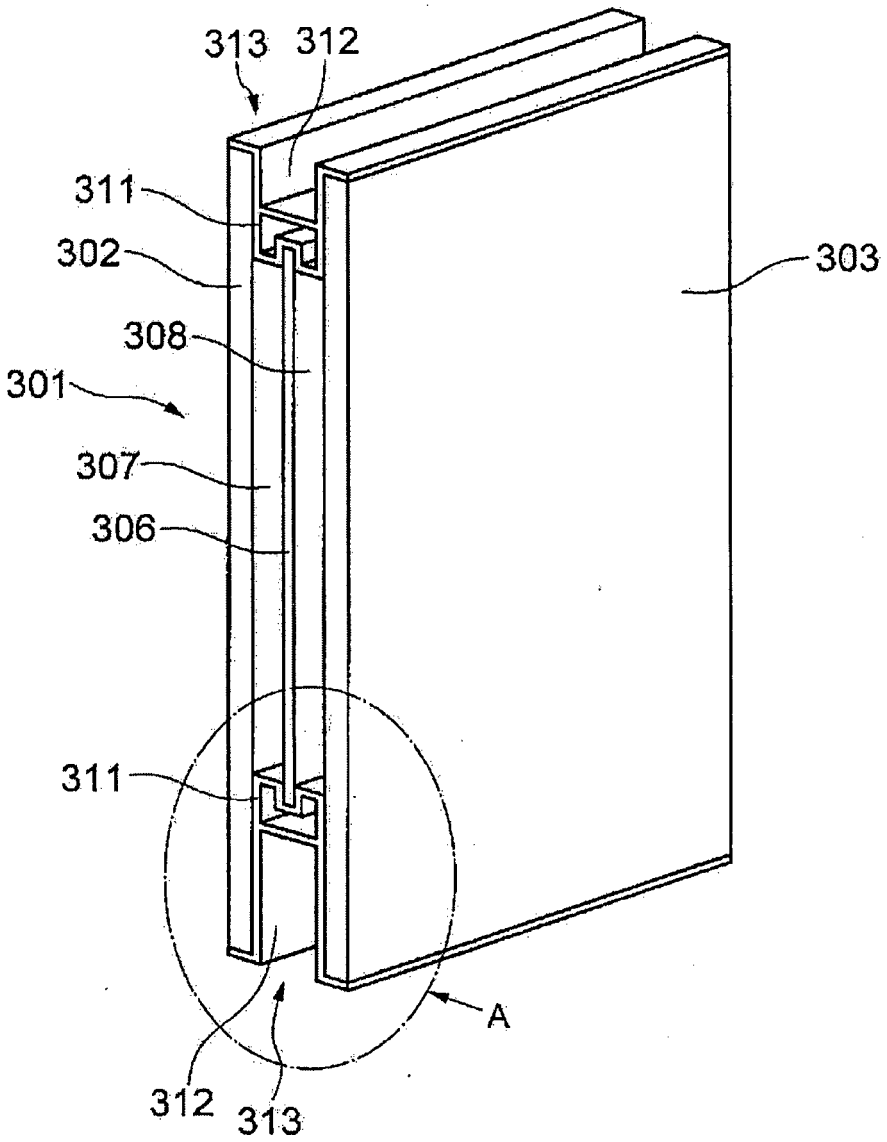

Fig. 44

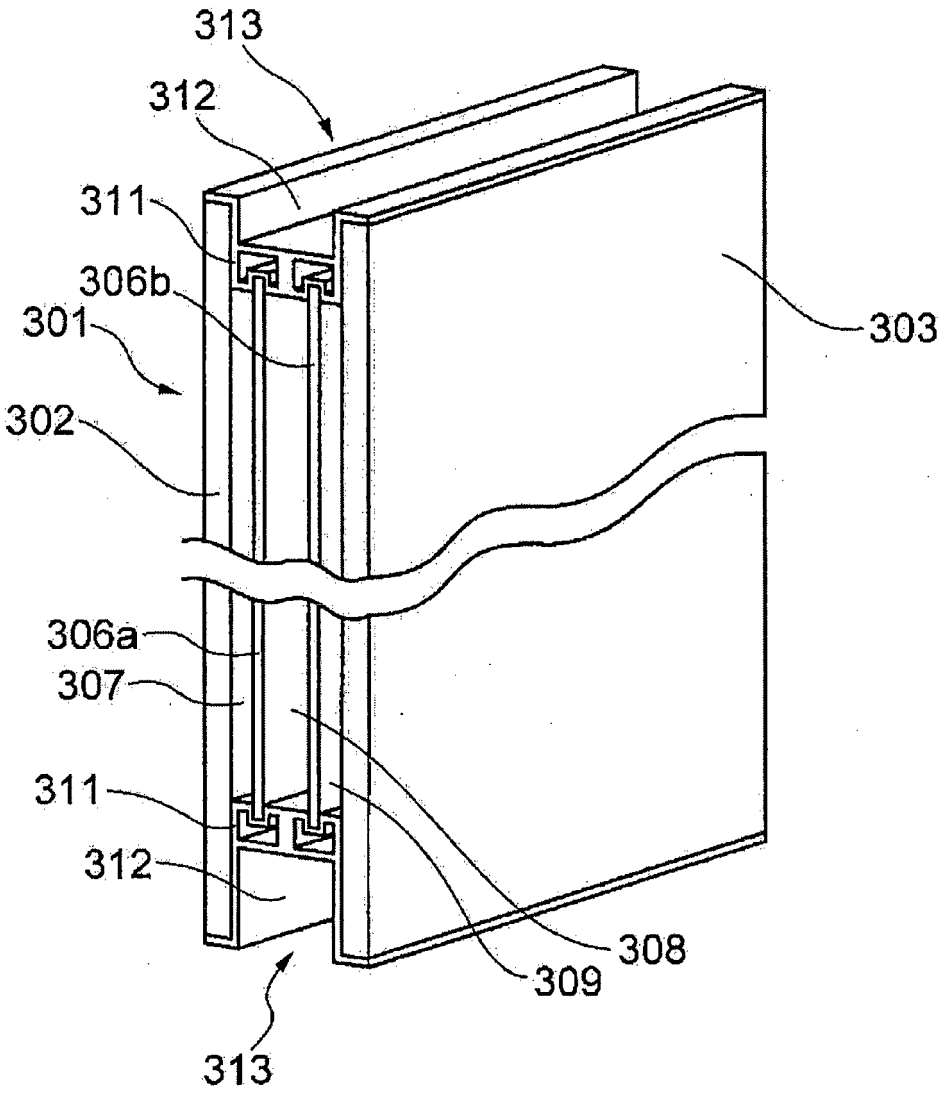

Fig. 45

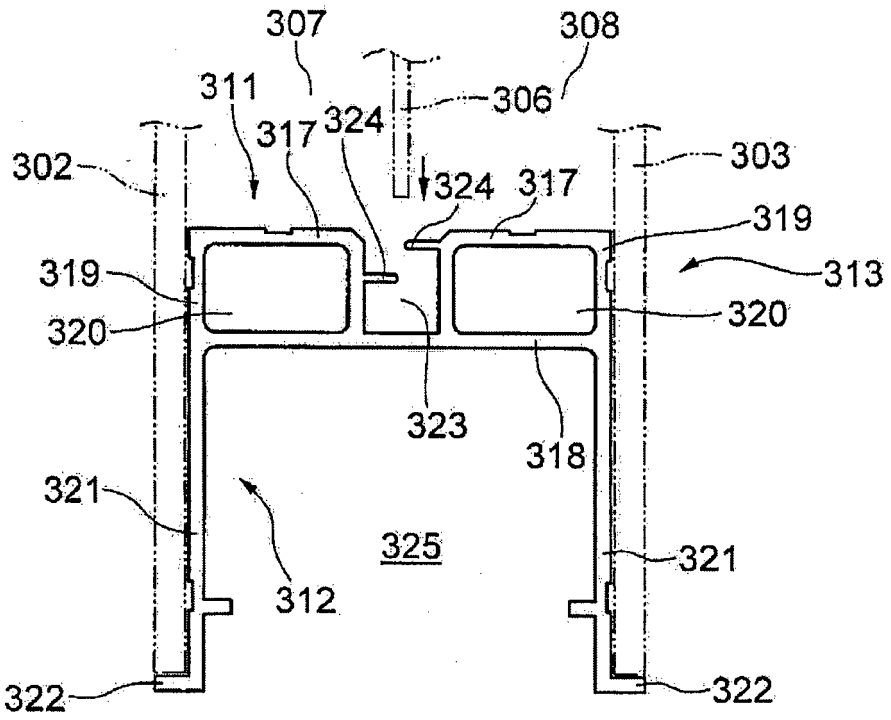
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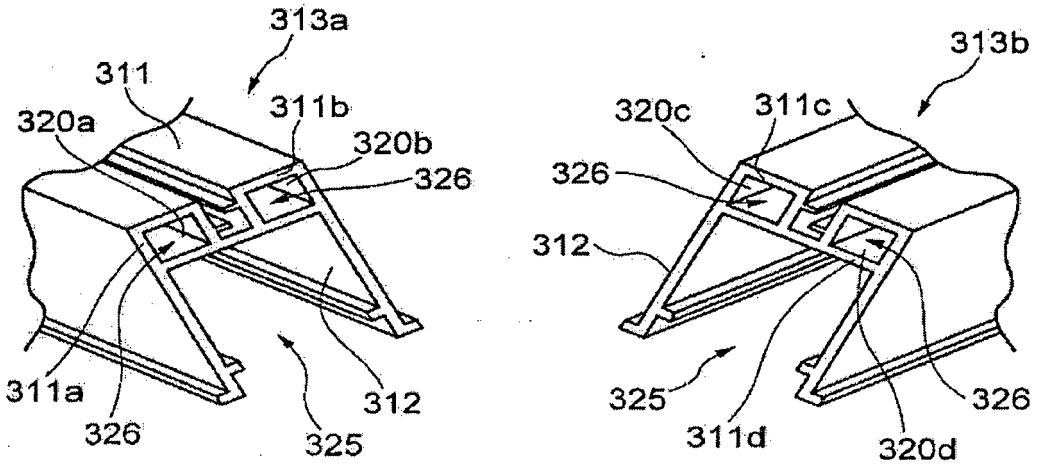
Fig. 46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326

Fig. 47

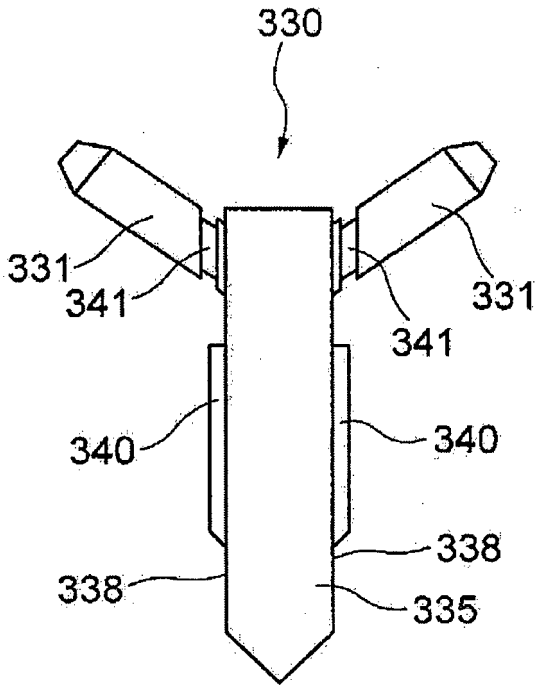


Fig. 48

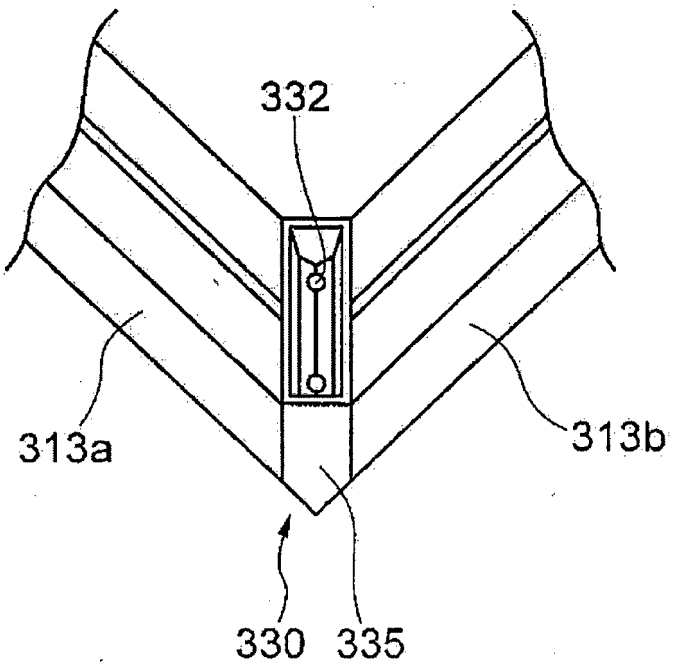


Fig. 49

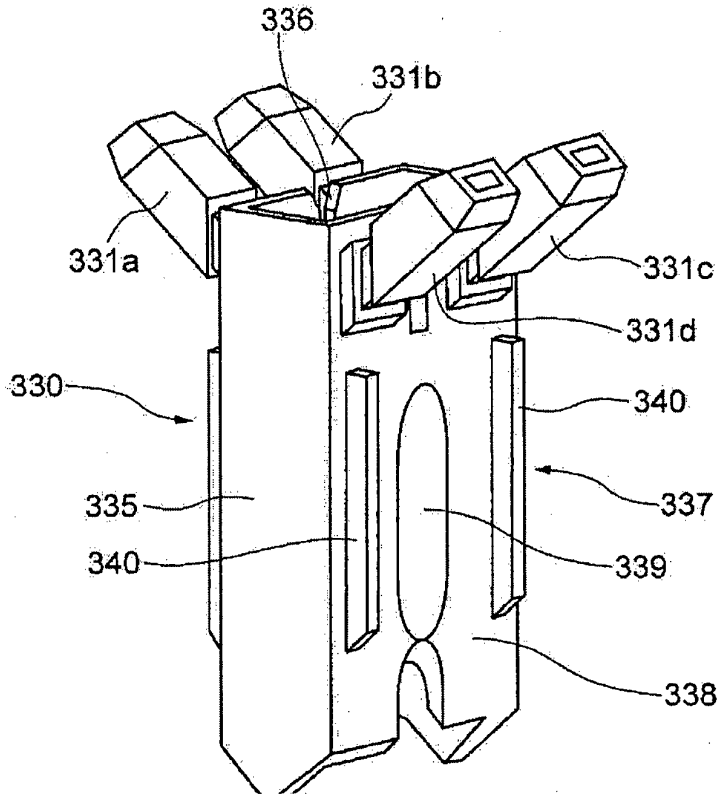

336
331b
331a
331c
331d
330
340
335
337
340
339
338

Fig. 50

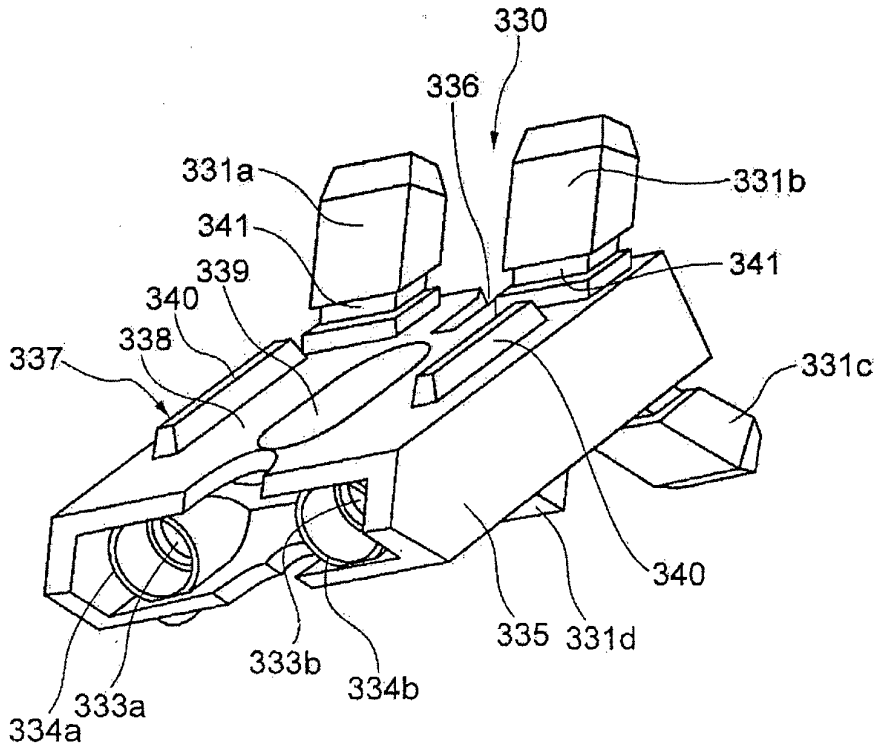

330
336
331a
331b
341
341
339
340
338
337
331c
340
335
331d
333b
334b
333a
334a

Fig. 51

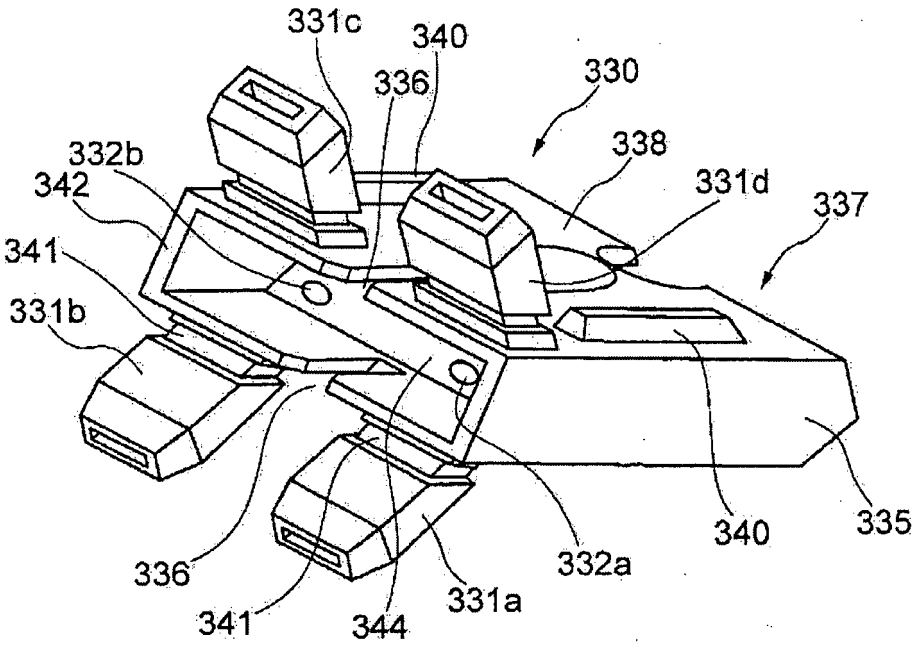

331c
340
336
330
338
332b
342
331d
337
341
331b
340
335
336
332a
341
344
331a

Fig. 52

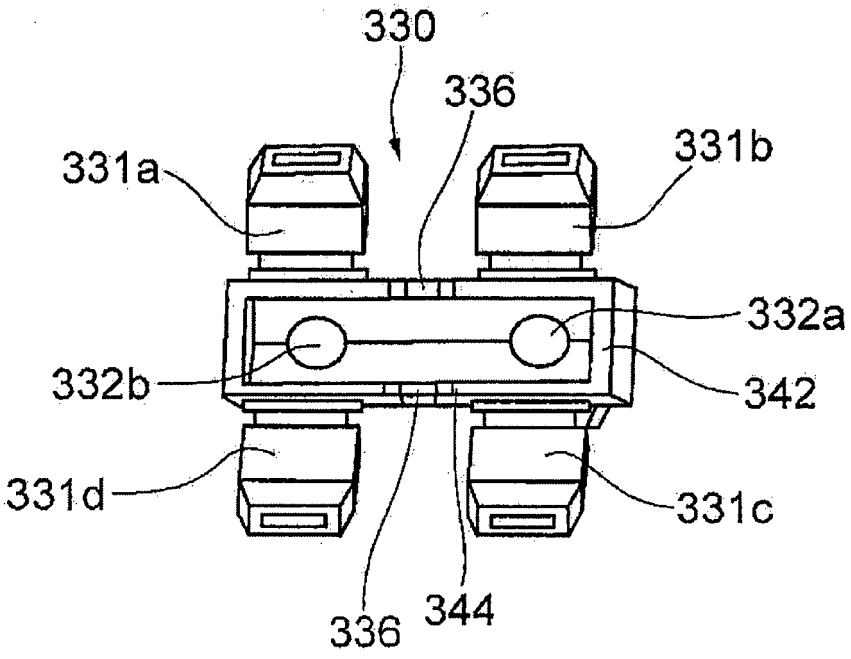

330
336
331a
331b
332a
332b
342
331d
331c
336
344

Fig. 53

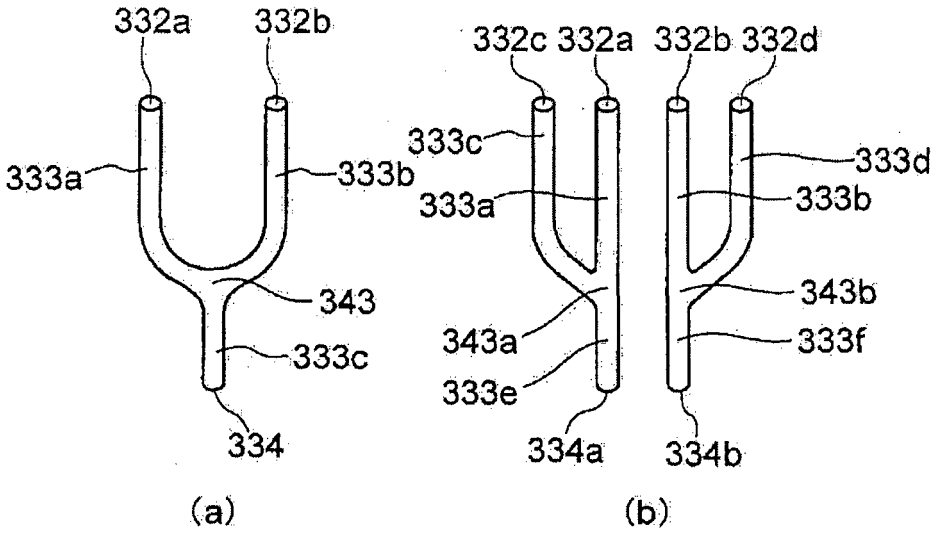

332a
332b
333a
333b
343
333c
334
(a)
332c
332a
332b
332d
333c
333d
333a
333b
343b
343a
333f
333e
334a
334b
(b)
332a
332b
332c
333i
333j
333g
343c
333h
334a
334b
(c)
332a
332b
332c
333m
333n
343d
333ℓ
333k
334a
334b
(d)

Fig. 54

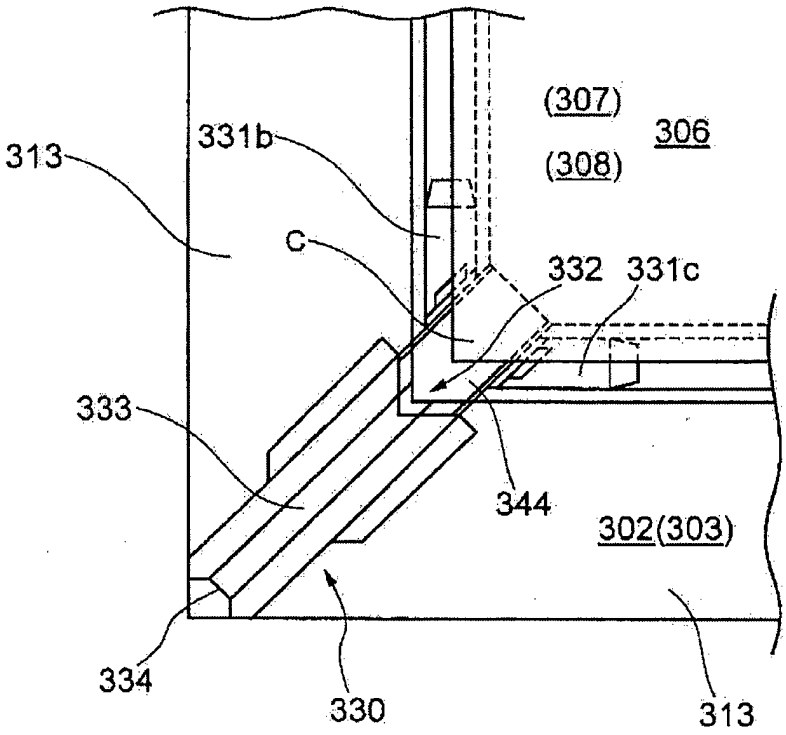

(307)
306
(308)
313
331b
C
332
331c
333
344
302(303)
334
330
313

Fig. 55

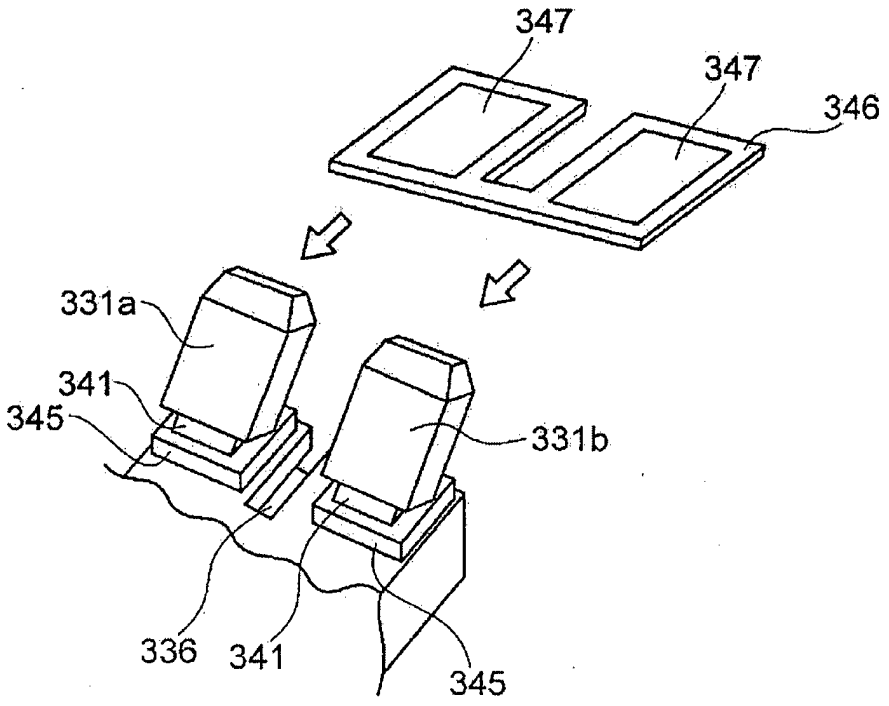

347
347
346
331a
341
345
331b
336
341
345

Fig. 56

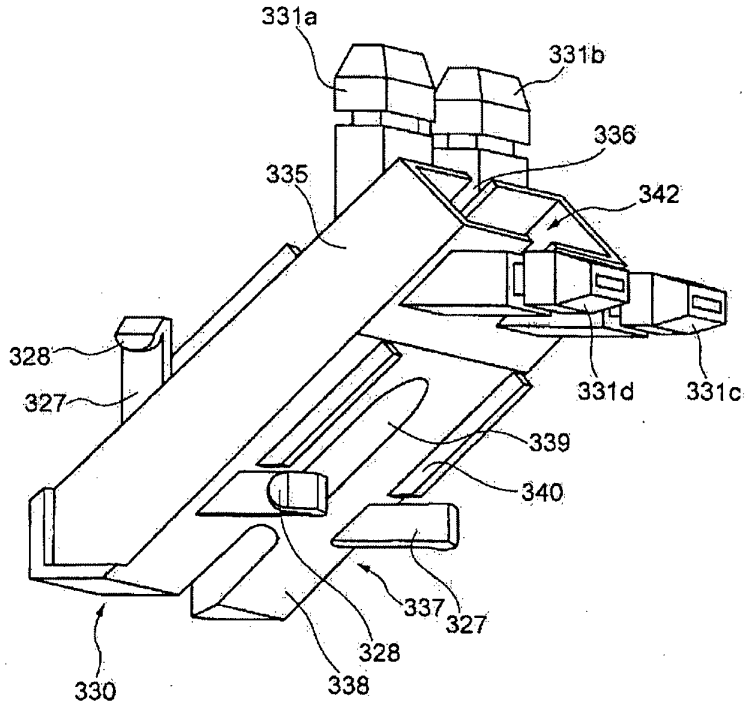

331a
331b
336
335
342
328
327
331d
331c
339
340
337
327
328
330
338

Fig. 57

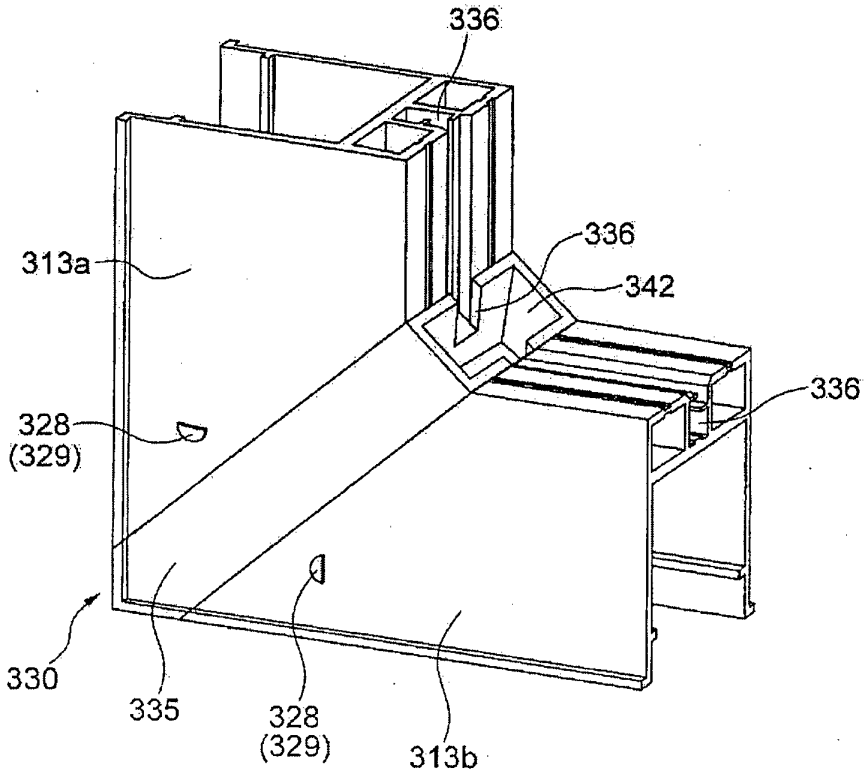

336
336
313a
342
336
328
(329)
330
335
328
(329)
313b

Fig. 58

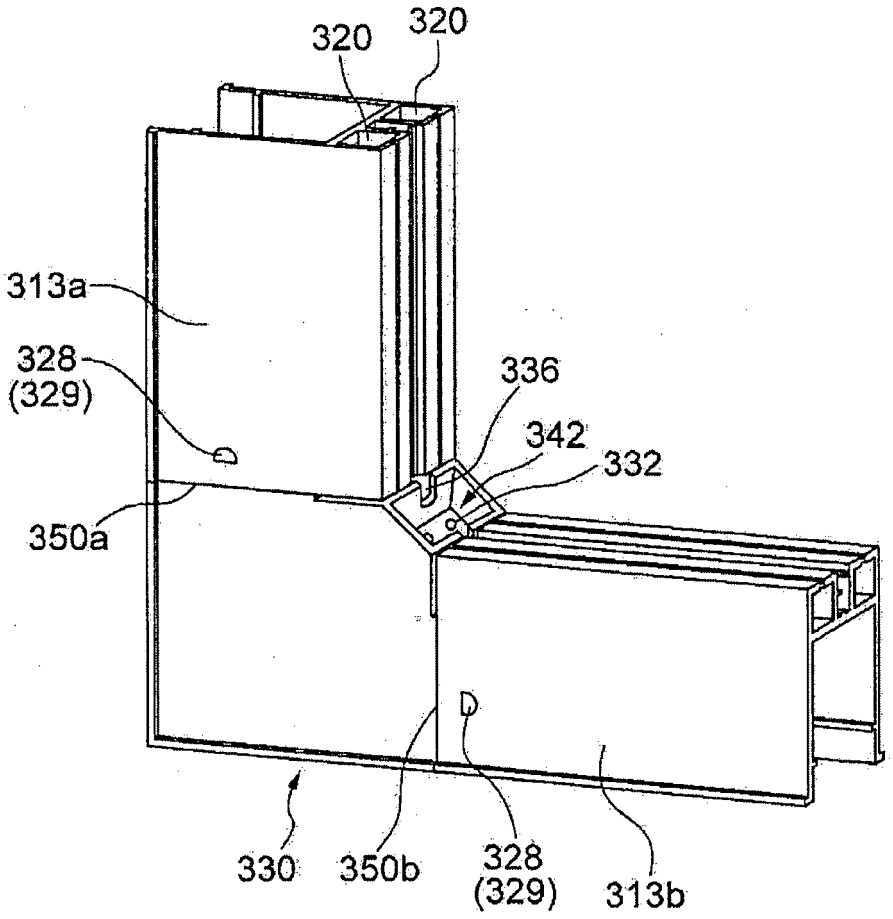


Fig. 59

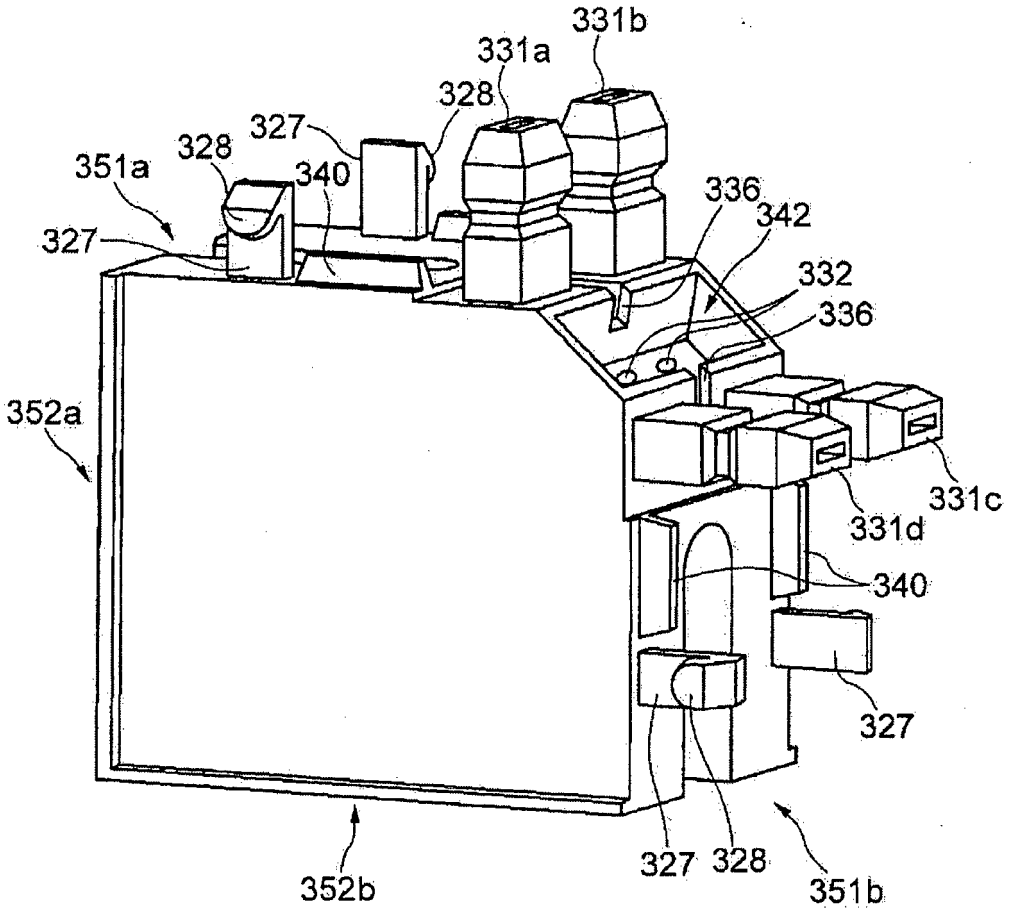

331b
331a
328
327
328
351a
340
336
342
327
332
336
352a
331c
331d
340
327
327
328
352b
351b

Fig. 60

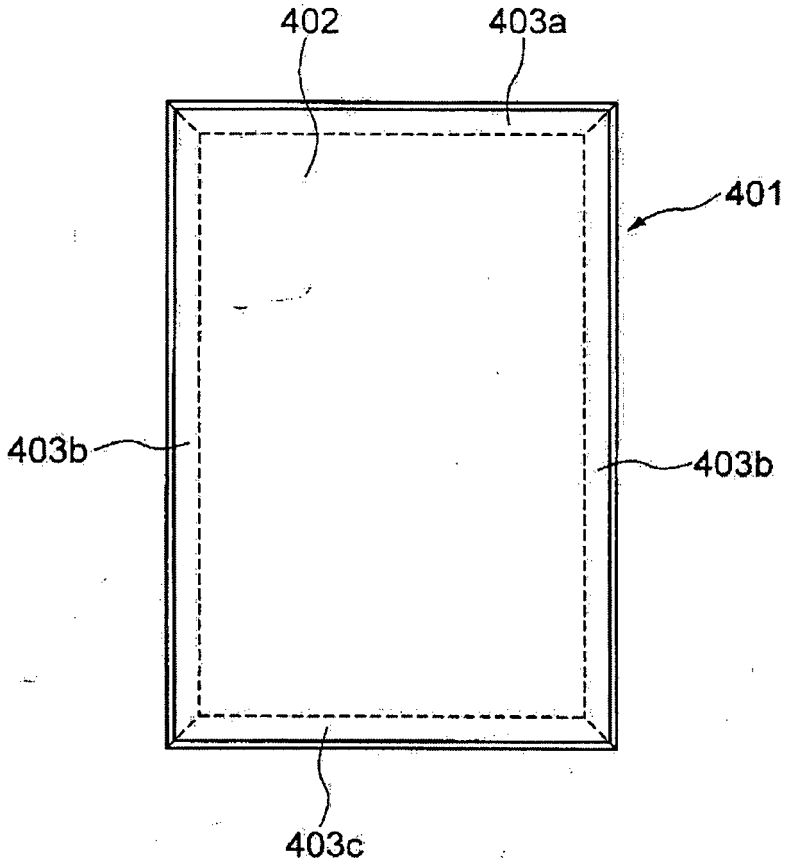


Fig. 61

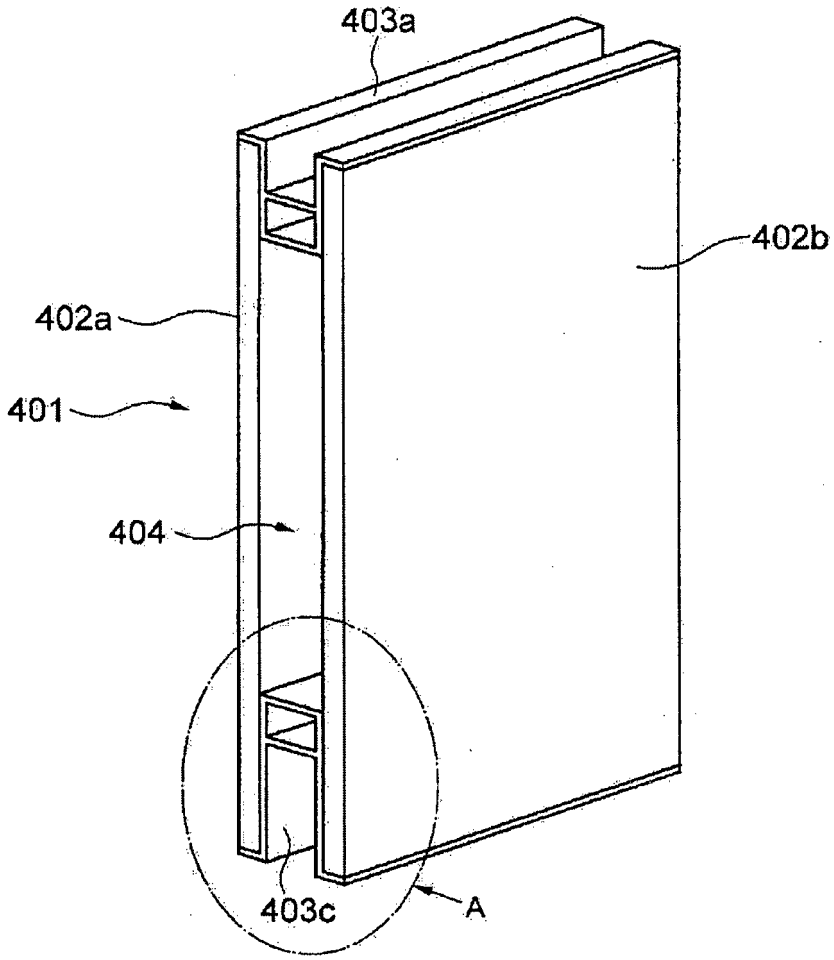


Fig. 62

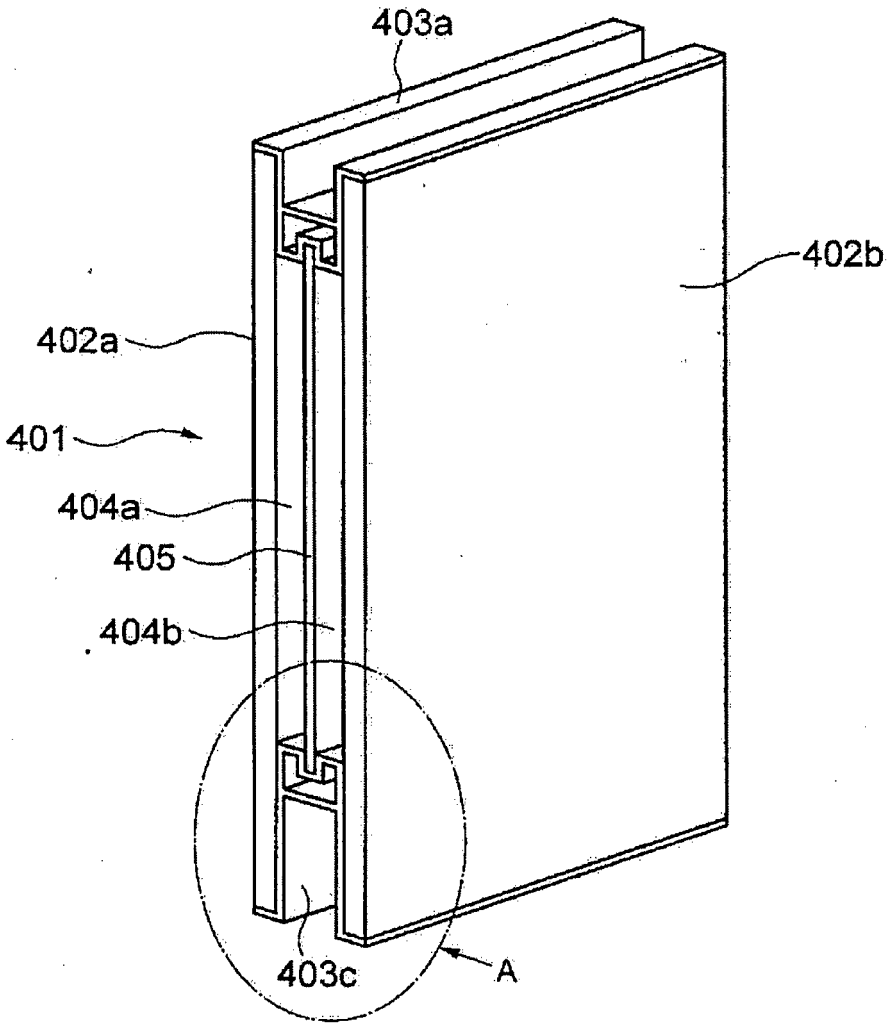


Fig. 63

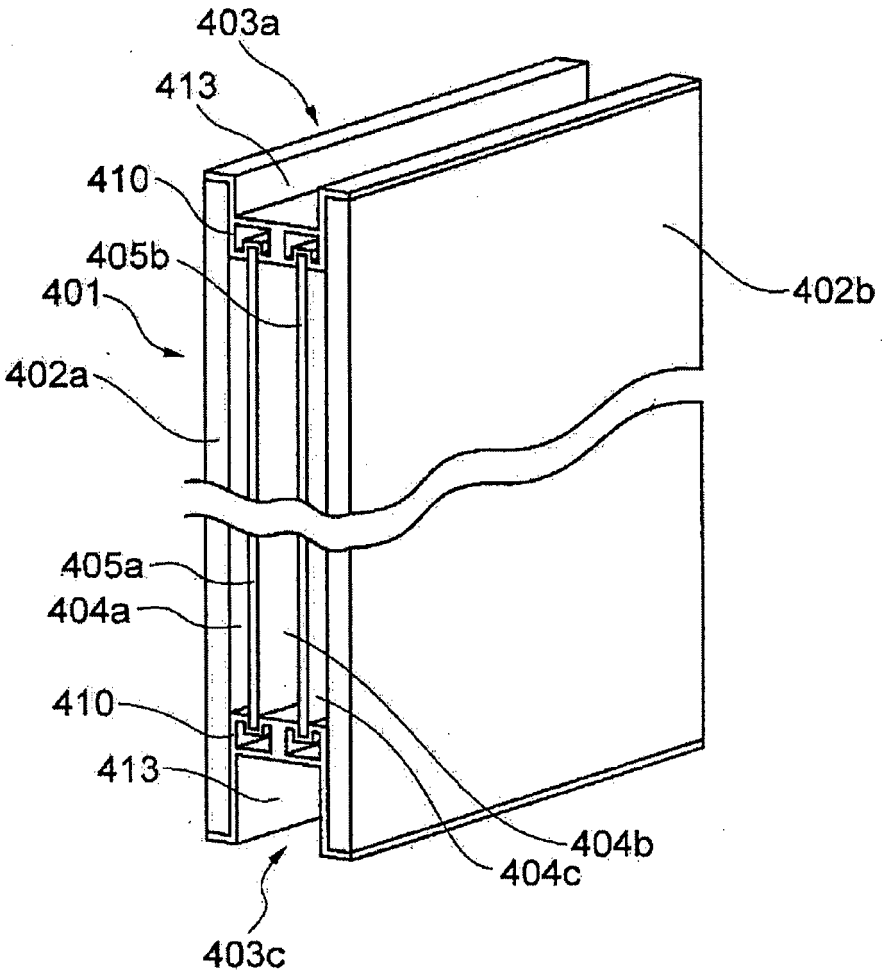

403a
413
410
405b
401
402a
402b
405a
404a
410
413
404b
404c
403c

Fig. 64

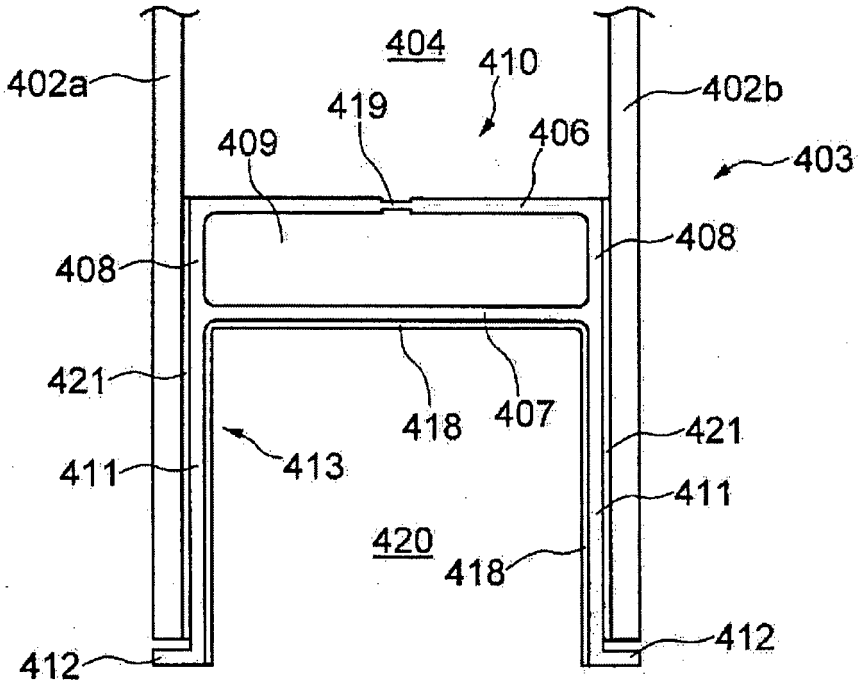

404
410
402a
402b
419
409
406
403
408
408
421
418
407
421
411
413
411
420
418
412
412

Fig. 65

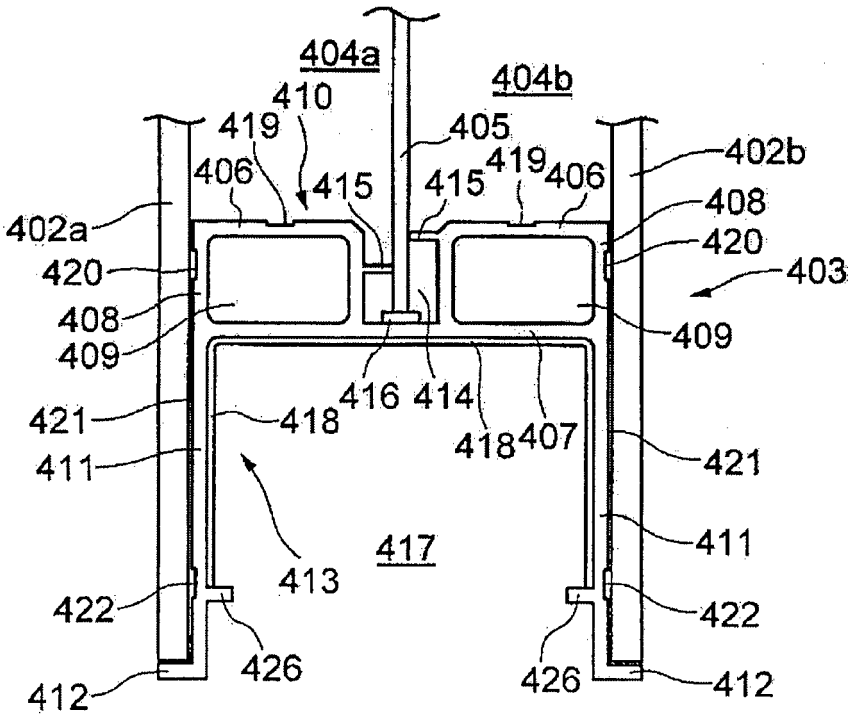

404a
404b
410
419
405
402b
406
415
415
419
406
402a
408
420
420
403
408
409
409
416
414
421
418
418
407
421
411
411
417
413
422
422
426
426
412
412

Fig. 66

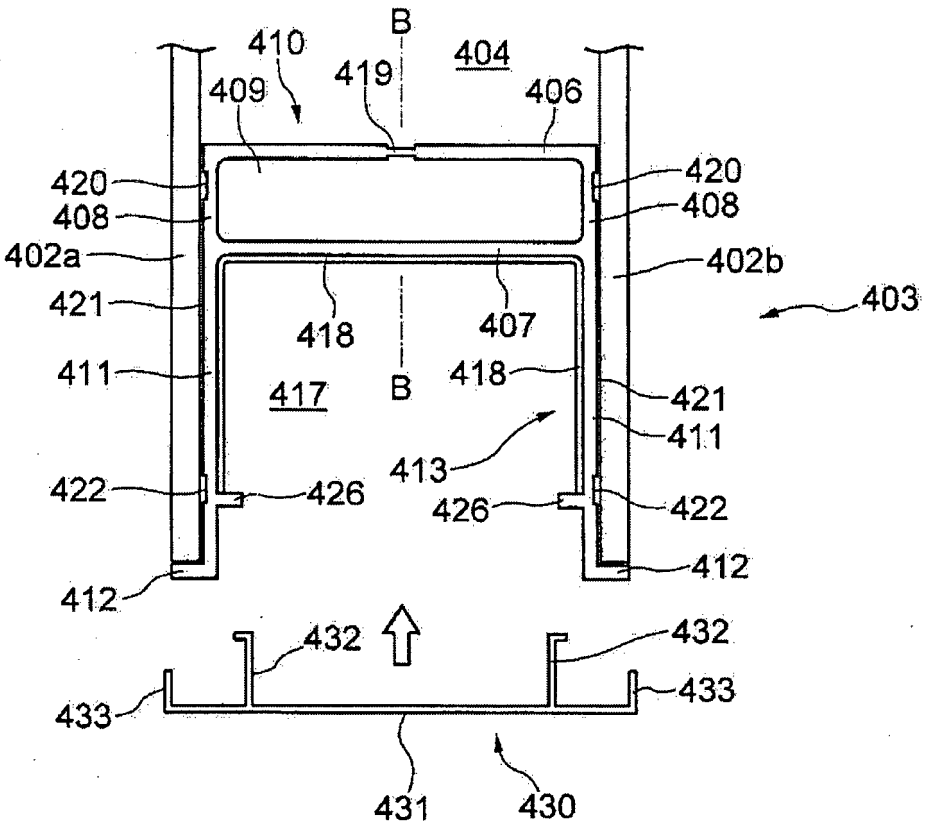

B
410
419
404
409
406
420
408
402a
421
411
420
408
402b
403
418
407
417
B
418
421
411
413
422
426
426
422
412
412
432
432
433
433
431
430

Fig. 67

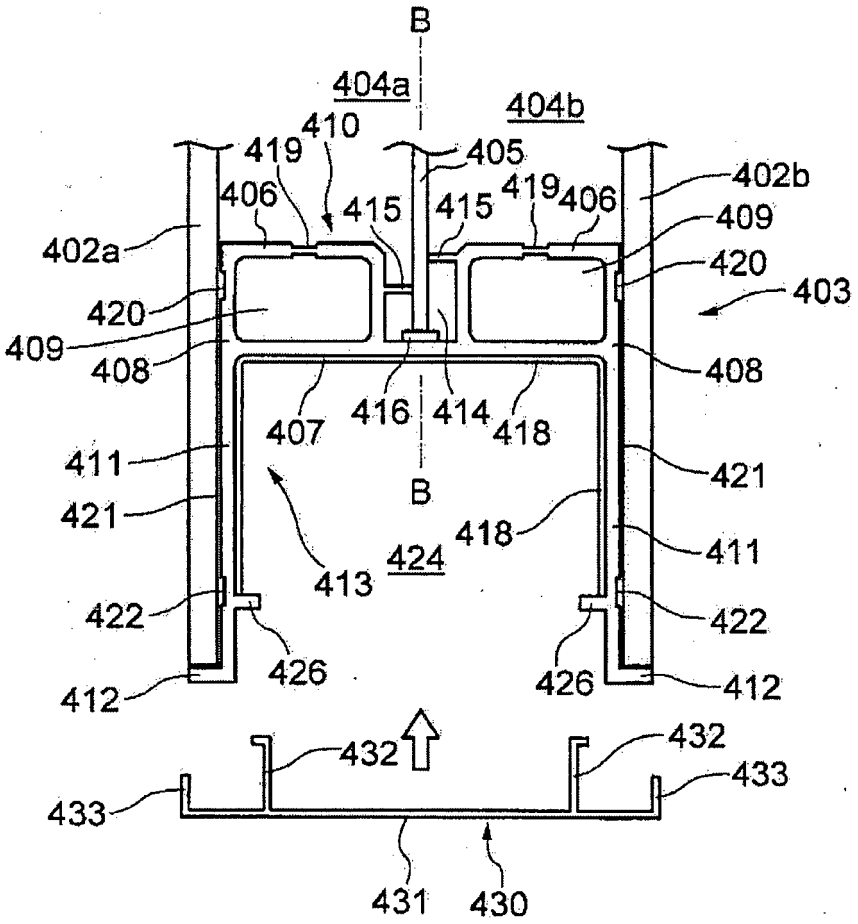

B
404a
404b
410
419
405
406
415
415
419
406
402b
409
402a
420
403
420
409
408
408
407
416
414
418
411
421
B
421
418
424
411
413
422
422
426
426
412
412
432
432
433
433
431
430

Fig. 68

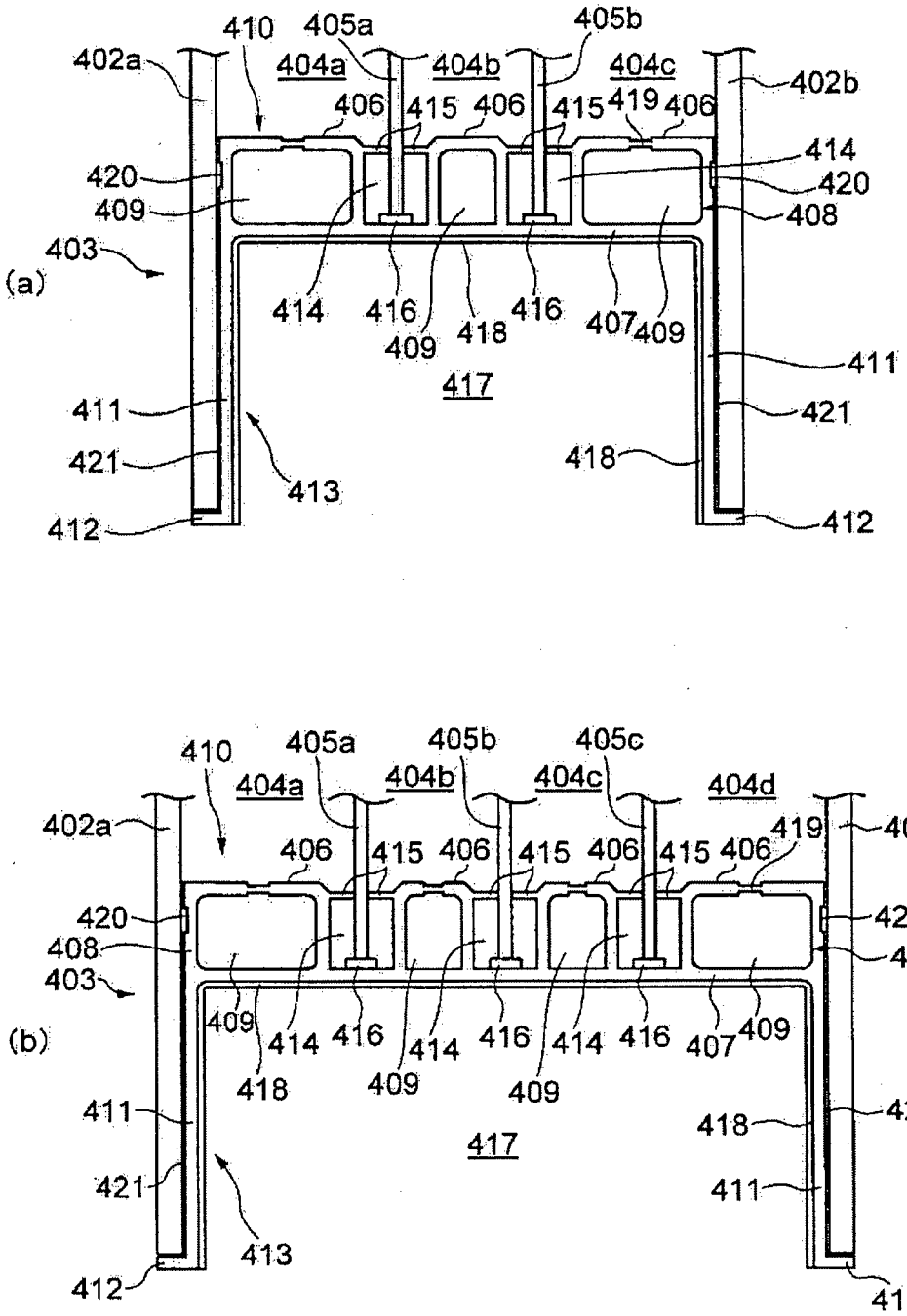

(a)
410
405a
405b
402a
404a
404b
404c
402b
406
415
406
415
419
406
414
420
420
409
408
403
414
416
409
418
416
407
409
411
417
411
421
421
413
418
412
412
(b)
410
405a
405b
405c
404a
404b
404c
404d
402a
406
415
406
415
406
415
406
419
402b
420
420
408
408
403
409
414
416
414
416
414
416
407
409
418
409
409
411
417
418
421
421
411
413
412
412

Fig. 69

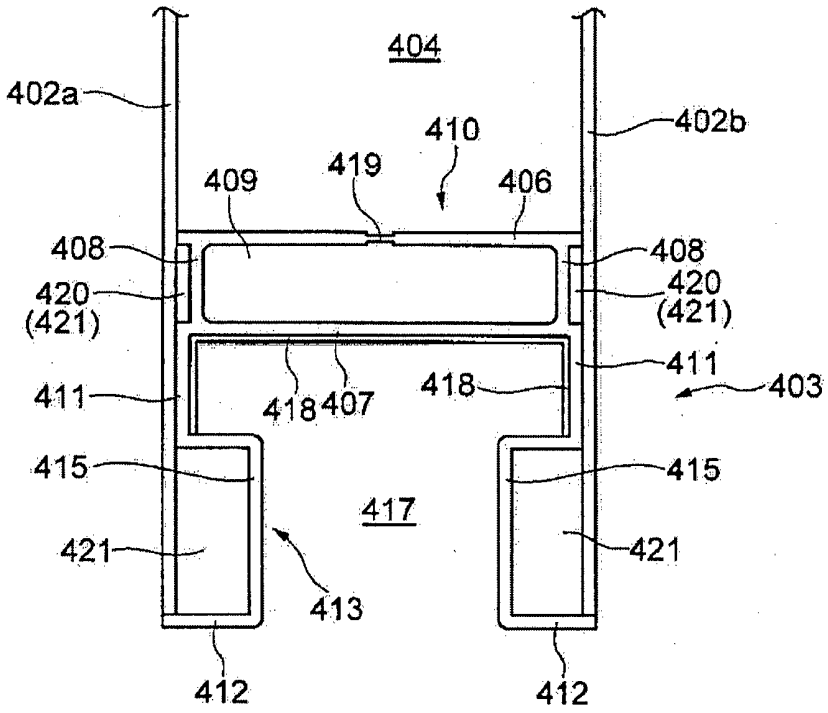

404
402a
402b
410
419
409
406
408
408
420
(421)
420
(421)
411
411
403
418
407
418
415
415
417
421
421
413
412
412

Fig. 70

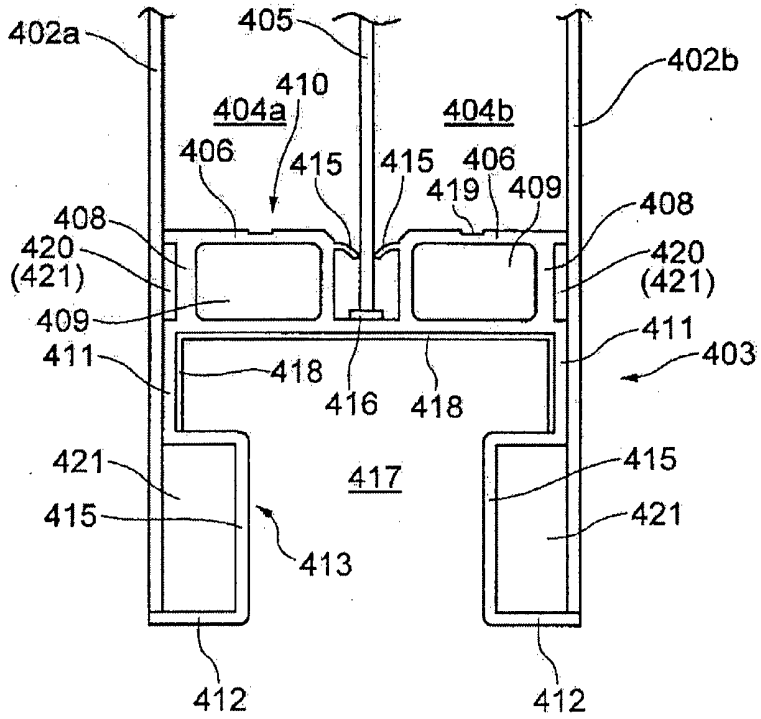

402a
405
402b
410
404a
404b
406
415
415
406
419
409
408
408
420
(421)
420
(421)
409
411
411
403
418
416
418
421
415
417
415
421
413
412
412

Fig. 71

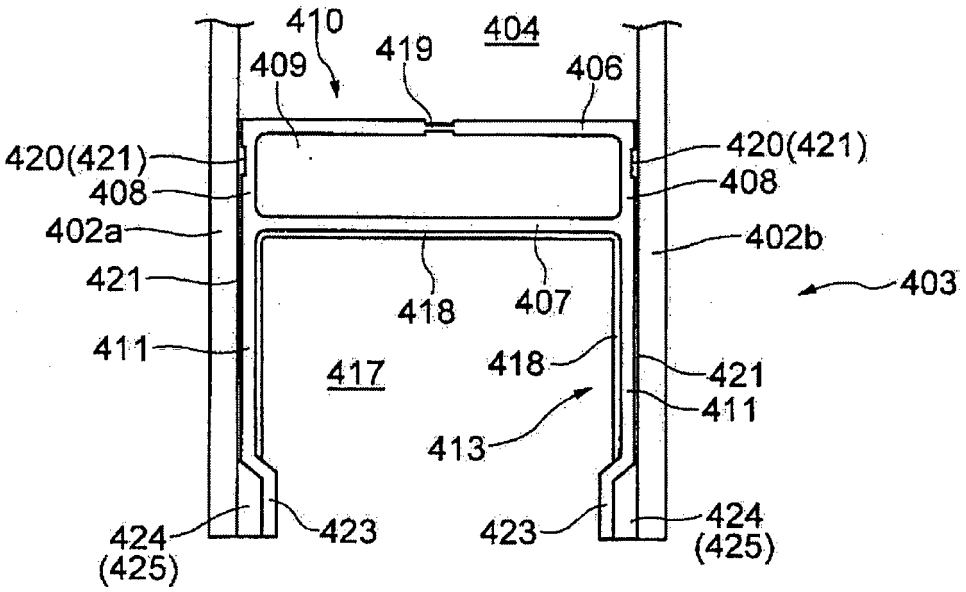

410
404
419
409
406
420(421)
408
402a
421
411
417
418
407
403
402b
420(421)
408
418
421
411
413
424
(425)
423
423
424
(425)

Fig. 72

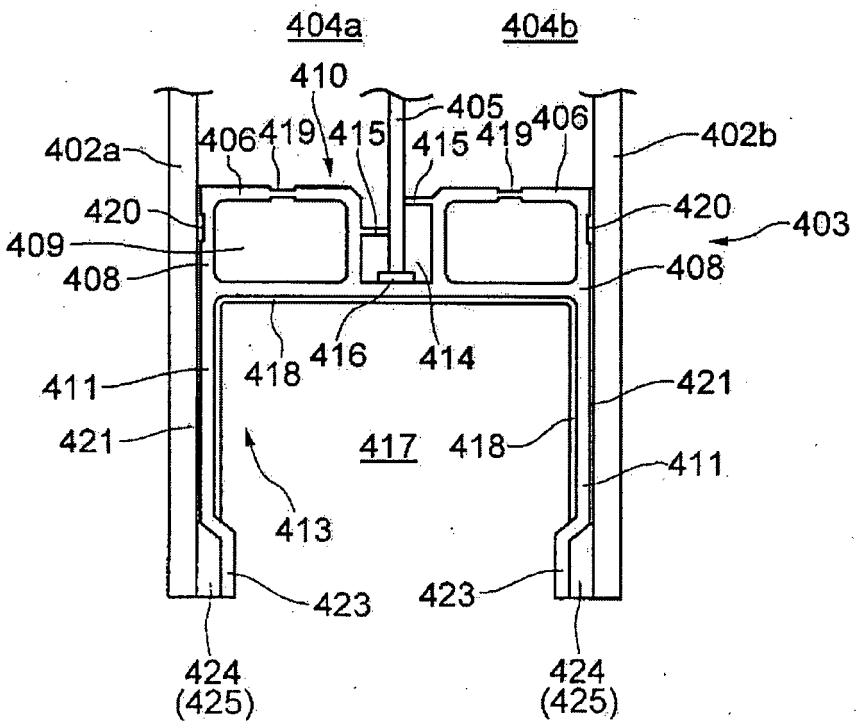

404a
404b
410
405
406
419
415
415
419
406
402a
402b
420
420
403
409
408
408
418
416
414
411
421
421
417
418
411
413
423
423
424
(425)
424
(425)

Fig. 73

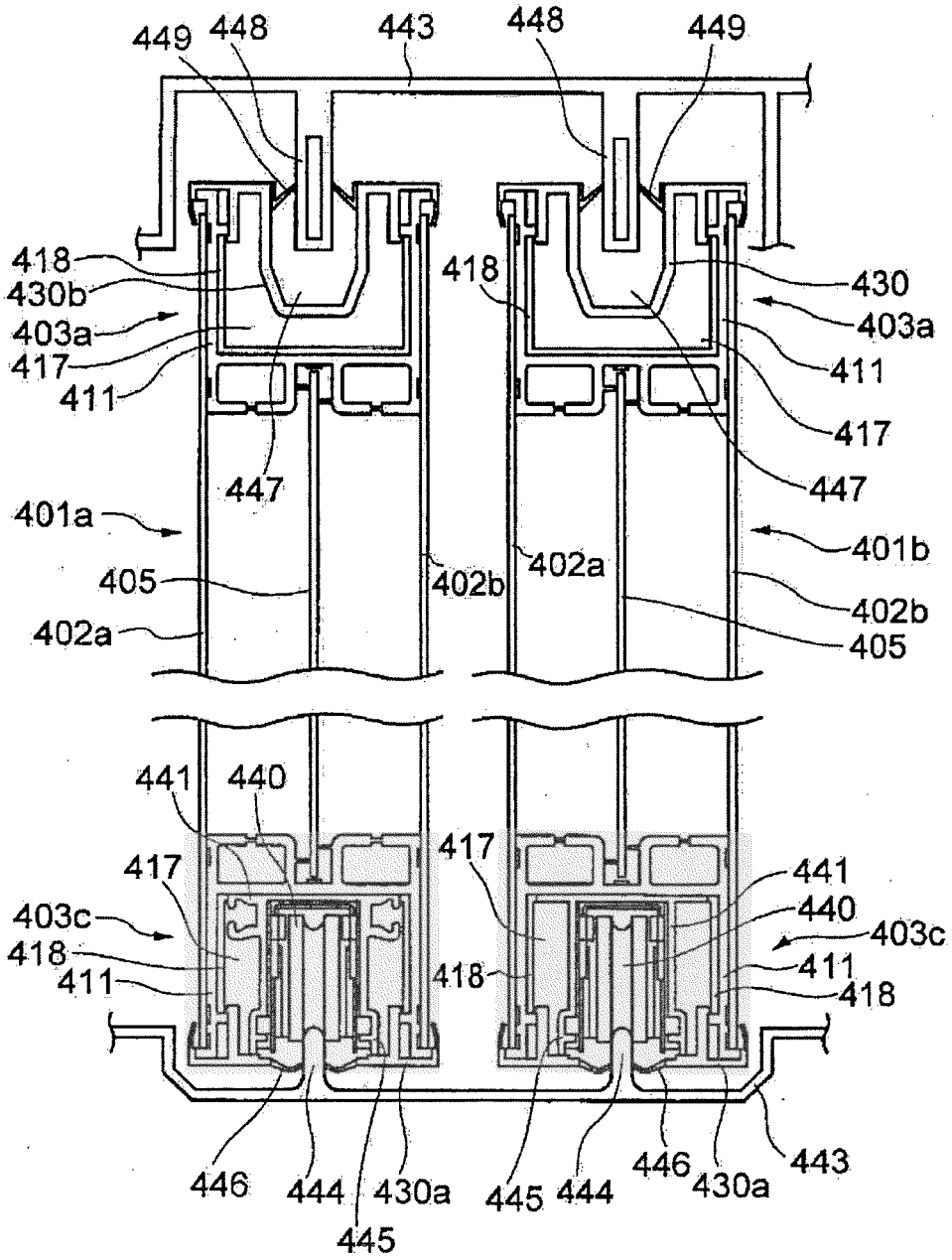

449
448
443
448
449
418
430b
403a
417
411
418
430
403a
411
417
447
447
401a
401b
405
402b
402a
402a
402b
405
441
440
417
417
441
440
403c
403c
418
411
418
411
418
446
444
430a
445
445
444
446
430a
443

Fig. 74

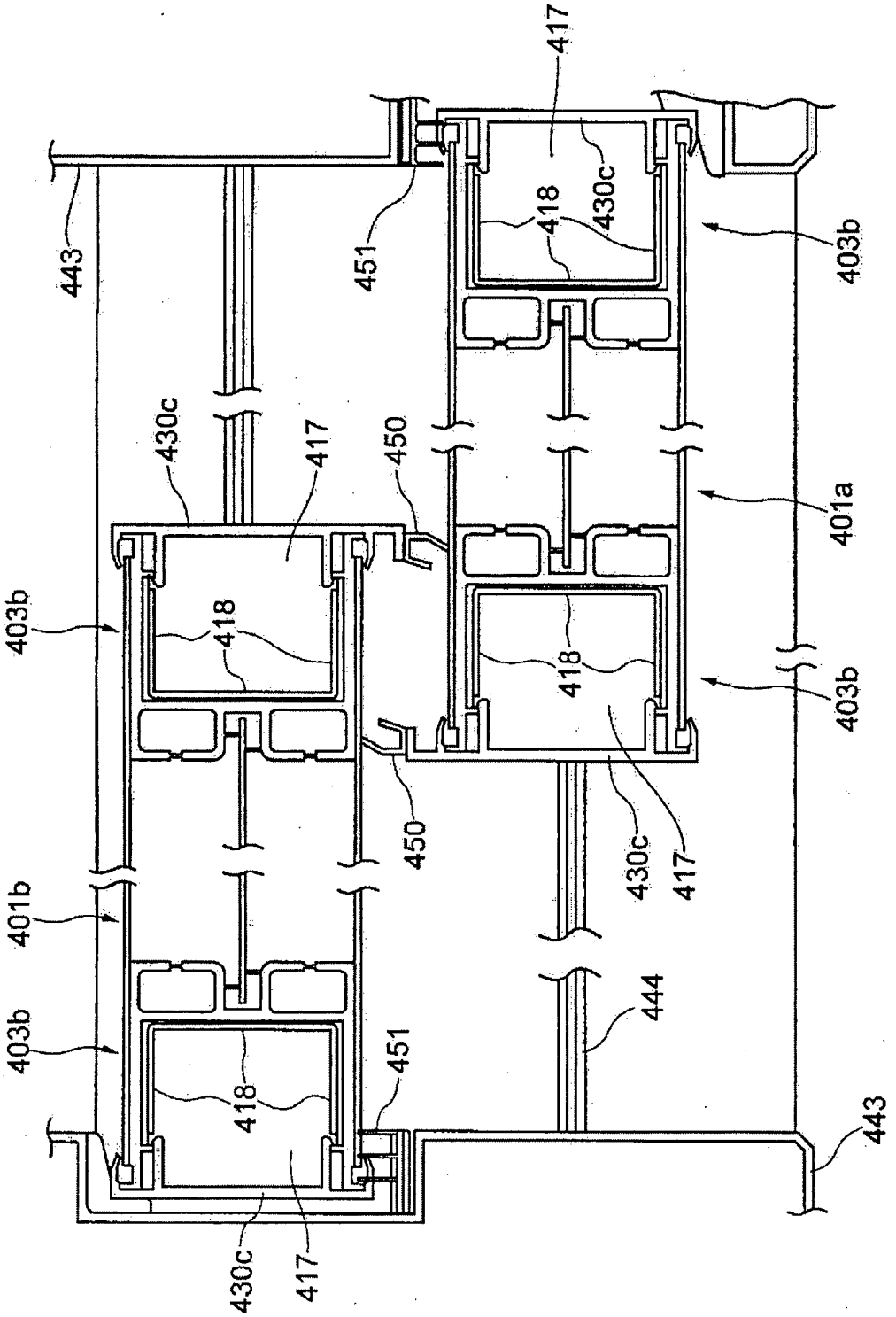

417
443
451
418
430c
403b
430c
417
450
401a
403b
418
418
403b
450
430c
417
401b
444
403b
451
418
443
430c
417

Fig. 75

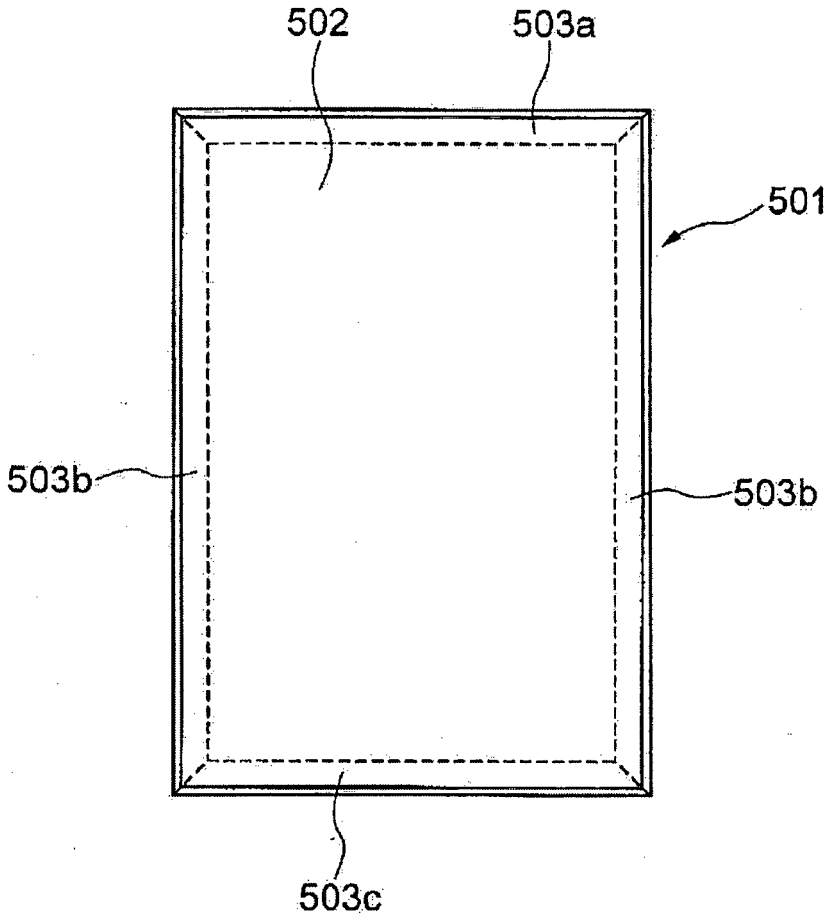


Fig. 76

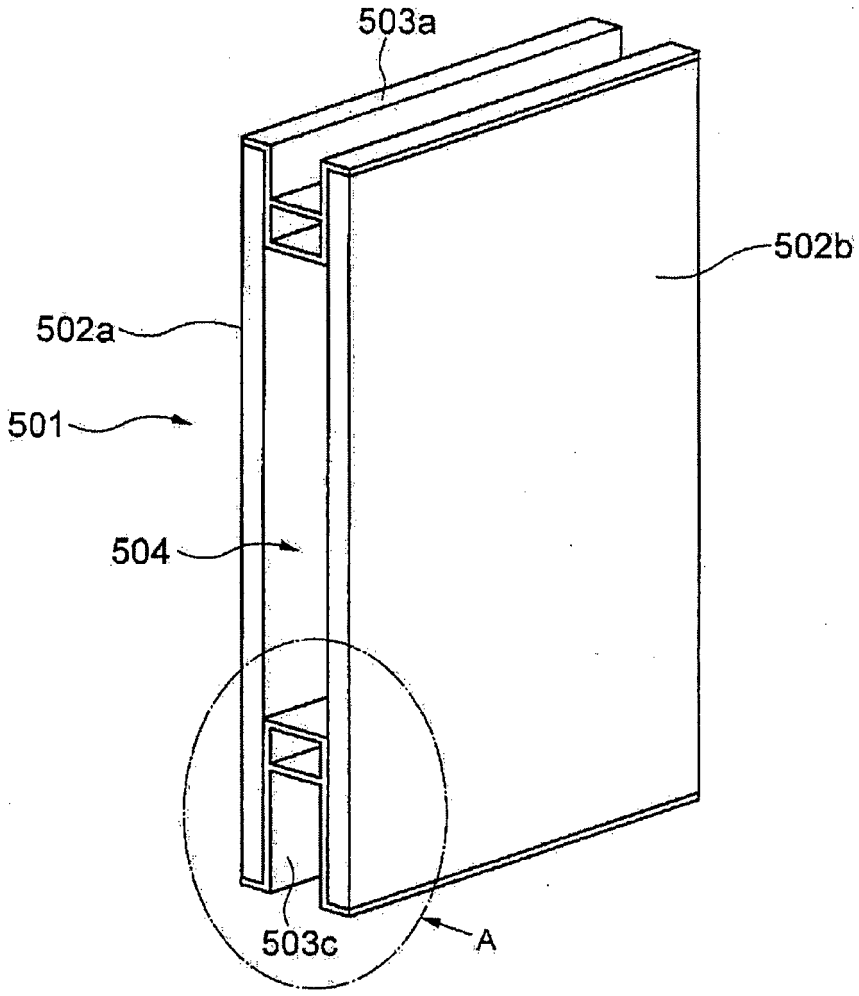


Fig. 77

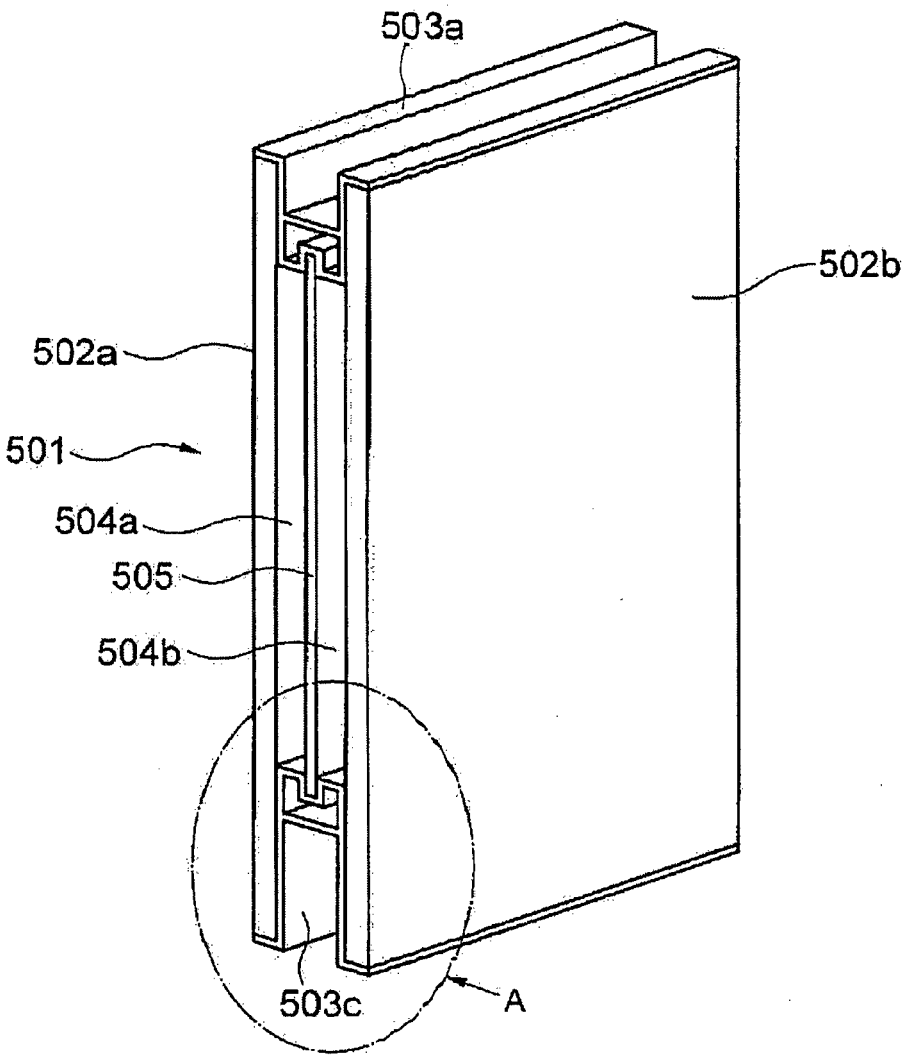


Fig. 78

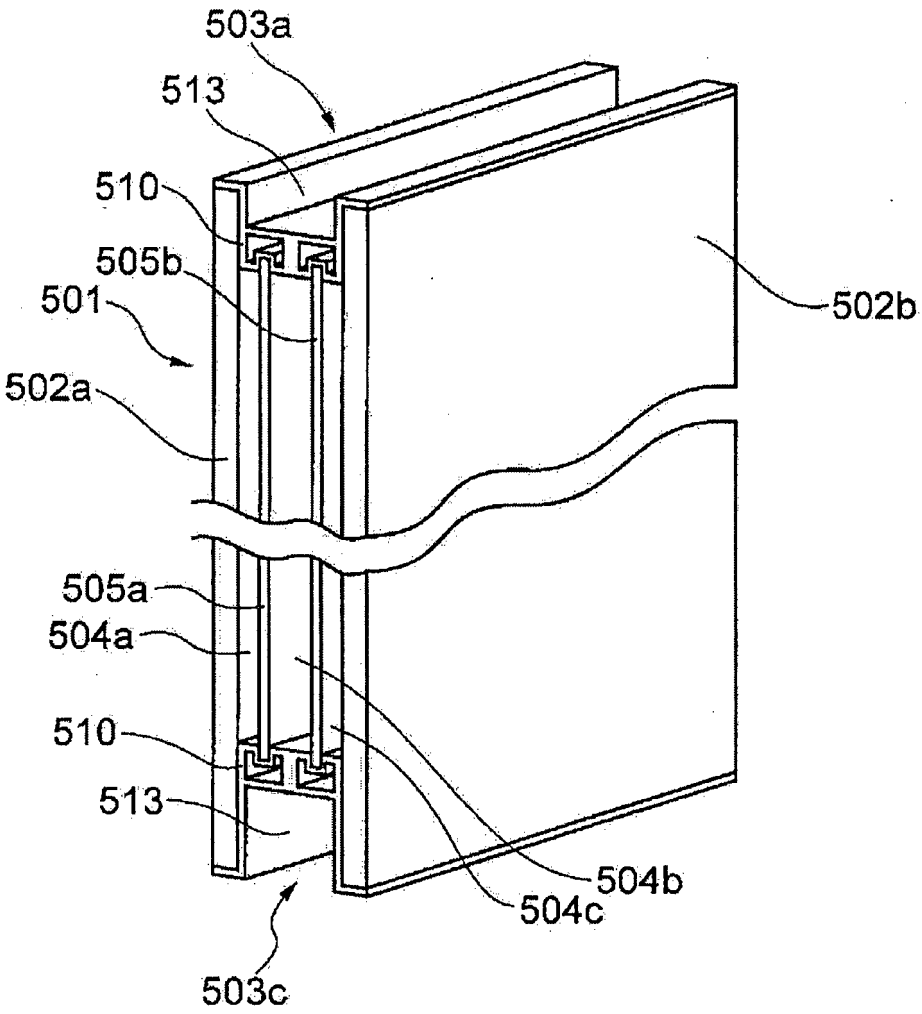

503a
513
510
505b
501
502a
502b
505a
504a
510
513
504b
504c
503c

Fig. 79

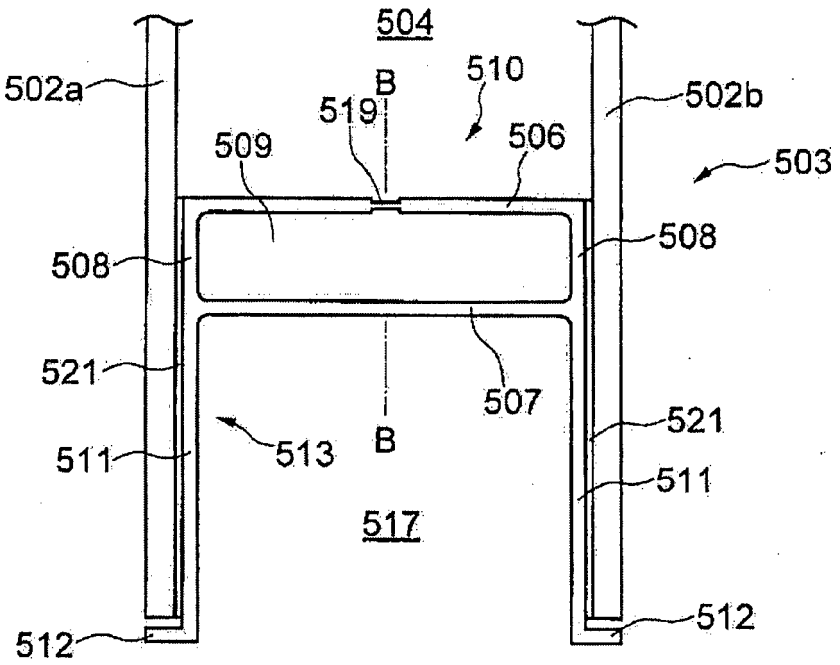

504
502a
B
510
519
502b
509
506
503
508
508
521
507
521
513
B
511
511
517
512
512

Fig. 80

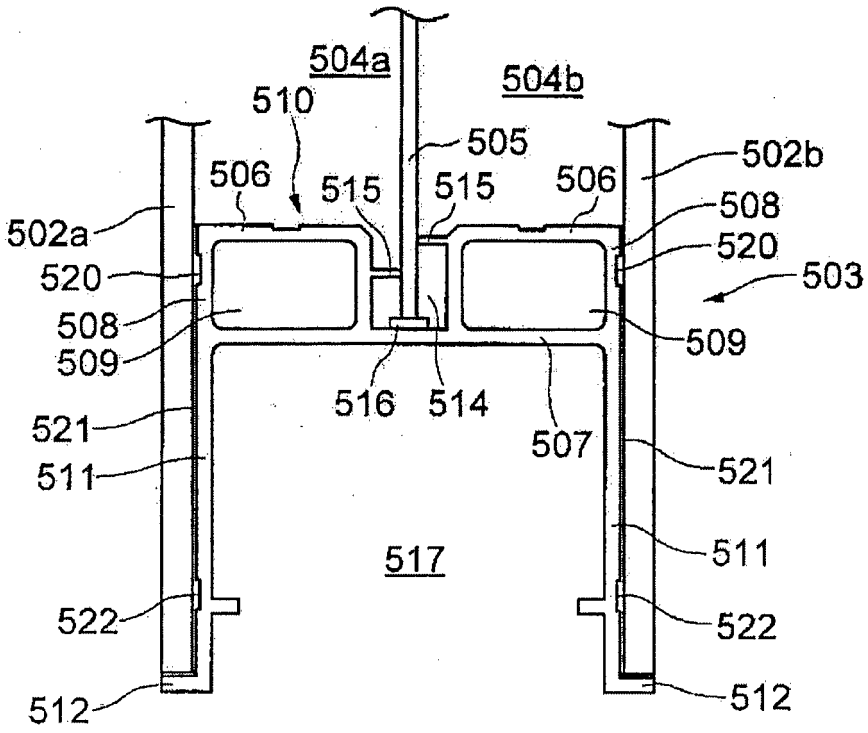
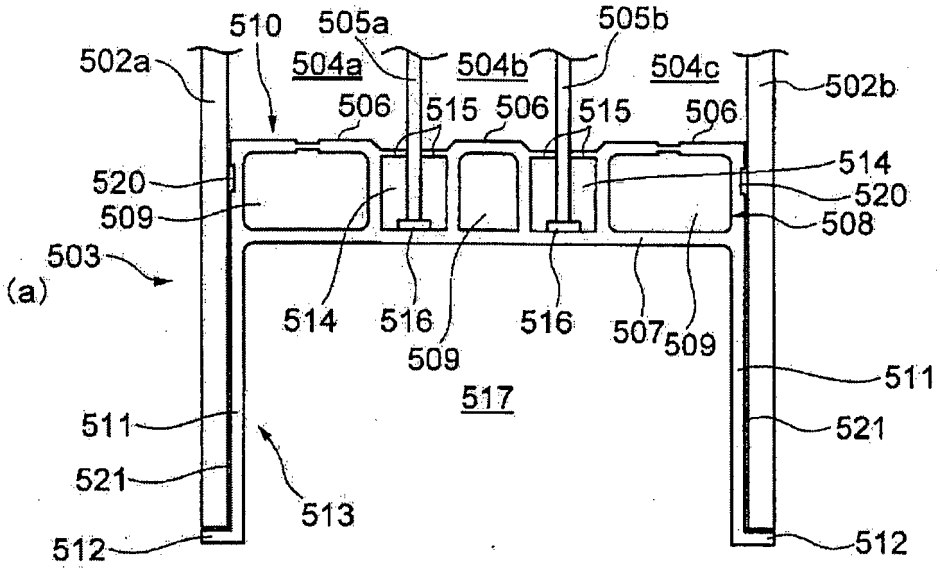

504a
504b
510
505
502b
506
515
515
506
502a
508
520
520
503
508
509
509
516
514
507
521
521
511
511
517
522
522
512
512

Fig. 81


(a)
510
505a
505b
502a
504a
504b
504c
502b
506
515
506
515
506
520
514
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503
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509
509
511
517
511
521
521
513
512
512

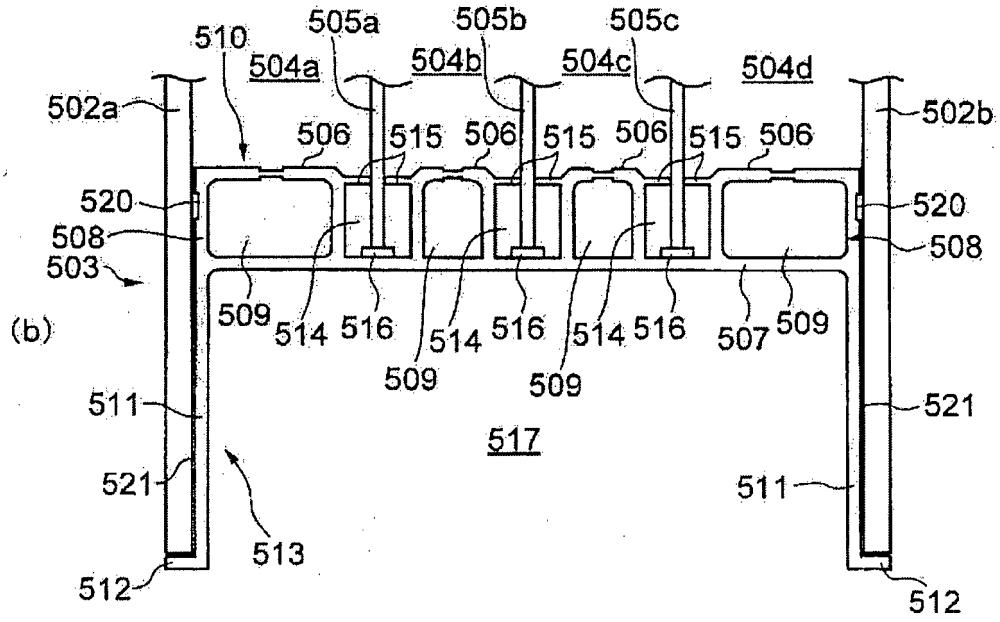
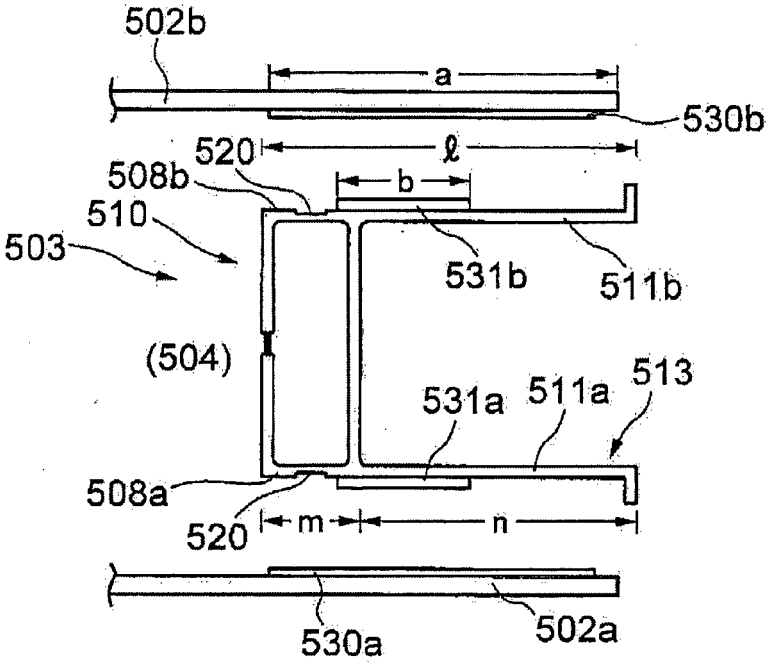

(b)
510
505a
505b
505c
504a
504b
504c
504d
502a
502b
506
515
506
515
506
515
506
520
520
508
508
503
509
514
516
514
516
514
516
507
509
509
509
511
517
521
521
511
513
512
512

Fig. 82

(a)


502b
a
530b
520
ℓ
508b
b
510
503
531b
511b
(504)
513
531a
511a
508a
520
m
n
530a
502a

(b)

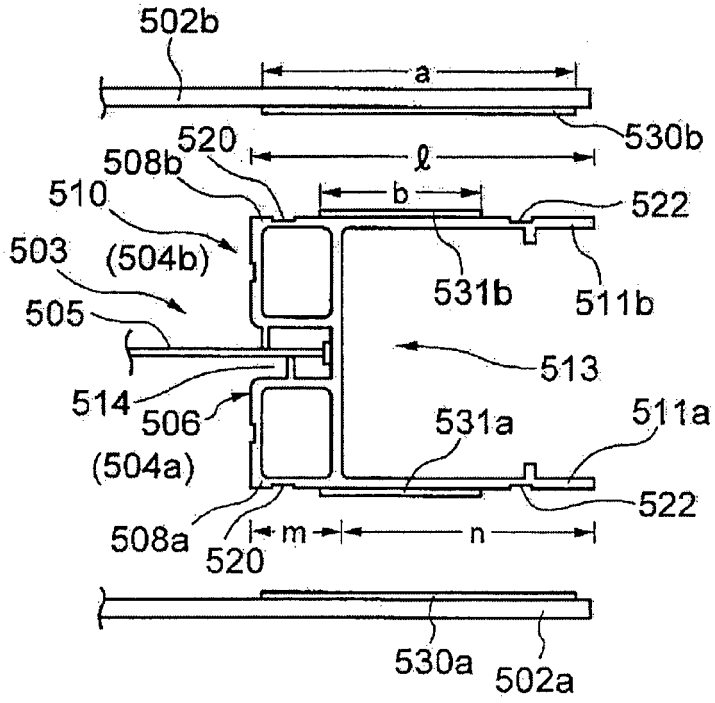
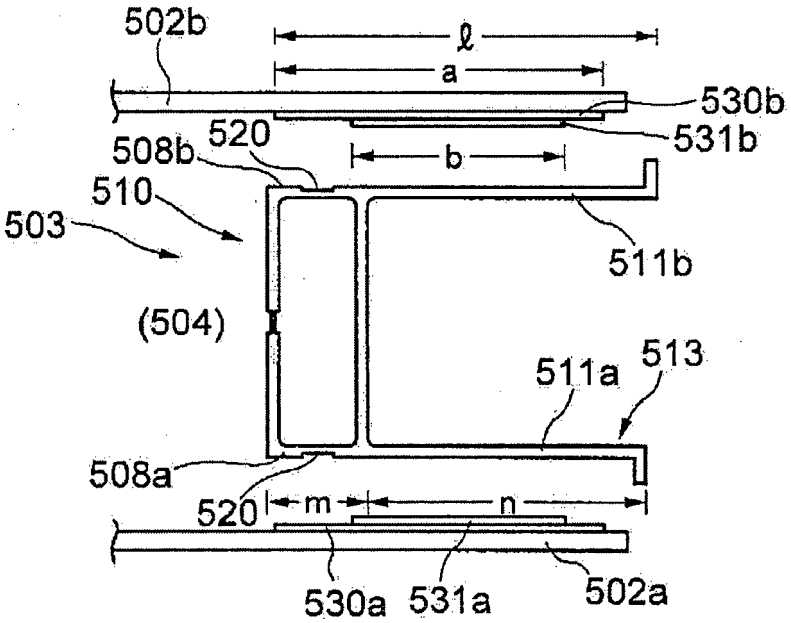

502b
a
530b
520
ℓ
508b
510
b
522
503
(504b)
531b
511b
505
513
514
506
531a
511a
(504a)
522
508a
520
m
n
530a
502a

Fig. 83

(a)


502b
ℓ
a
530b
531b
520
508b
b
510
503
511b
(504)
513
511a
508a
520
m
n
530a
531a
502a

(b)

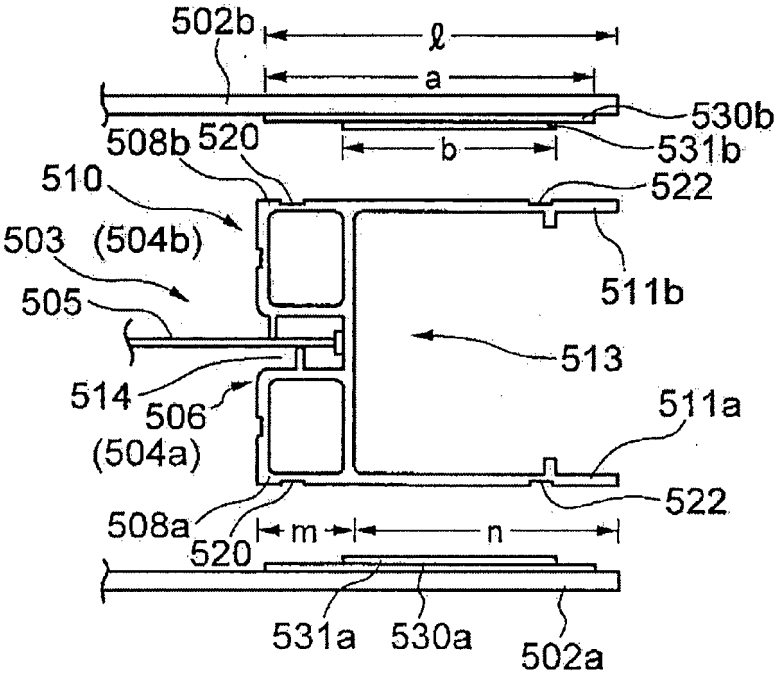

502b
ℓ
a
530b
508b
520
531b
b
510
522
503
(504b)
511b
505
513
514
506
(504a)
511a
522
508a
520
m
n
531a
530a
502a

Fig. 84

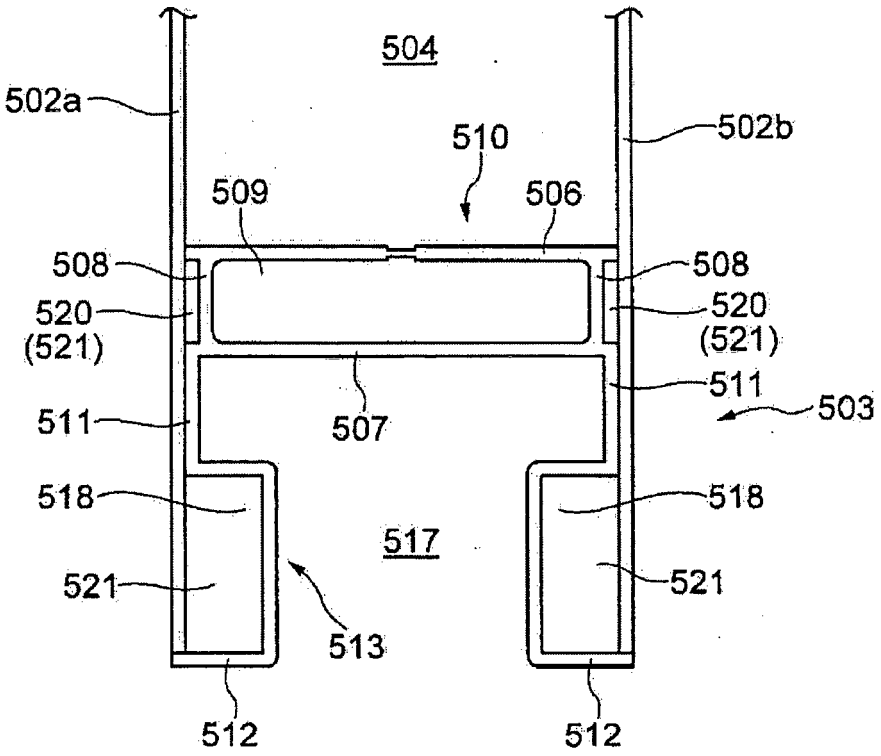

504
502a
510
502b
509
506
508
508
520
(521)
520
(521)
511
503
507
511
518
518
517
521
521
513
512
512

Fig. 85

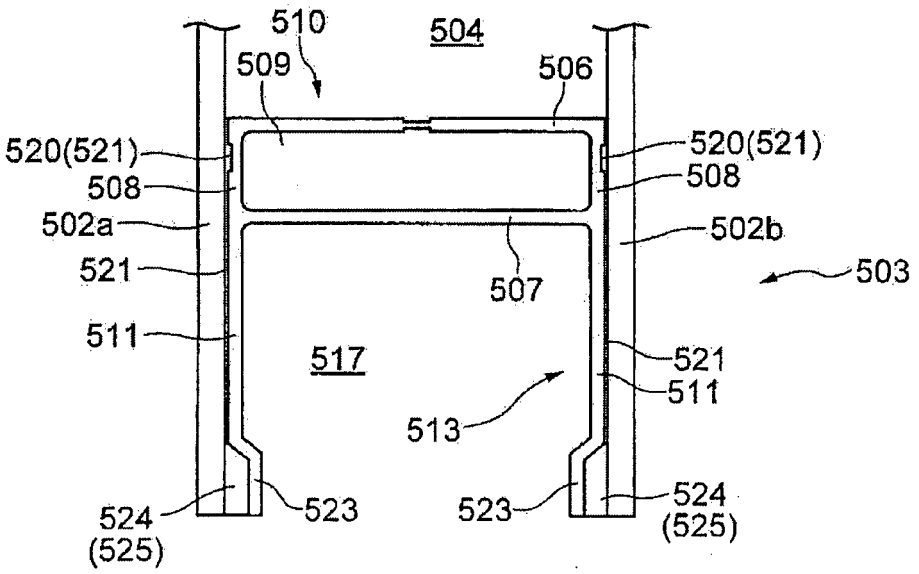

510
504
509
506
520(521)
520(521)
508
508
502a
502b
521
503
507
511
517
521
511
513
524
(525)
523
523
524
(525)

Fig. 86

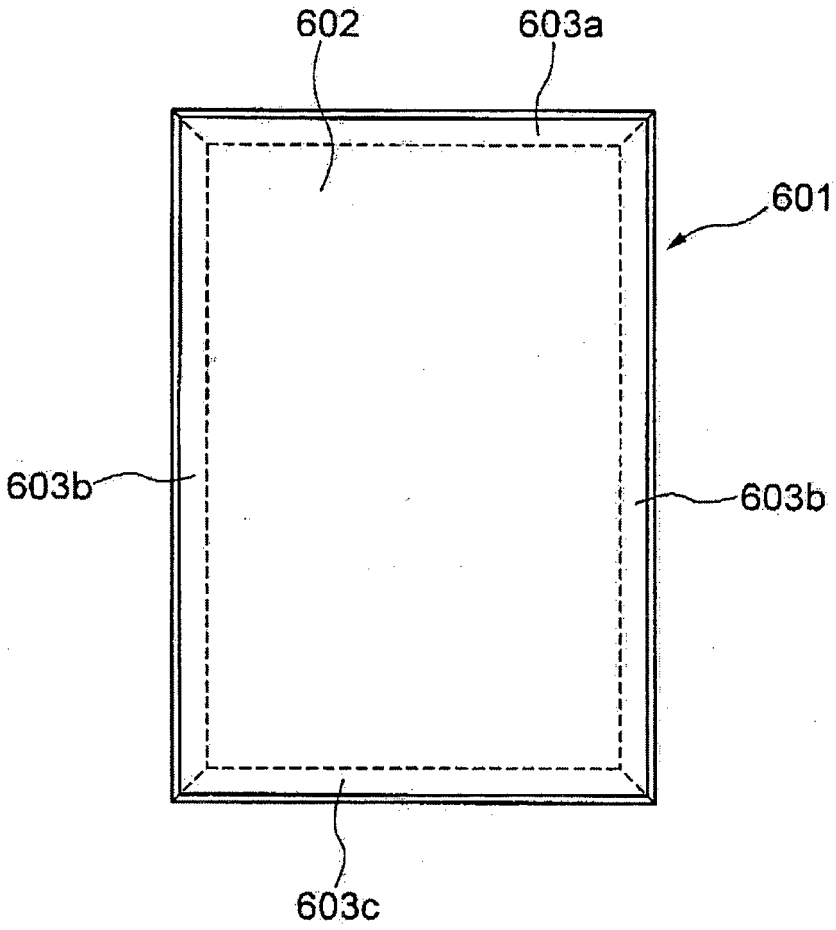


Fig. 87

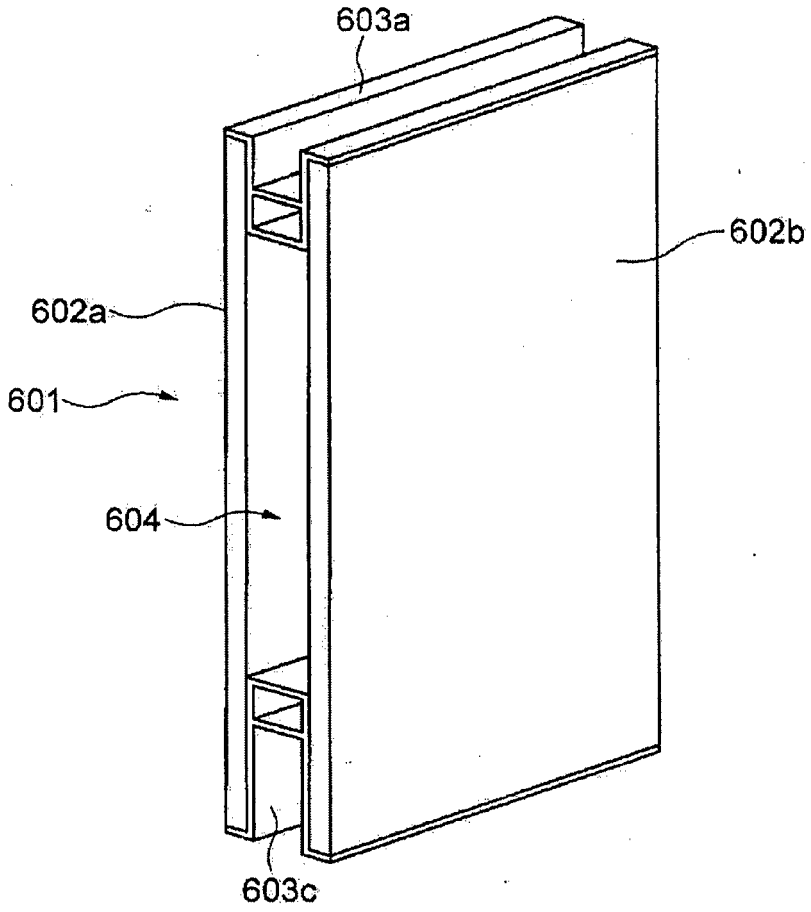


Fig. 88

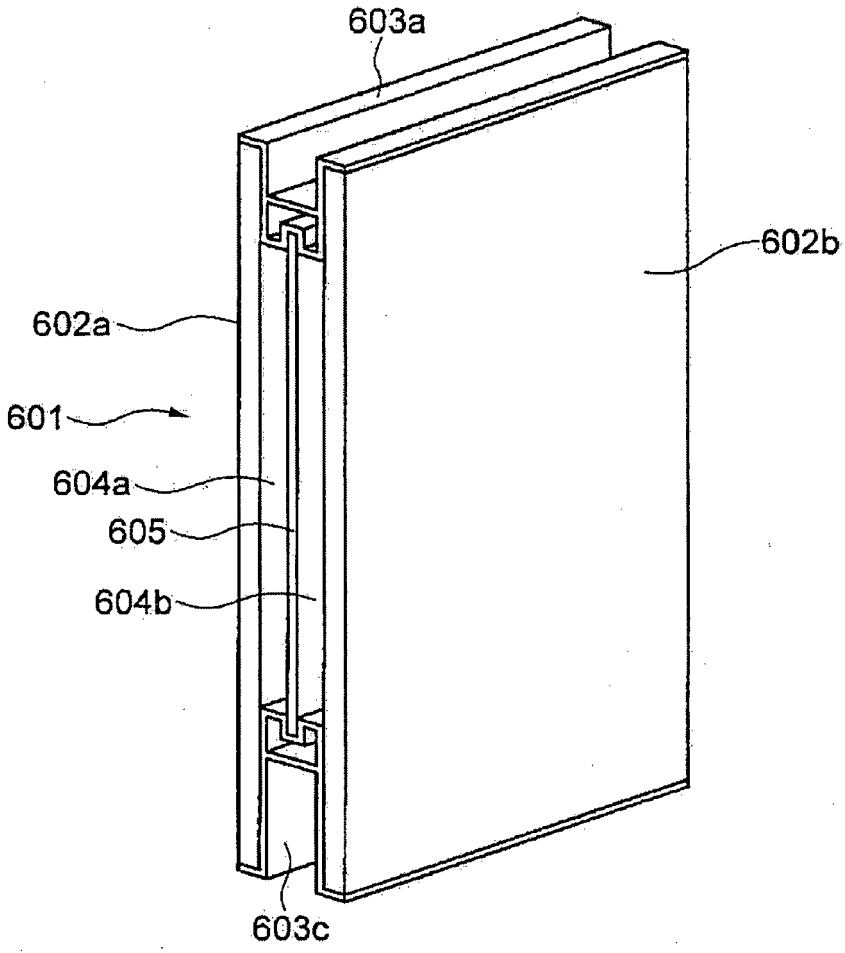


Fig. 89

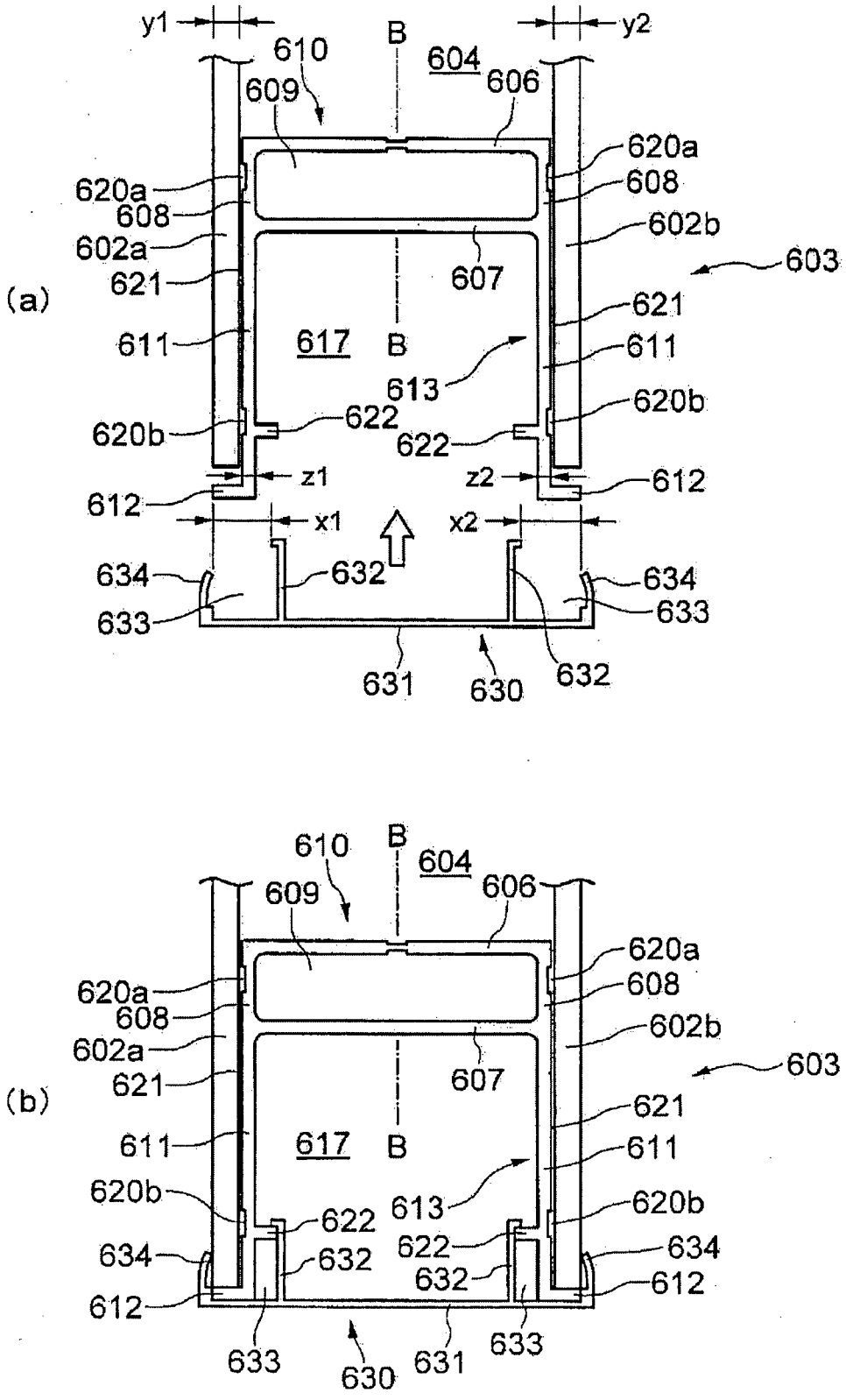

(a)
y1
y2
610
B
604
606
609
620a
608
602b
603
602a
621
607
611
617
613
620b
622
z1
z2
612
x1
x2
634
632
633
631
630
(b)
610
B
604
606
609
620a
608
602b
603
602a
621
607
611
617
613
620b
622
634
632
612
633
630
631

Fig. 90

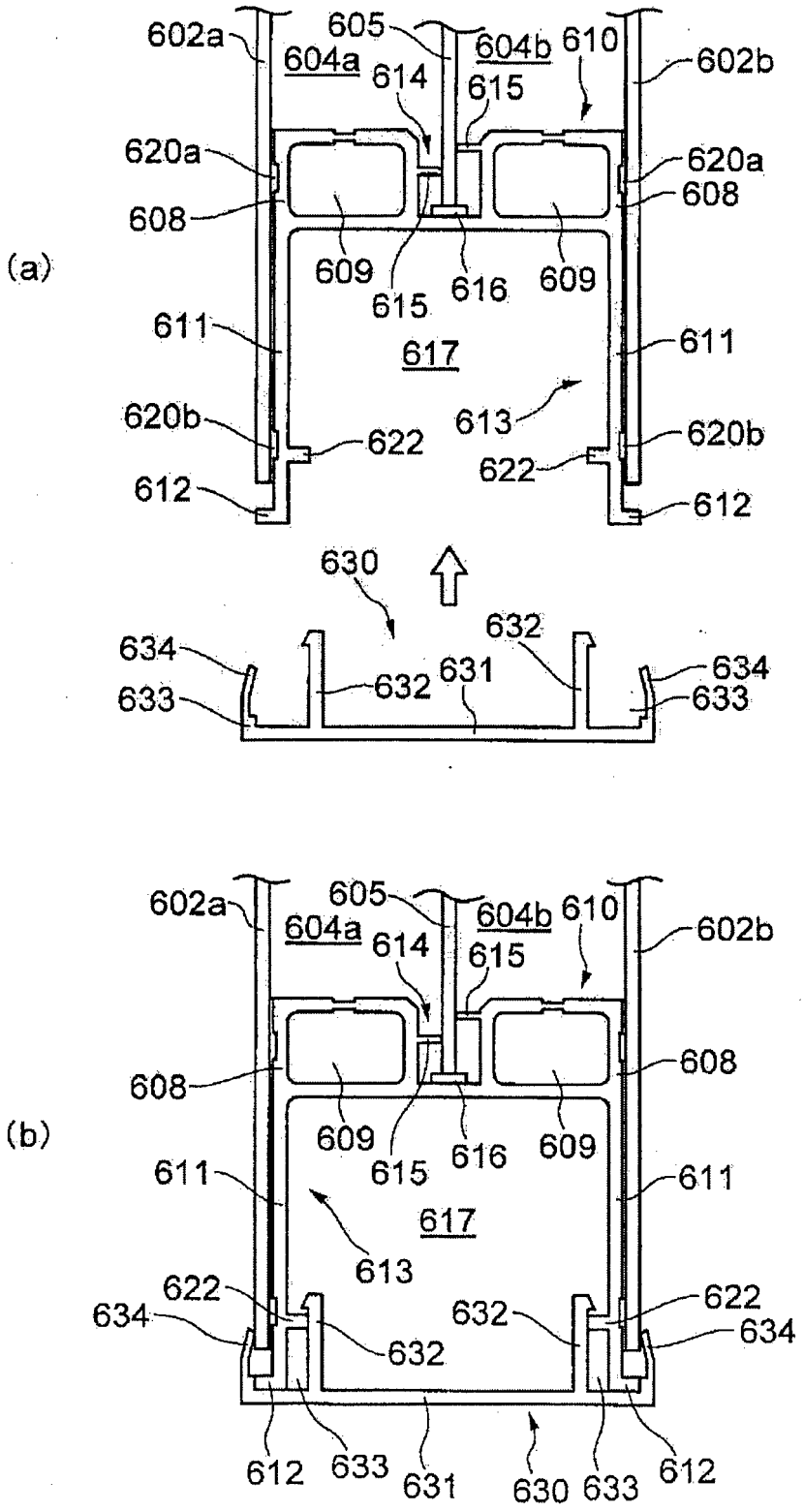

(a)
602a
605
604b
610
602b
604a
614
615
620a
620a
608
608
609
615
616
609
611
617
611
620b
613
620b
622
622
612
612
630
632
634
634
632
631
633
633
(b)
602a
605
604b
610
602b
604a
614
615
608
608
609
615
616
609
611
611
617
613
622
622
634
632
632
634
612
633
631
630
633
612

Fig. 91

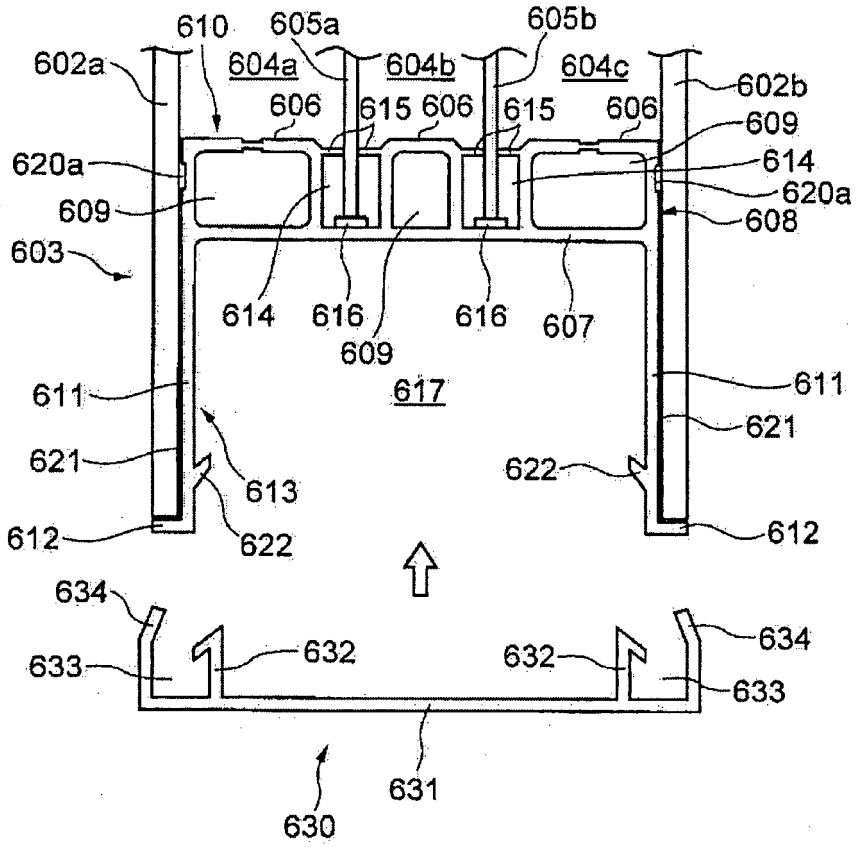

610
605a
605b
602a
604a
604b
604c
602b
606
615
606
615
606
609
620a
614
620a
609
608
603
614
616
616
607
609
617
611
611
621
621
622
613
612
622
612
634
634
633
632
632
633
631
630

Fig. 92

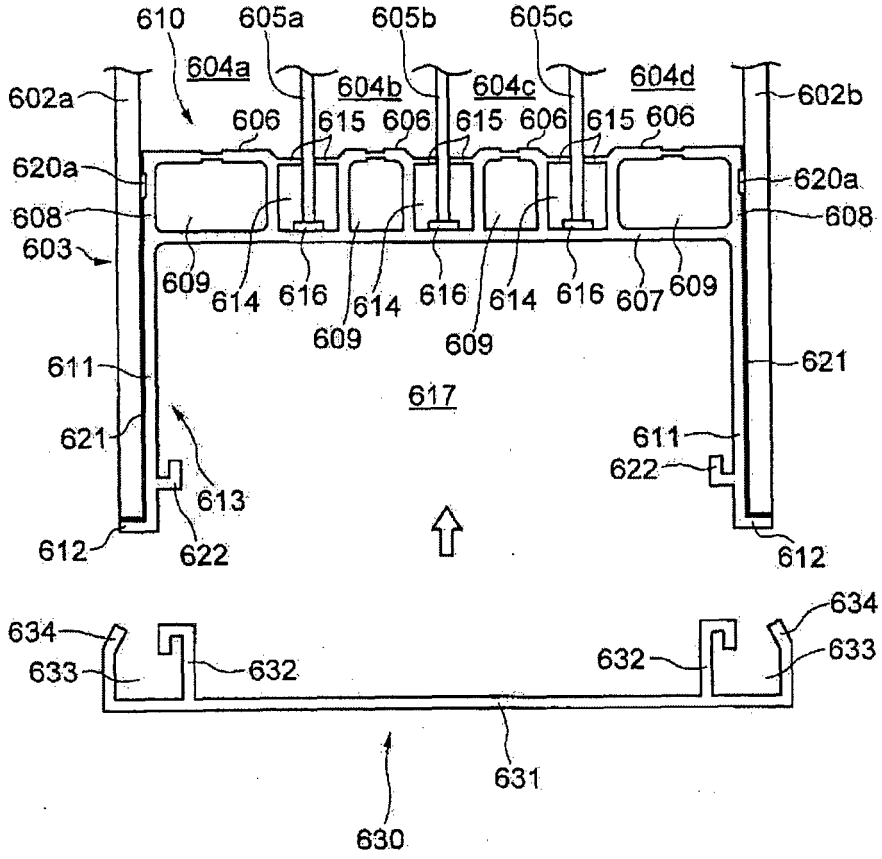

610
605a
605b
605c
604a
604b
604c
604d
602a
602b
606
615
620a
608
603
609
614
616
607
611
621
617
622
613
612
634
633
632
631
630

Fig. 93

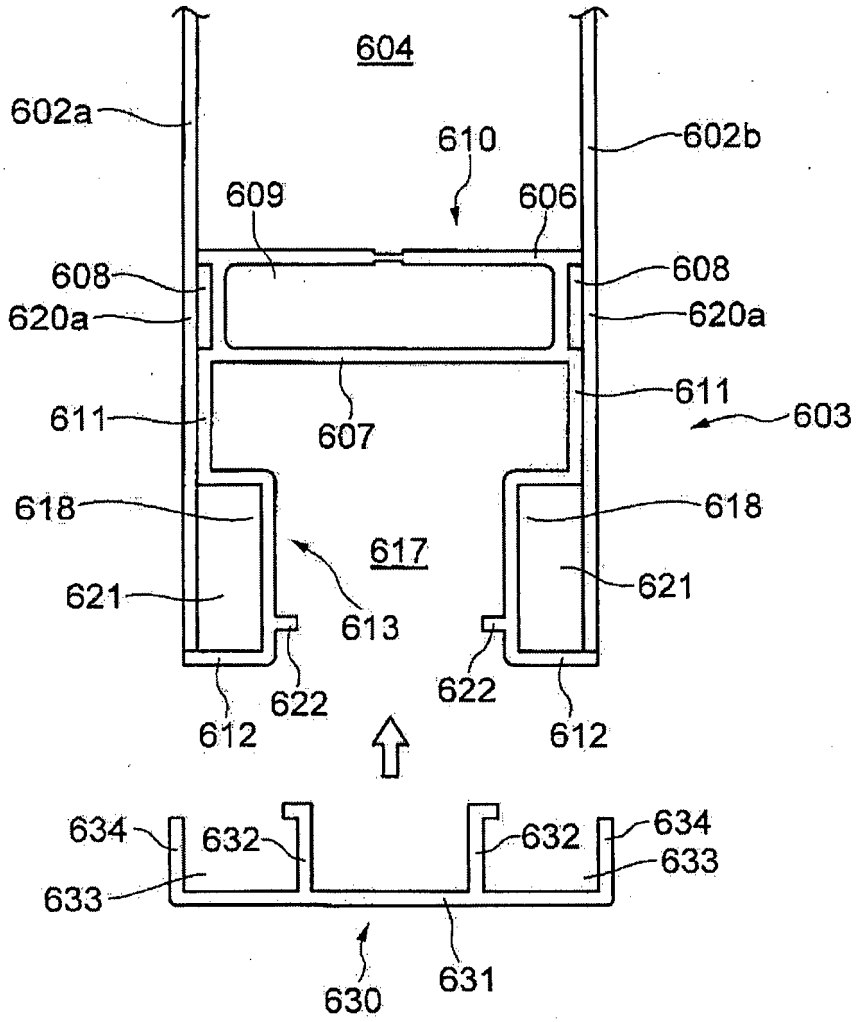

604
602a
610
602b
609
606
608
608
620a
620a
611
611
607
603
618
618
617
621
621
613
622
622
612
612
634
632
632
634
633
633
630
631

Fig. 94

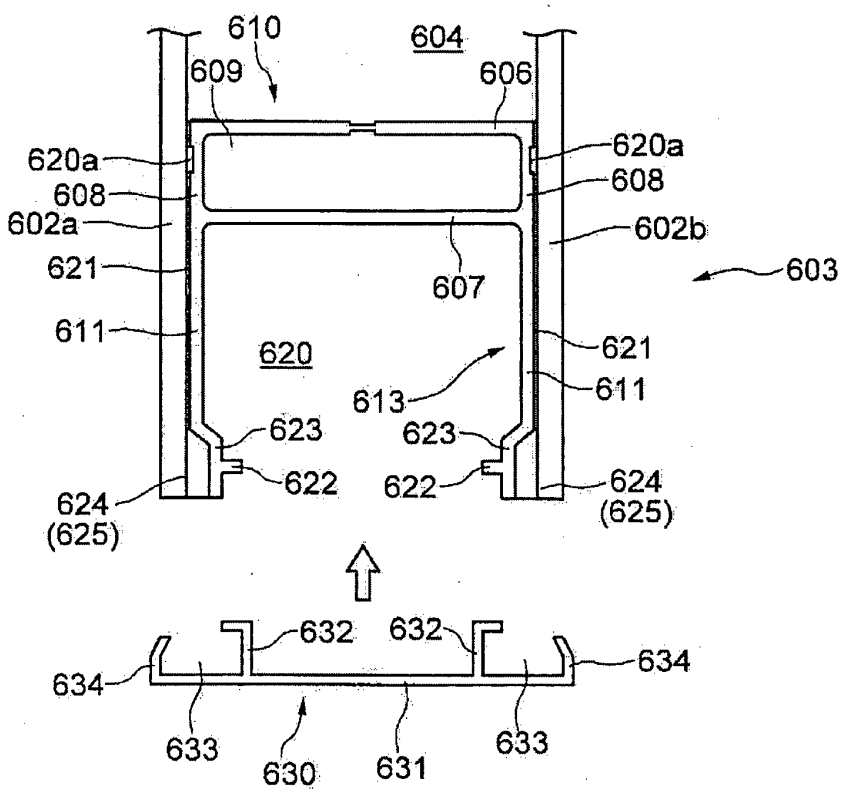

610
604
609
606
620a
608
602a
621
611
620
613
623
622
624
(625)
620a
608
602b
603
607
621
611
623
622
624
(625)
632
632
634
634
633
630
631
633

Fig. 95

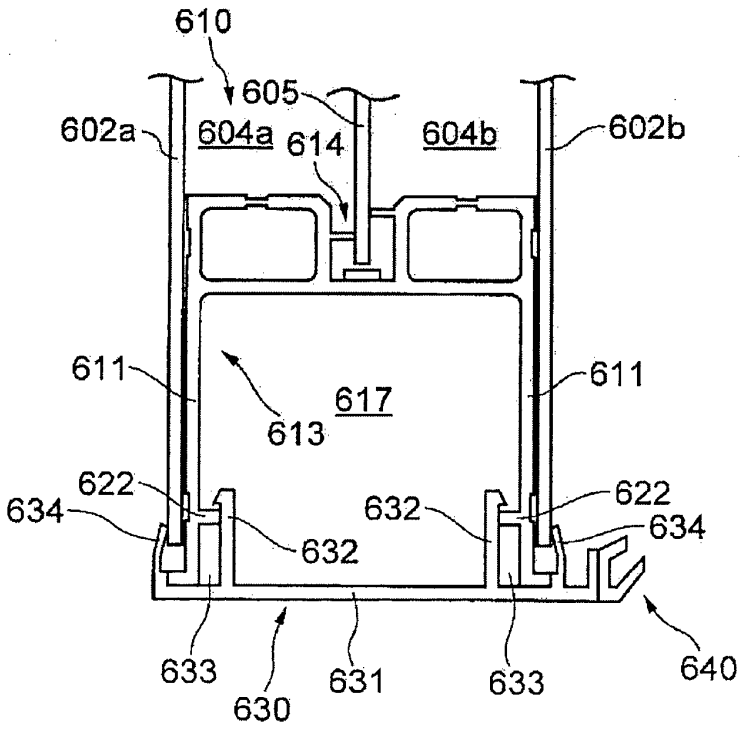

610
605
602a
604a
614
604b
602b
611
613
617
611
622
634
632
632
622
634
633
630
631
633
640

Fig. 96

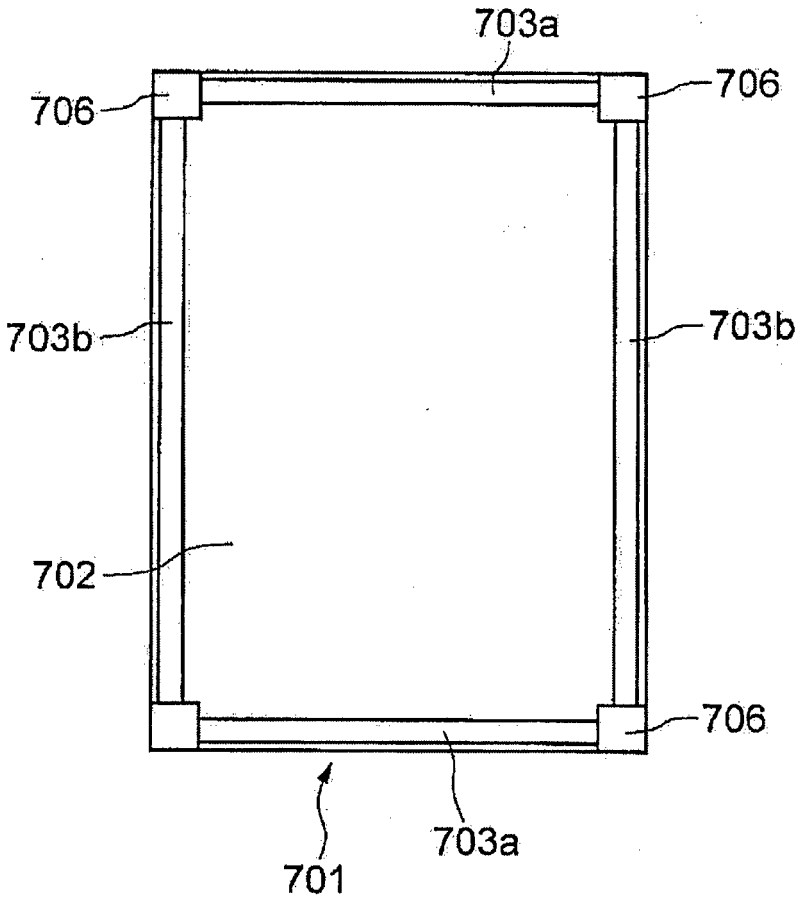


Fig. 97

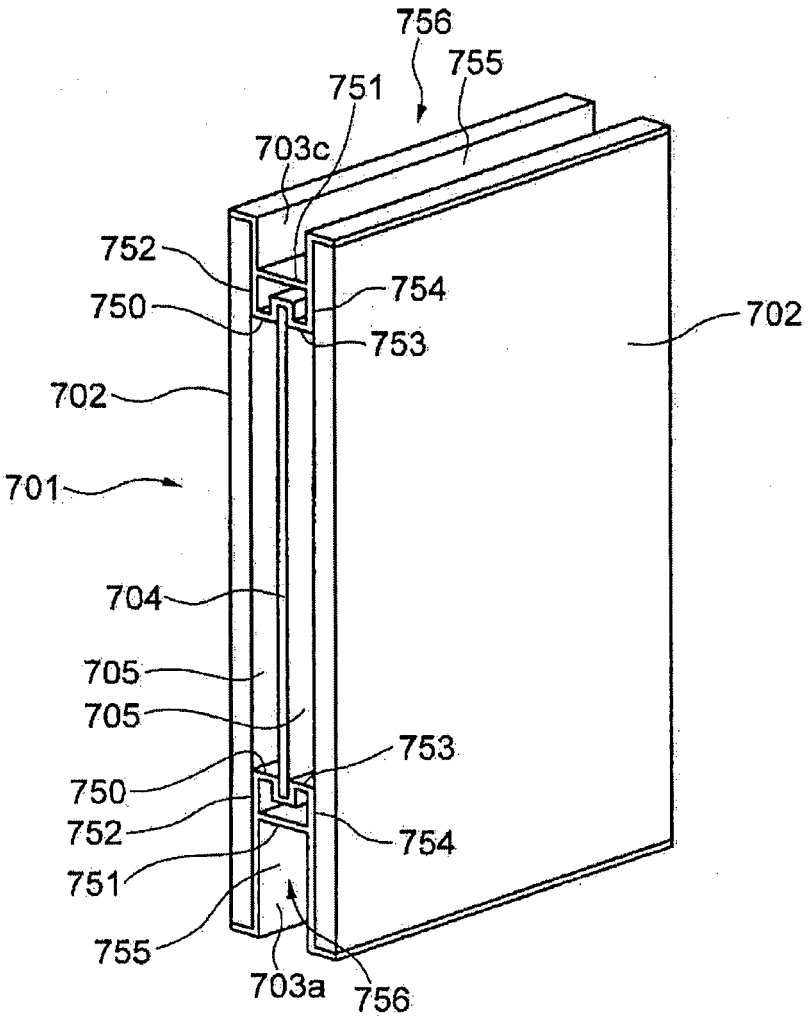

756
755
751
703c
752
754
750
753
702
702
701
704
705
705
753
750
752
754
751
755
703a
756

Fig. 98

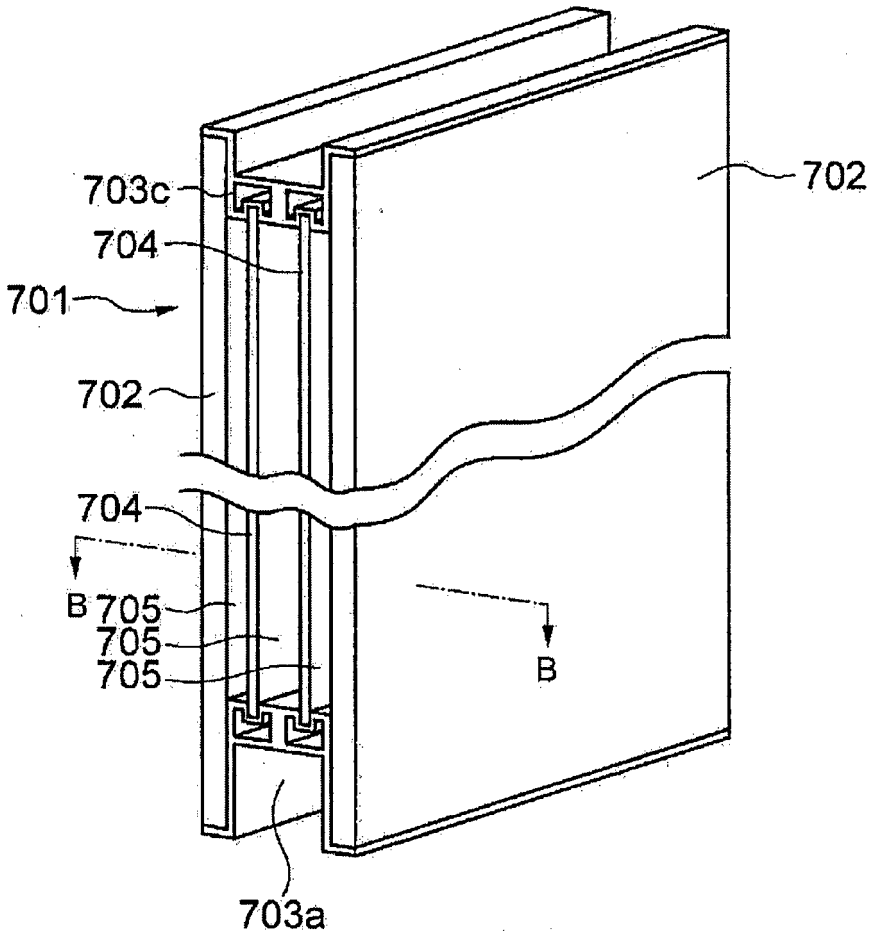
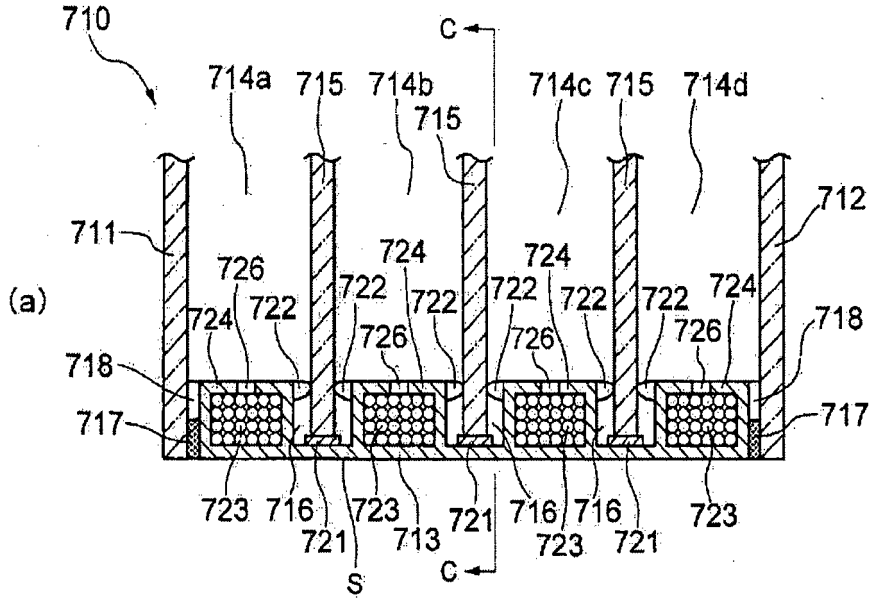


Fig. 99


(a)
710
714a
715
714b
715
714c
715
714d
712
711
726
724
722
724
722
722
722
722
724
724
722
726
726
726
718
718
717
717
723
716
721
723
721
713
S
C
C
721
716
723
716
721
723

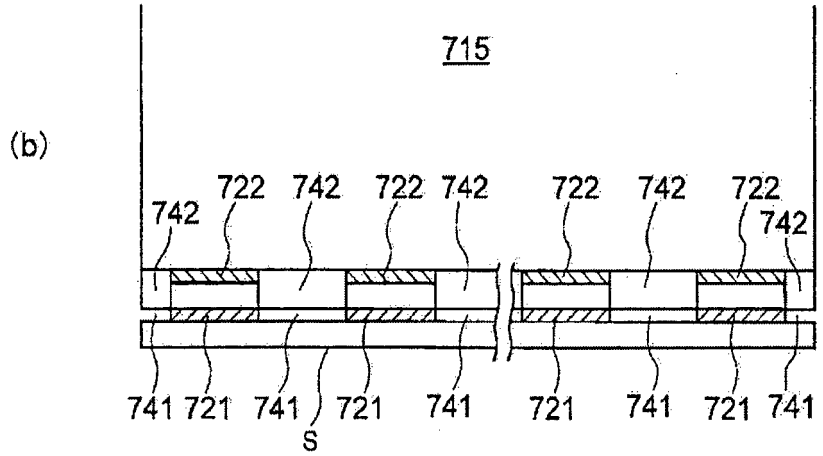

(b)
715
742
722
742
722
742
722
742
722
742
741
721
741
721
741
721
741
721
741
S

Fig. 100

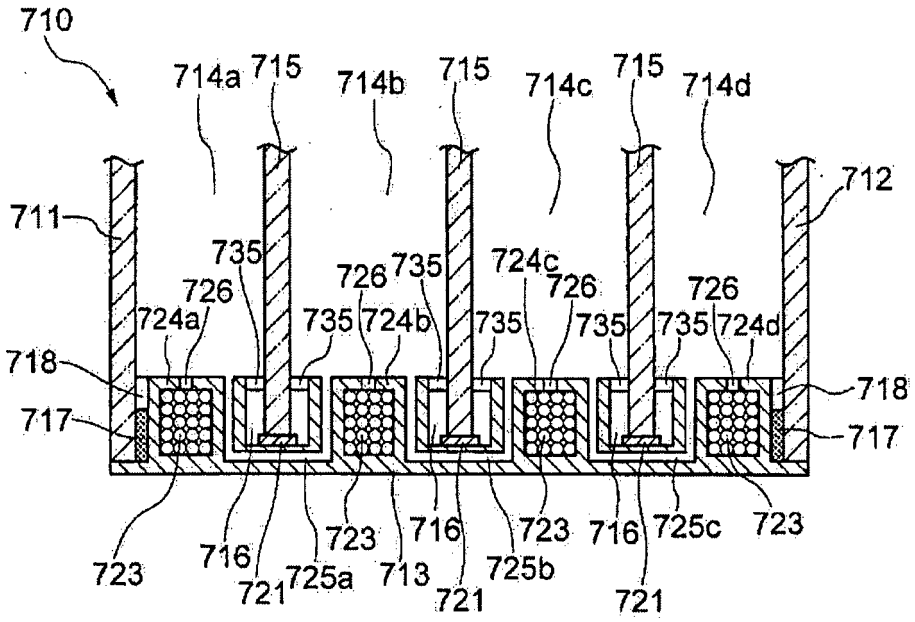


Fig. 101

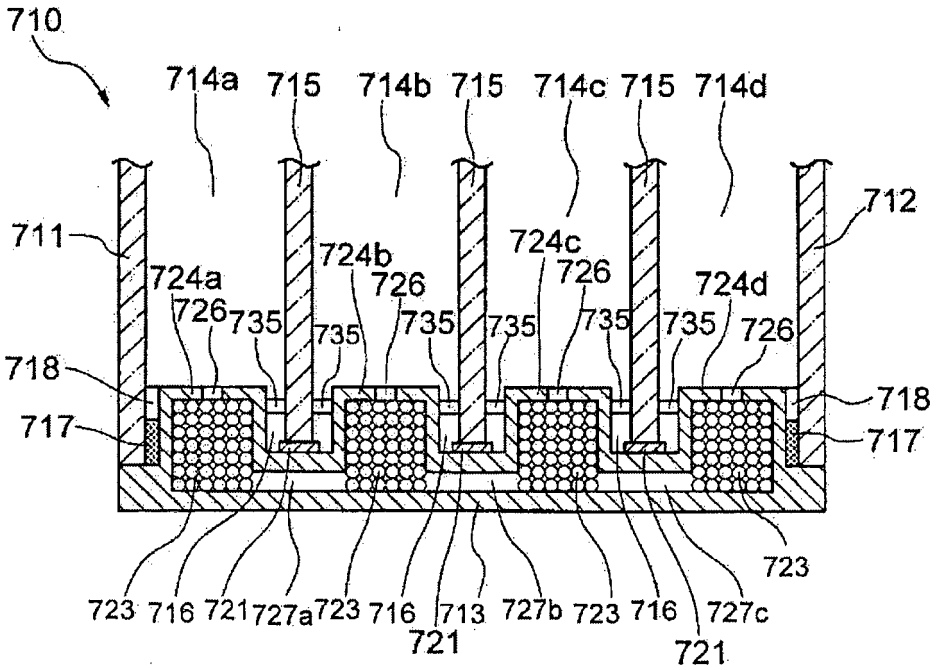


Fig. 102

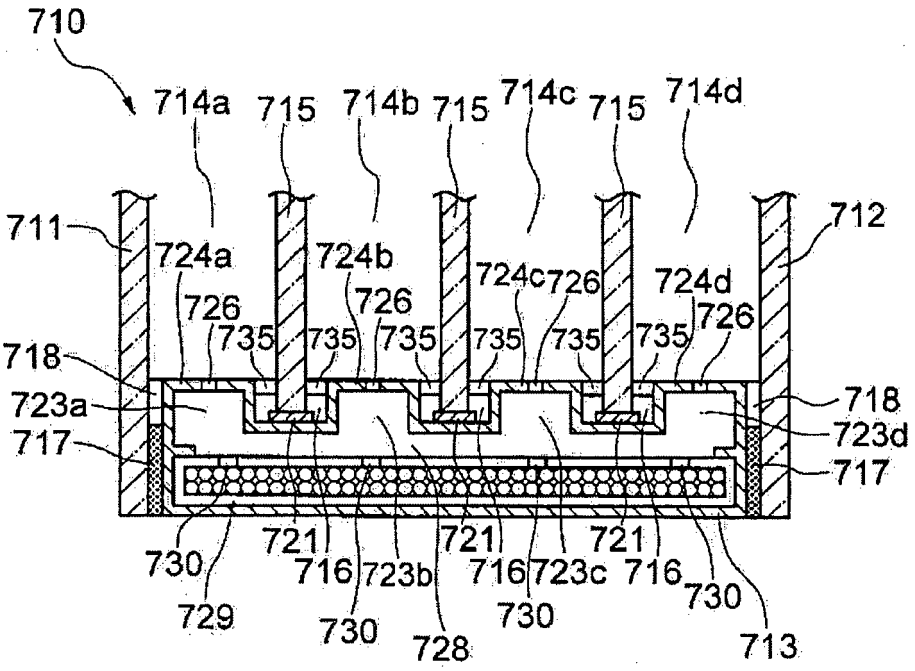


Fig. 103

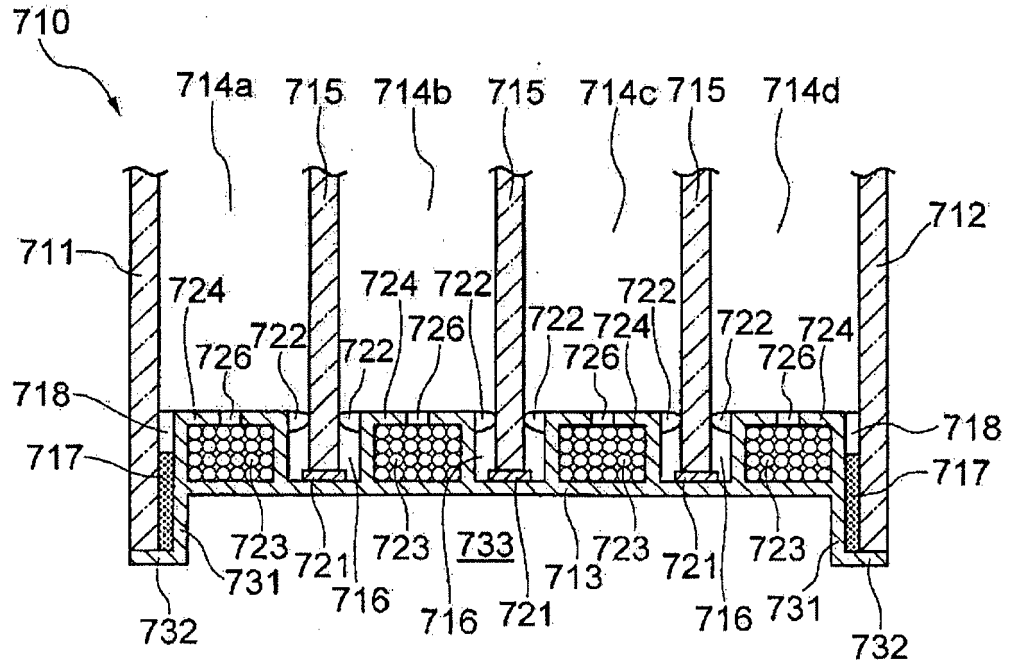


Fig. 104

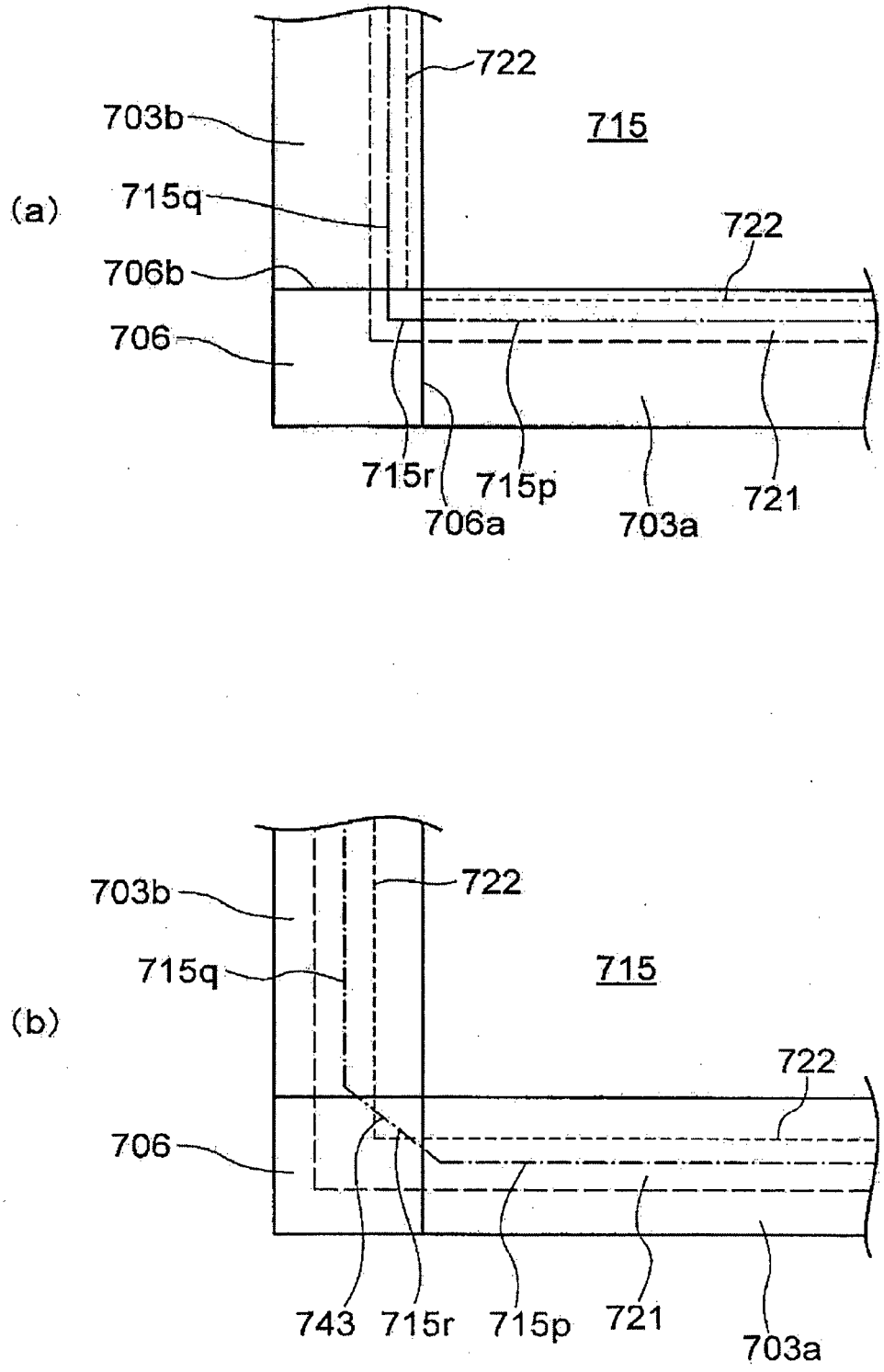

(a)
722
703b
715
715q
722
706b
706
715r
715p
721
706a
703a
(b)
703b
722
715q
715
722
706
743
715r
715p
721
703a

Fig. 105

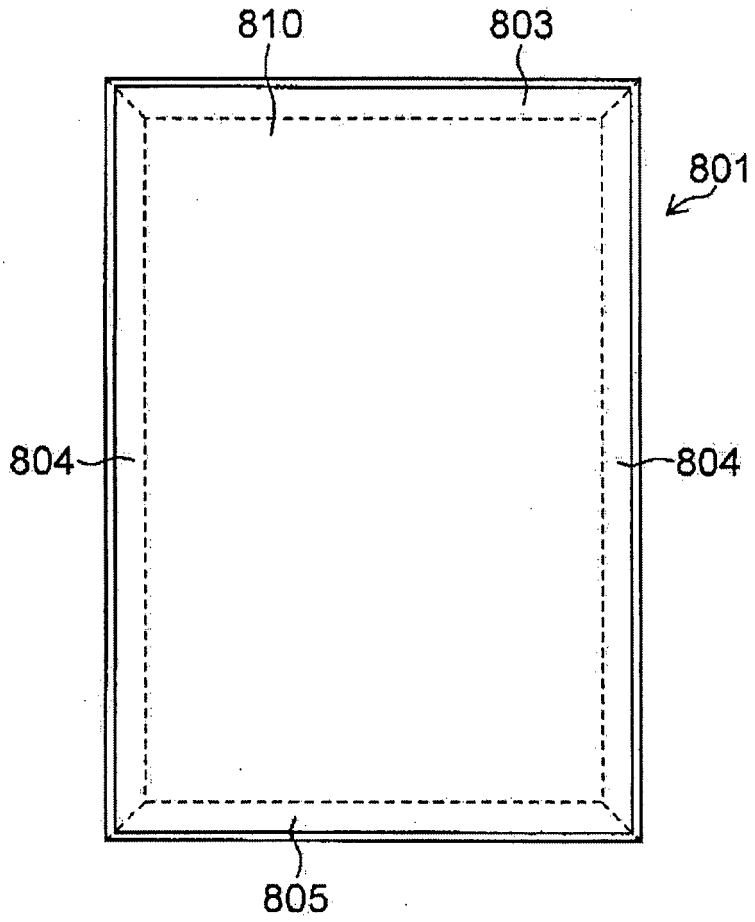


Fig. 106

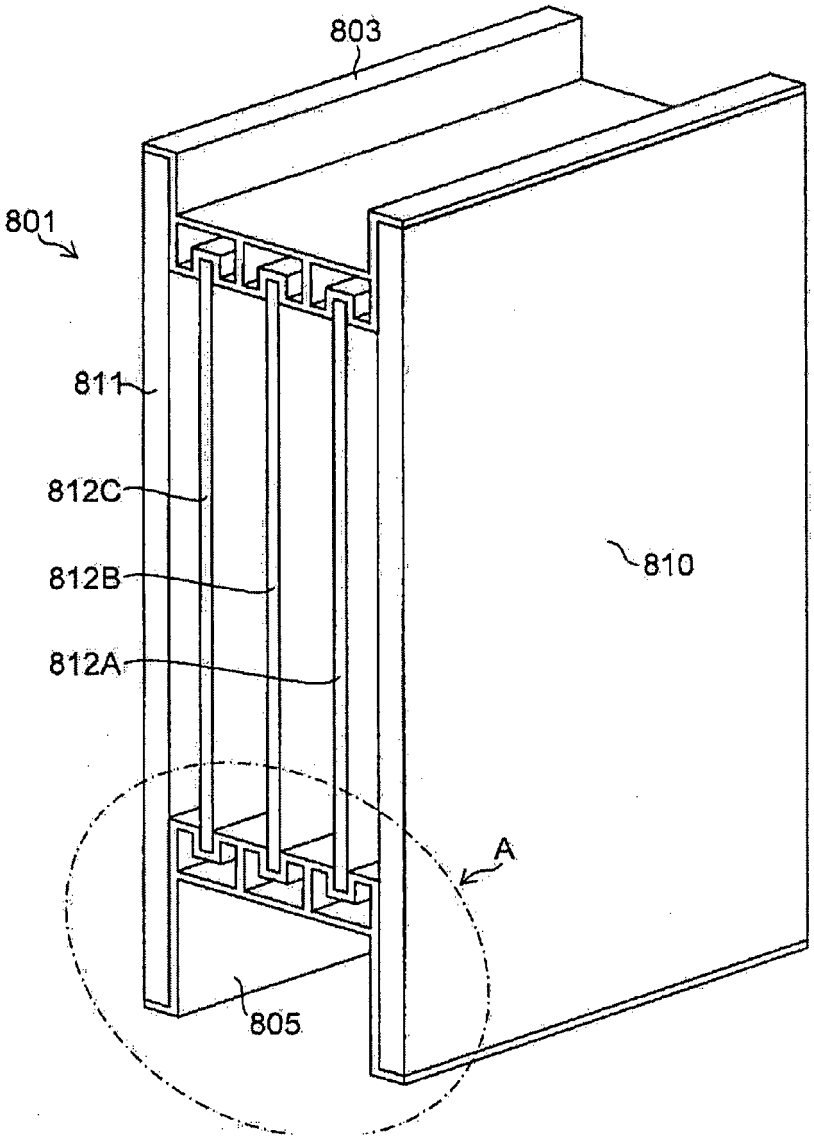


Fig. 107

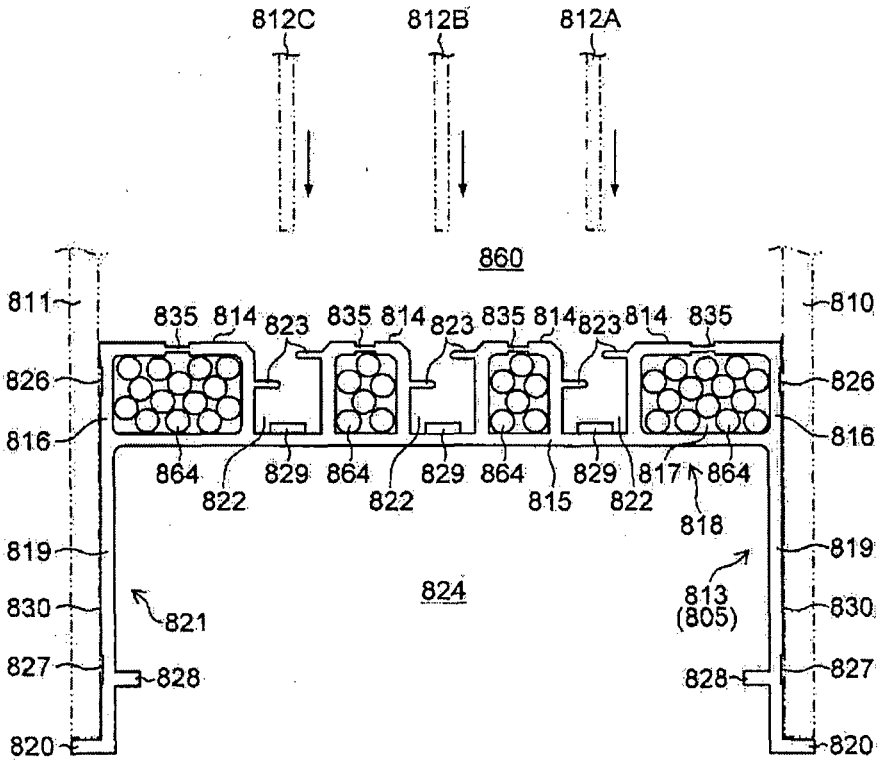

812C
812B
812A
860
811
810
835
814
823
826
816
864
822
829
815
817
818
819
824
813
(805)
821
830
827
828
820

Fig. 108

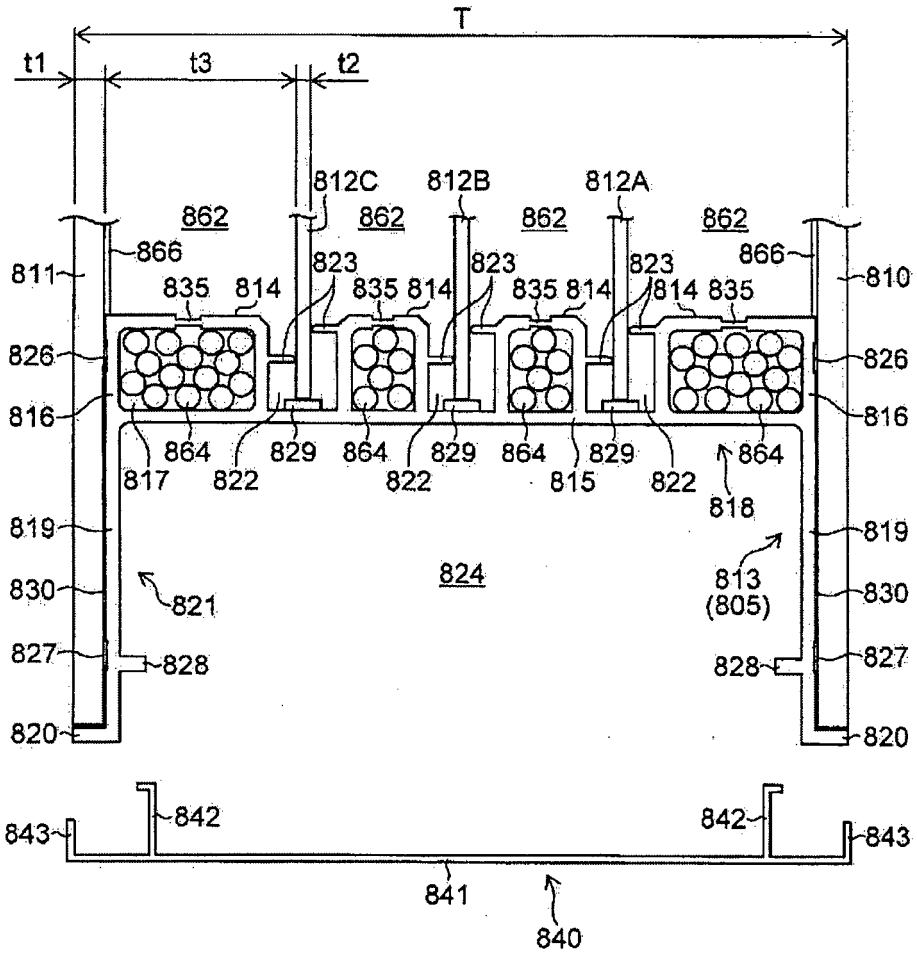

T
t1
t3
t2
812C
812B
812A
862
862
862
862
866
866
811
810
823
823
823
835
814
835
814
835
814
814
835
826
826
816
816
864
829
864
829
864
829
864
817
822
822
815
822
818
819
819
824
813
(805)
830
821
830
827
828
828
827
820
820
842
842
843
843
841
840

Fig. 109

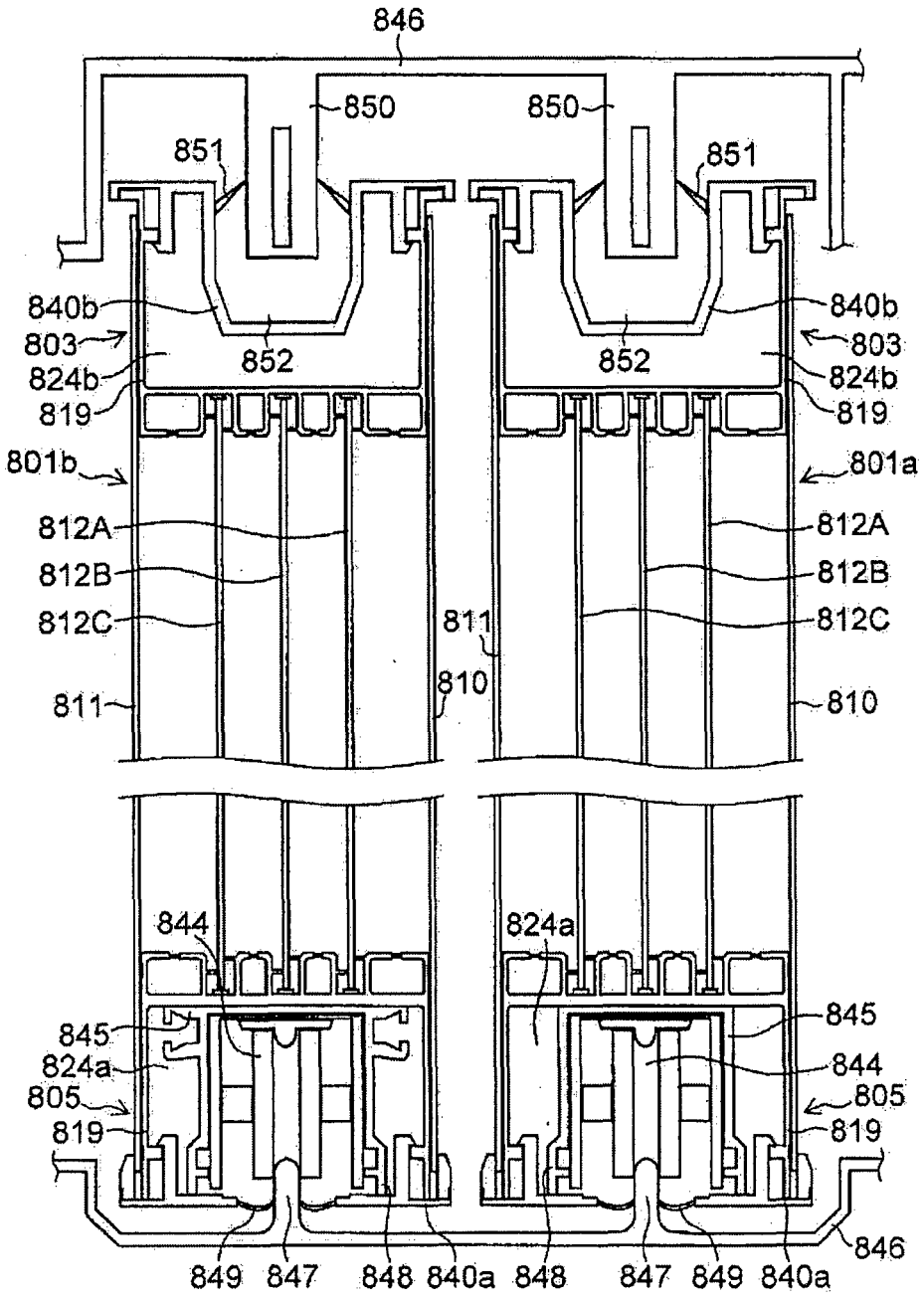

846
850
850
851
851
840b
803
824b
819
852
852
840b
803
824b
819
801b
801a
812A
812B
812C
811
810
812A
812B
812C
810
844
824a
845
824a
805
819
845
844
805
819
849
847
848
840a
848
847
849
840a
846

Fig. 110

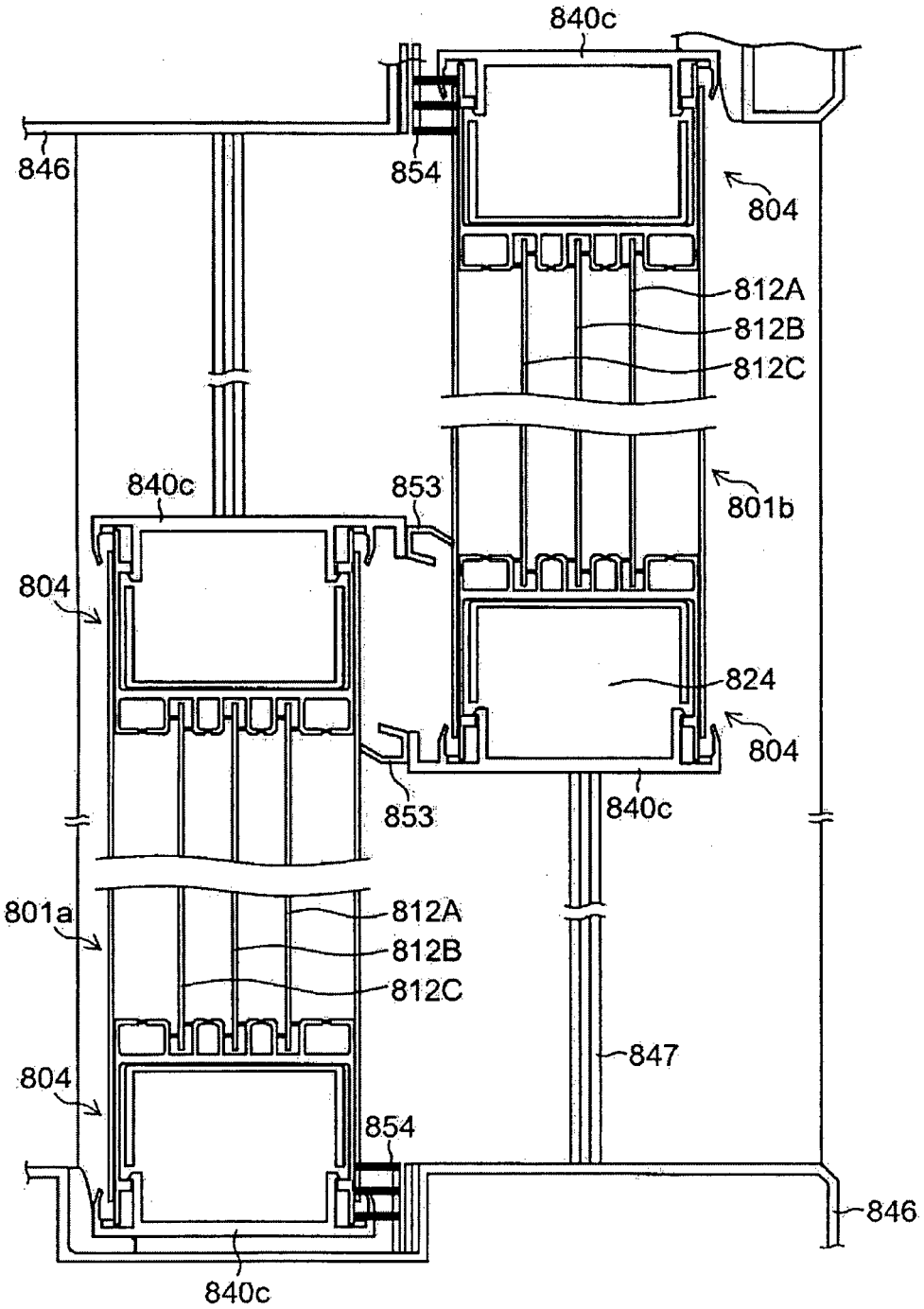

840c
846
854
804
812A
812B
812C
840c
853
801b
804
824
804
853
840c
801a
812A
812B
812C
847
804
854
846
840c

Fig. 111

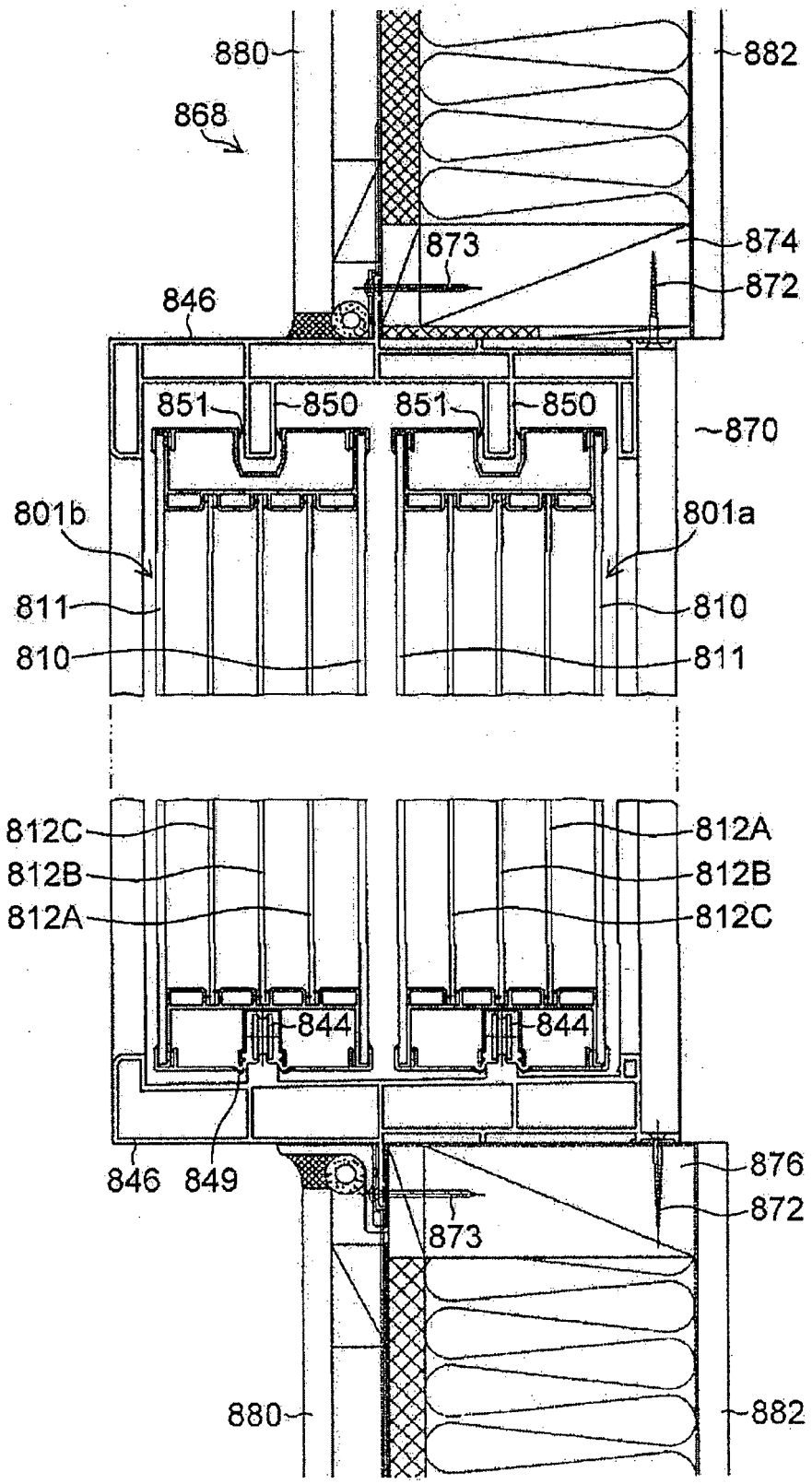

880
882
868
873
874
872
846
851
850
851
850
870
801b
801a
811
810
810
811
812C
812B
812A
812A
812B
812C
844
844
846
849
876
872
873
880
882

Fig. 112

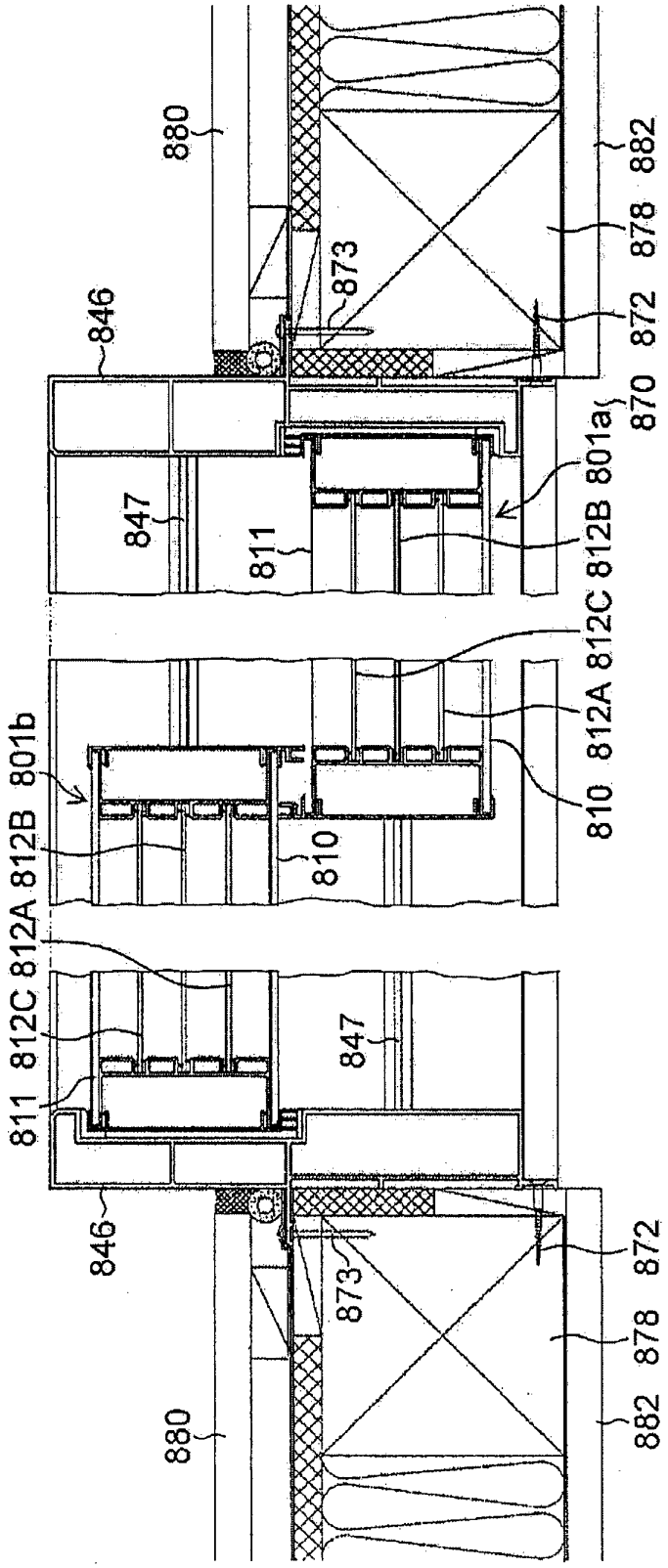

880
882
878
873
872
846
870
801a
847
811
812B
812C
812A
810
801b
812B
812A
812C
811
847
846
872
873
878
880
882

Fig. 113

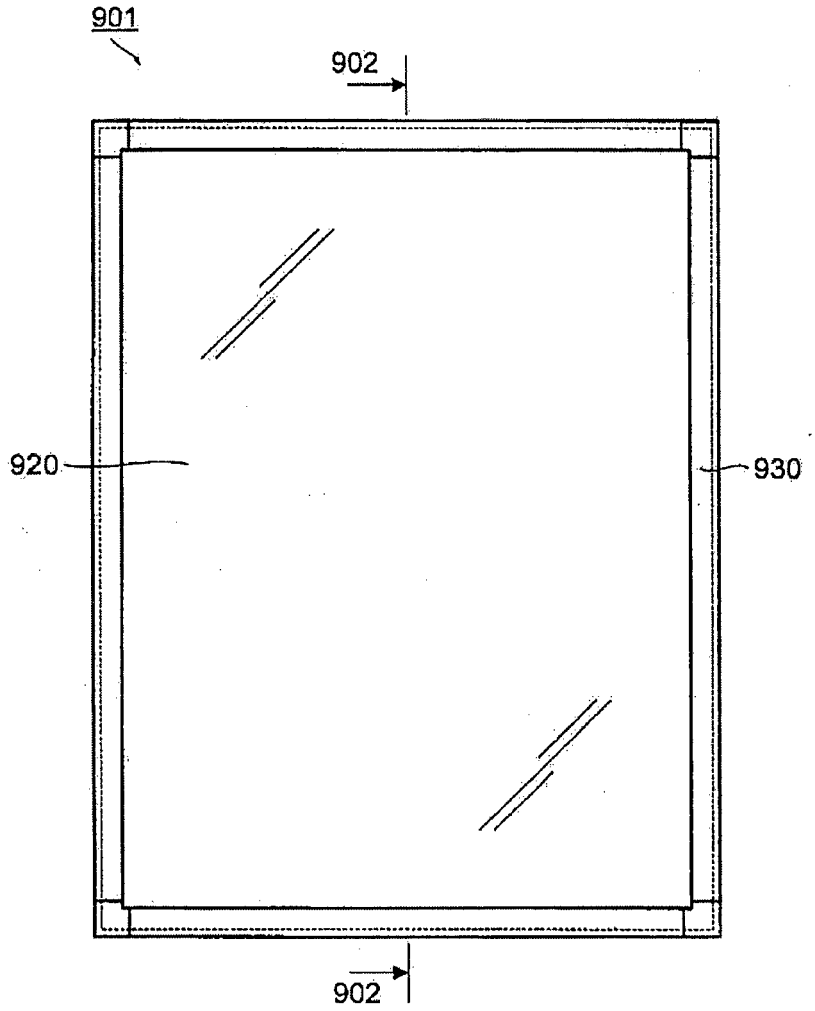


Fig. 114

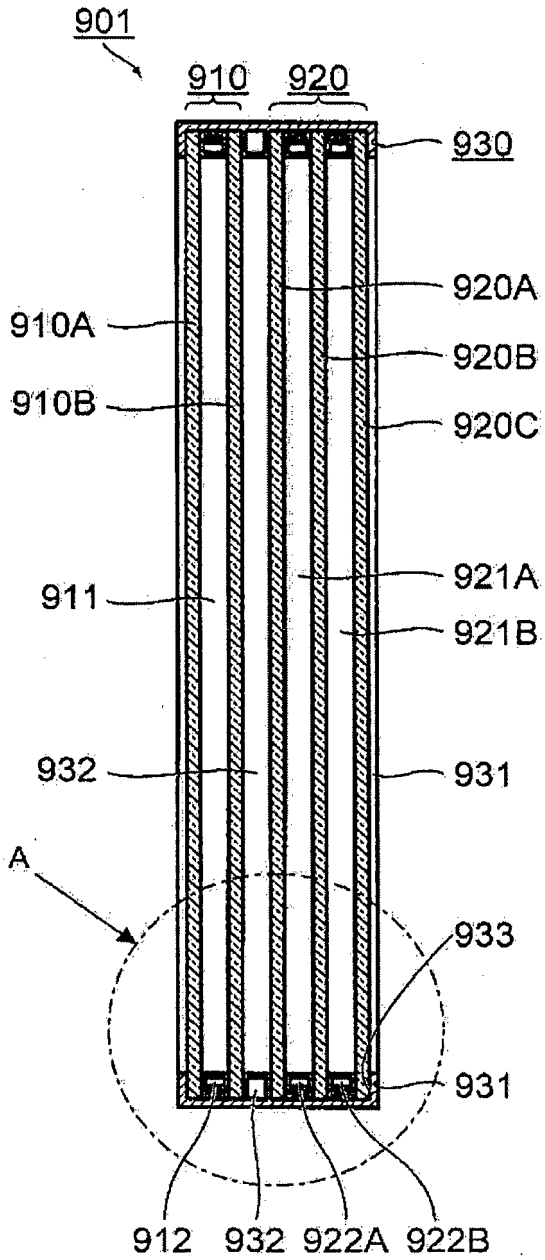

901
910
920
930
920A
910A
920B
910B
920C
921A
911
921B
932
931
A
933
931
912
932
922A
922B

Fig. 115

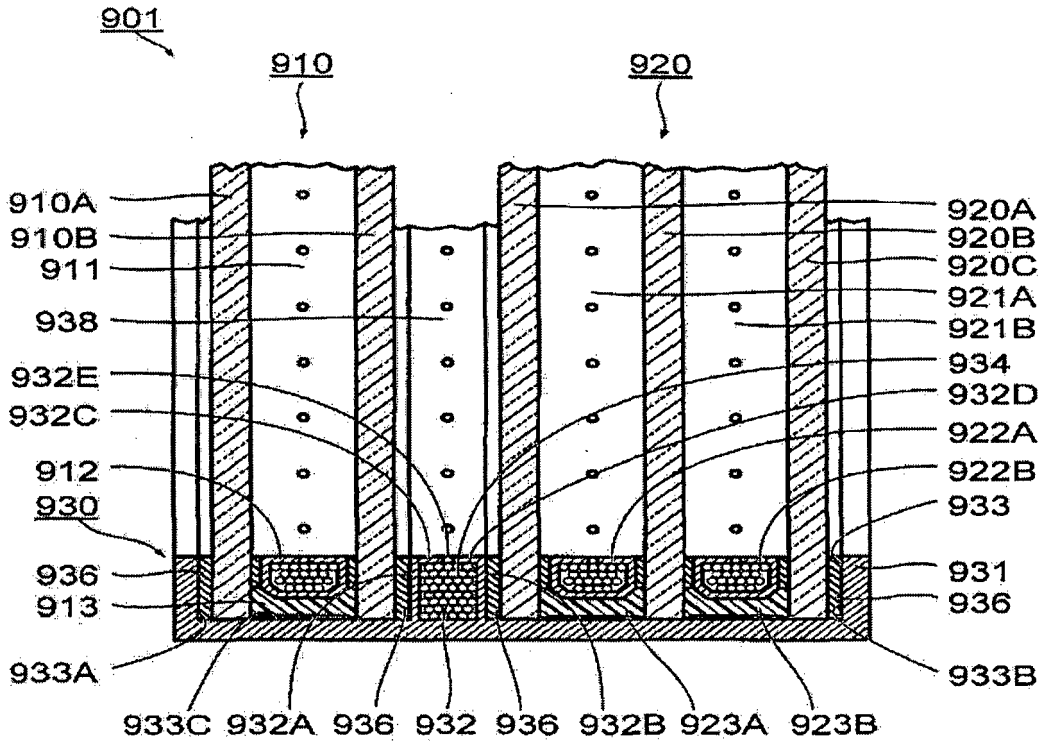

901
910
920
910A
910B
911
938
932E
932C
912
930
936
913
933A
920A
920B
920C
921A
921B
934
932D
922A
922B
933
931
936
933B
933C
932A
936
932
936
932B
923A
923B

Fig. 116

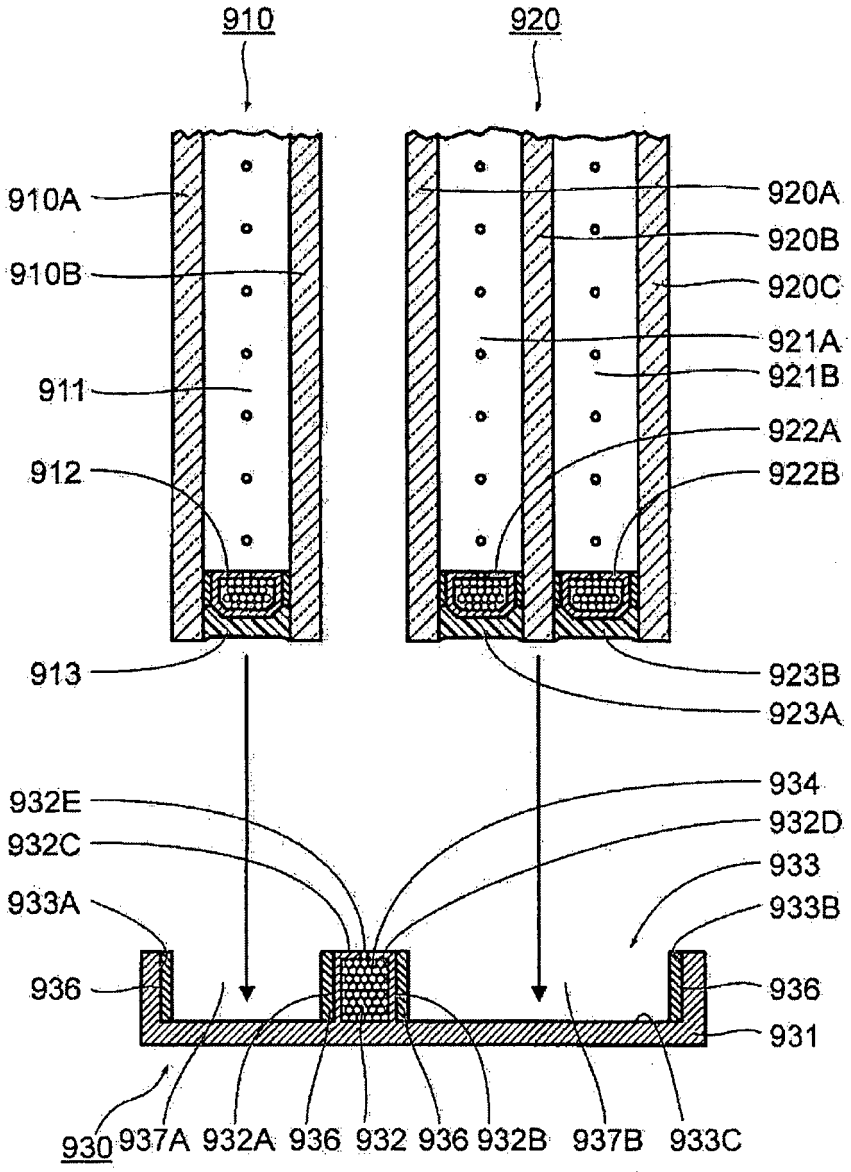

910
920
910A
910B
911
912
913
920A
920B
920C
921A
921B
922A
922B
923B
923A
932E
932C
933A
936
934
932D
933
933B
936
931
930
937A
932A
936
932
936
932B
937B
933C

Fig. 117

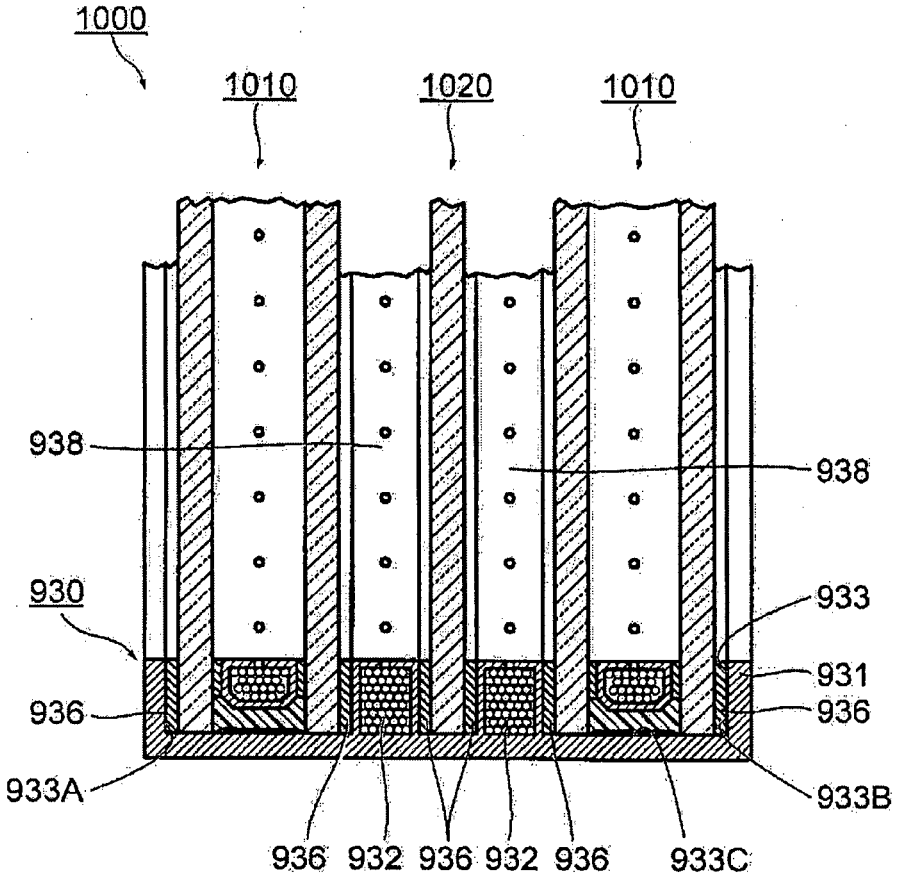

1000
1010
1020
1010
938
938
930
933
931
936
936
933A
933B
936
932
936
932
936
933C

Fig. 118

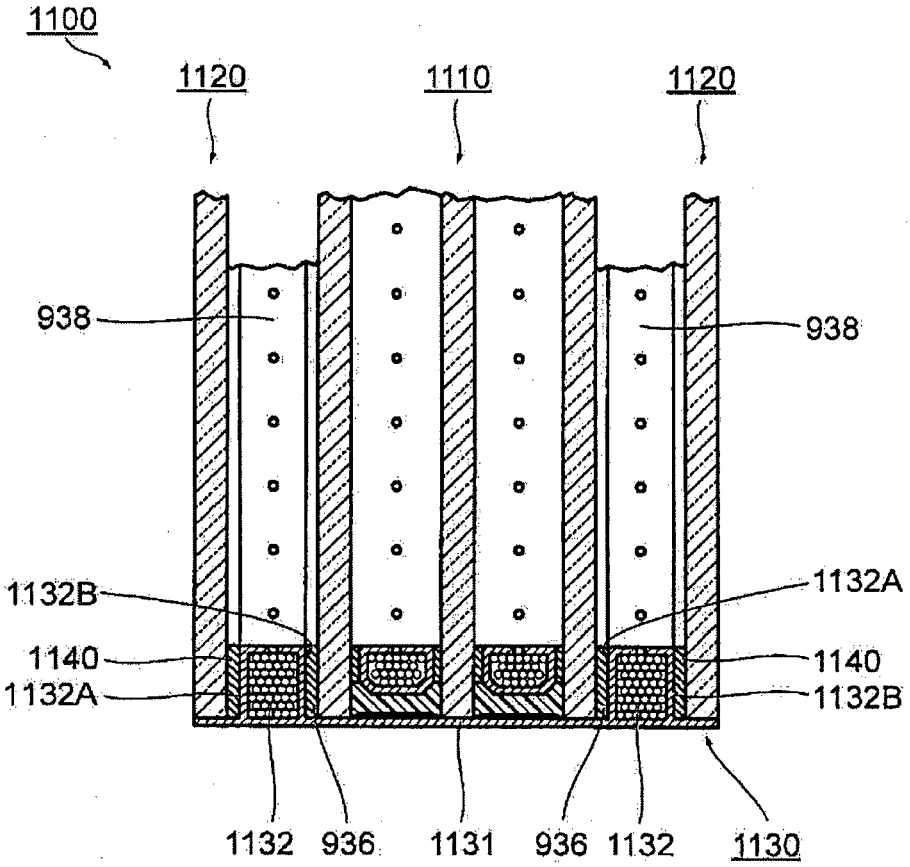

1100
1120
1110
1120
938
938
1132B
1132A
1140
1132A
1140
1132B
1132
936
1131
936
1132
1130

Fig. 119

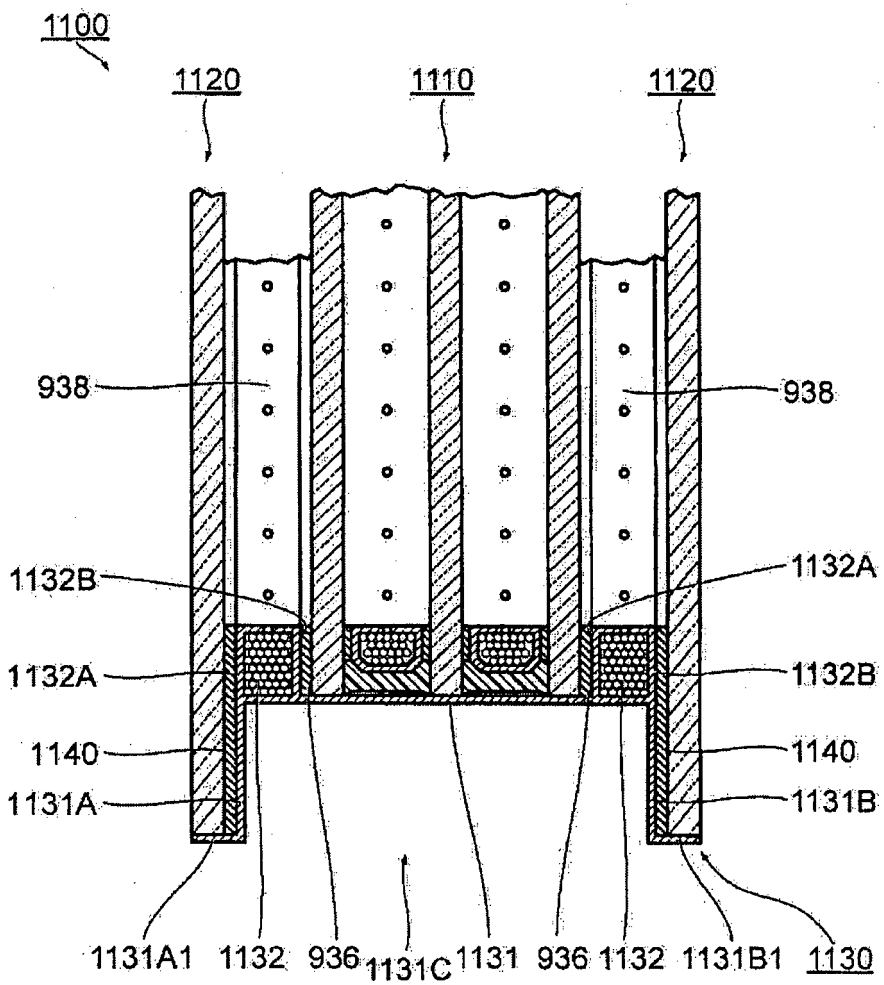

1100
1120
1110
1120
938
938
1132B
1132A
1132A
1132B
1140
1140
1131A
1131B
1131A1
1132
936
1131C
1131
936
1132
1131B1
1130

Fig. 120

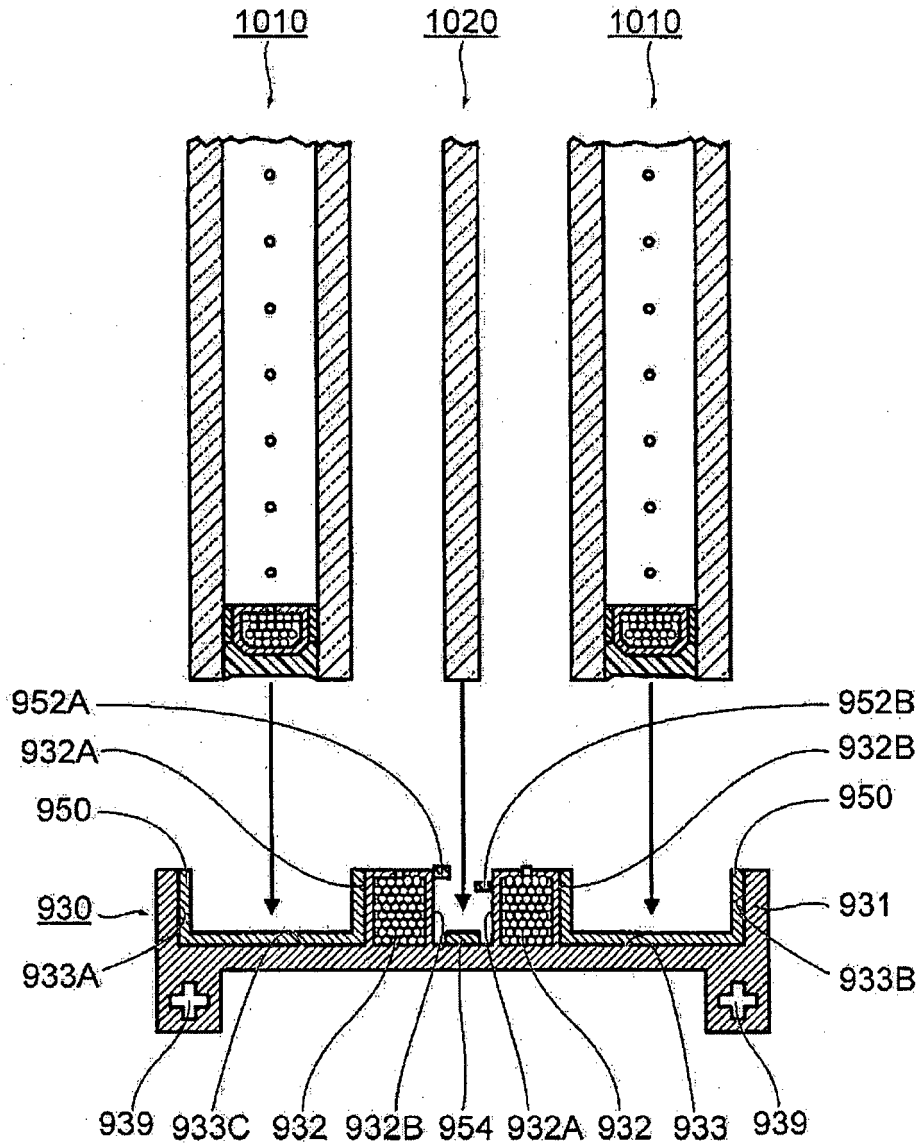
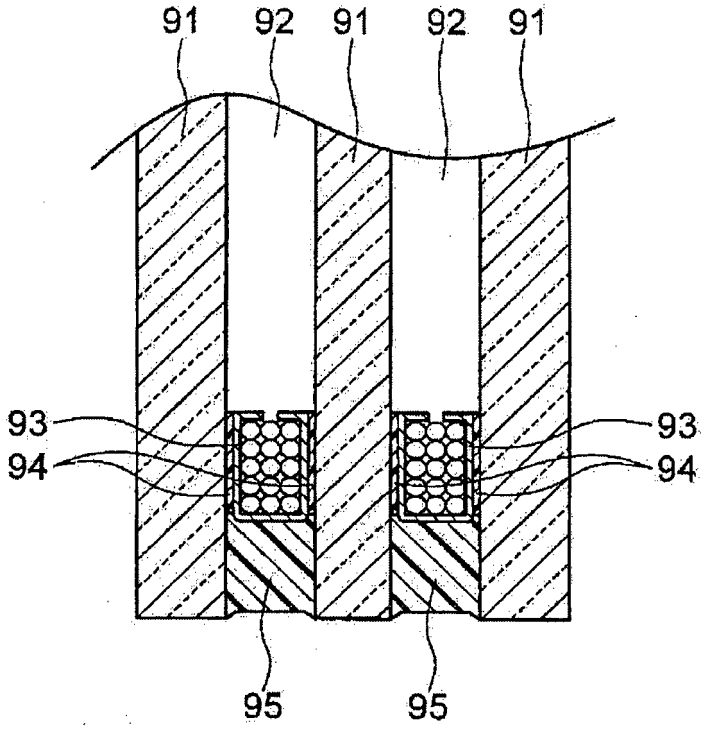

1010
1020
1010
952A
952B
932A
932B
950
950
930
931
933A
933B
939
933C
932
932B
954
932A
932
933
939

Fig. 121



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/059289

A. CLASSIFICATION OF SUBJECT MATTER
E06B3/66(2006.01)i, *C03C27/06*(2006.01)i, *E06B3/64*(2006.01)i, *E06B3/68*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E06B3/54-3/68, C03C27/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014
Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 08-004441 A (Kazuo KUROIWA), 09 January 1996 (09.01.1996), paragraphs [0001], [0021], [0039] to [0047]; fig. 5, 7 & JP 8-4440 A & WO 1994/028278 A1 & AU 6658394 A	1,4,8 2,3,5-7, 9-10,21,26, 30-31,33, 35-38,43, 46-47,68-73, 103-105
A		11-20,22-25, 27-29,32,34, 39-42,44-45, 48-67, 74-102, 106-113

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 June, 2014 (16.06.14)	01 July, 2014 (01.07.14)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/059289

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y		3,7,9-10, 17-18,21,26, 30-31,33, 35-38,43, 46-47,57-83, 96-102,105, 107-113
A		1-2,4-6,8, 48-56,84-95, 103-104,106
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/059289

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	JP 2008-019131 A (Asahi Glass Co., Ltd.), 31 January 2008 (31.01.2008), paragraphs [0050] to [0053]; fig. 1 to 3 (Family: none)	59-73
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Y	WO 2005/108322 A1 (Asahi Glass Co., Ltd.), 17 November 2005 (17.11.2005), paragraphs [0021], [0045] to [0050]; fig. 1 to 3 & JP 5167639 B & US 2007/0122572 A1 & CN 1950309 A & CA 2565838 A	74-83
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Y	JP 60-145833 A (Sanyo Electric Co., Ltd.), 01 August 1985 (01.08.1985), page 2, upper right column, line 14 to lower left column, line 10; fig. 1 to 2 (Family: none)	101-102
X Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 193104/1981(Laid-open No. 099494/1983) (Yoshida Kogyo Co., Ltd.), 06 July 1983 (06.07.1983), specification, page 2, line 11 to page 5, line 17; fig. 1 to 4 (Family: none)	106 107-113

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