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(71) Applicant: **NAN YA PLASTICS CORPORATION Taipei (TW)**

(72) Inventor: **Chen Wang, Kuei-Yung Taipei (TW)**

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(74) Representative: **Carpmael, Robert Maurice Charles Marks & Clerk LLP 90 Long Acre London WC2E 9RA (GB)**

(54) **Coupler**

(57) A coupler for coupling together first and second frame members to form a frame which then holds a pane to an opening in a door or the like. The coupler has a first coupling member operatively connected to the first frame member; a second coupling member is operatively connected to the second frame member; and a connector has opposite first and second parts for connecting with the first and second coupling members respectively. The

first part has a first fastener for bodily engagement with the first coupling member and the second part has a second fastener for bodily engagement with the second coupling member. The first and second frame members are coupled together by the coupler, with the connector extending through said opening and connecting with the first and second coupling members, on opposite sides of said door or the like to thereby hold said pane in said opening.

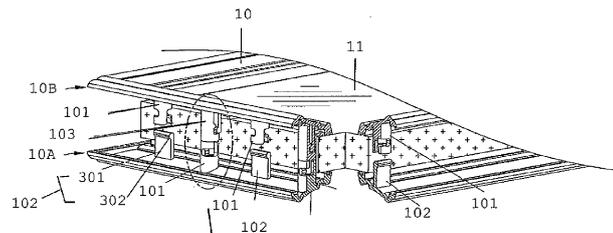


Figure 4A

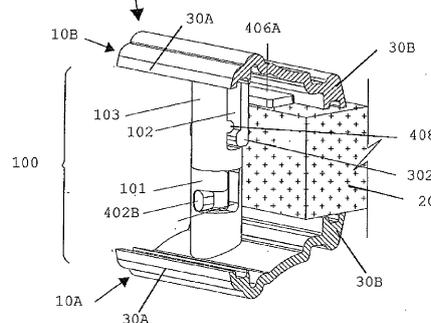


Figure 4B

Description

[0001] The invention relates to a coupler suitable for coupling a two-part frame. More particularly the coupler is suitable for coupling a two-part frame that holds a piece of pane to an opening on a panel such as a door or a window.

BACKGROUND OF THE INVENTION

[0002] Figs. 2 and 3 show a two-part pane frame for mounting a piece of pane in an opening of a door or window. The pane is sandwiched between inner edges of the parts of the frame. The outer edges of the parts of the frame are mounted on respective sides of the edges of the opening on the door or window.

[0003] The pane frame has a number of conventional connectors distributed along the inner sides of the frame. Each of the connectors includes male and female connection parts. The male connector includes a plate with an enlarged free end for snap fastening into the slot of the female connector.

[0004] As the dimensions of the male and female connection parts are predetermined and they are irremovably connected to the respective parts of the pane frame. The distance between the two parts of the pane frame is confined by the dimensions of the male and female connection parts. As the parts of the frame are mounted on the respective sides of the edge of the opening of the door or window, the thickness of the edge of the opening and the thickness of the pane to be mounted are confined by the distance between the two parts of the pane frame, and hence the dimensions of the male and female connection parts.

[0005] One problem of this conventional connection parts is that they delimits the thickness of the edge of the opening of the door or window on which the pane frame is to be mounted and the thickness of the pane sandwiched between the parts of the frame.

[0006] The invention seeks to mitigate or at least alleviate such problem by providing an improved coupling.

SUMMARY OF THE INVENTION

[0007] According to the invention, there is provided a coupler for coupling together first and second frame members to form a frame which then holds a pane to an opening in a door or the like, the coupler comprising a first coupling member operatively connected to the first frame member; a second coupling member operatively connected to the second frame member; and a connector having opposite first and second parts for connecting with the first and second coupling members respectively, the first part having a first fastener for bodily engagement with the first coupling member and the second part having a second fastener for bodily engagement with the second coupling member; such that the first and second frame members are coupled together by the coupler, with the

connector extending through said opening and connecting with the first and second coupling members, on opposite sides of said door or the like to thereby hold said pane in said opening.

[0008] Preferably, the first fastener and the first coupling member include corresponding engagement elements to effect bodily engagement between the first fastener and the first coupling member.

[0009] More preferably, the engagement elements include at least a pair of inter-engageable formations for inter-engagement to prevent relative movement between the connector and the first coupling member in at least a first direction.

[0010] Yet more preferably, the pair of inter-engageable formations includes complementary profiled engagement surfaces co-operable to effect bodily engagement between the first fastener and the first coupling member.

[0011] It is preferable that the complementary profiled engagement surfaces include a protuberance and a recess for receiving the protuberance.

[0012] Advantageously, the protuberance and the recess are inter-engageable to prevent relative movement between the connector and the first coupling member in three perpendicular directions.

[0013] More advantageously, the recess includes an L-shaped opening on the first coupling for receiving the protuberance to effect bodily engagement between the connector and the first coupling member.

[0014] Yet more advantageously, the engagement elements include two pairs of inter-engageable formations each having complementary profiled engagement surfaces including a protuberance and an L-shaped opening for receiving the protuberance, the L-shaped opening in each of the pair of inter-engageable formations are arranged in mirror image to one another on the first coupling member.

[0015] It is advantageous that the second fastener and the second coupling member include inter-engageable members for bodily engagement in a first direction to prevent separation of the second fastener and the second coupling member in at least one direction which is parallel to the first direction.

[0016] Preferably inter-engageable members include a pair of protuberances for inter-engagement therebetween.

[0017] More preferably, the second fastener includes an abutment for abutment relative to the second coupling member upon inter-engagement of the inter-engageable members, thereby fixing the relative position between the second fastener and the second coupling member in at least one of two mutually perpendicular directions.

[0018] Advantageously the second fastener includes two said abutments which extend co-parallel but are of different lengths.

[0019] Preferably, the second coupling member is associated with a void arranged to receive the or each abutment for engagement therewith to prevent relative movement between the connector and the second coupling

member in at least one of two mutually perpendicular directions perpendicular to the first direction.

[0020] More preferably, the first coupling member and the first fastener are bodily engaged through linear relative movement in a direction and subsequent angular relative movement about the direction of the linear relative movement.

[0021] Yet more preferably, the second coupling member and the second fastener are bodily engaged through linear relative movement disallowing angular movement of the connector thereby preventing disengagement between the first fastener and the first coupling member.

[0022] It is preferable that the first and second coupling members are integrally formed with the first and second frame parts respectively.

[0023] Preferably, the first coupling member is generally cylindrical in shape.

[0024] More preferably, the connector includes a cylindrical main body that flushes with the first coupling member upon engagement therebetween.

[0025] According to another aspect of the invention, there is provided a coupler substantially as hereinbefore described with reference to the accompanying drawings.

[0026] According to a further aspect of the invention, there is provided a method of coupling together first and second frame members to form a frame which then holds a pane to an opening in a door or the like by a coupler comprising the steps of providing a first coupling member operatively connected to the first frame member; providing a second coupling member operatively connected to the second frame member; and providing a connector having opposite first and second parts for connecting with the first and second coupling members respectively, the first part having a first fastener for bodily engagement with the first coupling member and the second part having a second fastener for bodily engagement with the second coupling member; such that the first and second frame members are coupled together, by the coupler, with the connector extending through said opening and connecting with the first and second coupling members, on opposite sides of said door or the like to hold said pane in said opening.

[0027] Preferably, the first fastener and the first coupling member include corresponding inter-engageable formations for bodily inter-engagement to prevent separation between the first fastener and the first coupling member, the first fastener being connected with the first coupling member through at least relative angular movement.

[0028] More preferably, the first fastener being initially connected with the first coupling member through relative linear movement in a direction followed by angular relative movement about the direction of the linear movement.

[0029] Yet more preferably, the second fastener and the second coupling member include inter-engageable formations for bodily engagement through linear relative movement in a direction disallowing angular relative

movement of the connector about the direction of the linear movement thereby preventing disengagement between the first fastener and the first coupling member.

[0030] It is preferable that the second coupling member is snap fitted with the second fastener.

[0031] Advantageously, the relative linear movement is in a direction parallel to a longitudinal extent of the connector.

10 BRIEF DESCRIPTION OF DRAWINGS

[0032] The invention will now be more particularly described, by way of example only, with reference to the accompanying drawings, in which:

15 Figure 1 is a front perspective view of a two-part pane frames mounted on an opening of a door or a window;

20 Figures 2 and 3 shows a conventional connector for connecting parts of the pane frame of Figure 1 together;

25 Figure 4A is a part perspective view of a two-part pane frame incorporated with a coupler in accordance with the invention, having a part of the frame and the coupler being cut away showing a cross-section of the couple;

30 Figure 4B is an enlarged perspective view of a part in Figure 4A;

35 Figure 5 is a partially exploded view of the two-part pane frame and the coupler of Figures 4A and 4B;

40 Figure 6A is a perspective view of the coupler in Figures 4A to 5; and

Figure 6B is a partially exploded perspective view of the coupler in Figure 4A to 6A.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

45 **[0033]** Referring to Figure 1, there is shown a portion of a door 20 with two pane frames 10 embedded therein. The pane frame 10 is a two-part pane frame sandwiches a piece of pane 11. The two-part pane frame 10 includes first and second frame members 10A and 10B. As shown in Figure 4, inner edges 30A of respective members 10A and 10B cooperate with each other to sandwich between them a piece of pane 11. Outer edges 30B of respective members 10A and 10B cooperate with each other to mount onto the edges of the opening of the door 20.

50 **[0034]** Preferably, the frame 10 is generally rectangular in shape and the shape of the frame 10 corresponds to that of the opening on the door 20. In a different embodiment, the frame 10, hence the frame members 10A

and 10B, may be of a square, circular, oval or any geometric shape. The frame members 10A and 10B may be moulded from plastic or stamped from sheet metal.

[0035] An embodiment of coupler 100 is shown in Figures 4A to 6B. The coupler 100 couples together the first and second frame members 10A and 10B to form a frame 10 which then holds a pane 11 to an opening in a door 20 or the like. The coupler 100 has three main parts namely a first coupling member 101 operatively connected to the first frame member 10A, a second coupling member 102 operatively connected to the second frame member 10B; and a connector 103 which has opposite first and second parts for connecting with the first and second coupling members respectively. The first part has a first fastener 103A for bodily engagement with the first coupling member 101 and the second part has a second fastener 103B for bodily engagement with the second coupling member 102. The first and second frame members 10A and 10B are coupled together by the coupler 100, with the connector 103 extending through said opening and connecting with the first and second coupling members 101 and 102, on opposite sides of said door 20 or the like to thereby hold said pane 11 in said opening.

[0036] In the preferred embodiment, the first and second coupling members 101 and 102 each has one end integrally formed with the respective frame members 10A and 10B. The first and second coupling members 101 and 102 on the respective frame parts 10A and 10B extend towards one another and are provided at corresponding positions on the frame parts 10A and 10B respectively. In an alternative embodiment, the first and second coupling members 101 and 102 may be provided separate from the frame parts 10A and 10B and are connected to the frame parts 10A and 10B by conventional connectors.

[0037] The first fastener 103A and the first coupling member 101 include corresponding engagement elements to effect bodily engagement between the first fastener 103A and the first coupling member 101. The corresponding engagement elements includes first and second pairs of inter-engageable formations for inter-engagement to prevent relative movement between the connector 103/first fastener 103A and the first coupling member 101 in at least a first direction Y and preferably all of three perpendicular directions X, Y and Z. The directions X, Y and Z are substantially perpendicular to one another. The first and second pairs of inter-engageable formations each includes a complementary profiled engagement surfaces co-operable to effect bodily engagement between the first fastener 103A and the first coupling member 101.

[0038] The first coupling member 101 is cylindrical in shape. It includes a recess 201, which is preferably an L-shaped opening on the periphery of the cylindrical first coupling member 101. The opening 201 extends from a free end to mid-length of the first coupling member 101. In the preferred embodiment, there is a pair of opposing L-shaped openings 201 on the first coupling member

101. The two L-shaped openings are mirror images of one another. Inner wall of each of the L-shaped openings 201 form part of the complementary profiled engagement surfaces of the respective first and second pairs of formations.

[0039] The second coupling member 102 and the second fastener 103B include inter-engageable members for bodily engagement in a first direction to prevent separation of the second fastener and the second coupling member in a direction parallel to the first direction. The second coupling member 102 has a base 301 and a protruberance 302 provided adjacent free end of the second coupling member 102. The protruberance 302 of the second coupling member 102 forms part of the inter-engageable members of the second fastener 103B and the second coupling member 102. The second coupling member is associated with two voids 107. In the preferred embodiment, the voids 107 are provided at the inner side of the frame parts 10B.

[0040] The connector 103 is generally cylindrical in shape with two opposite first and second parts or ends for connecting with the first and second coupling members 101 and 102 respectively. The first fastener 103A is provided adjacent the first part or end and the second fastener 103B is provide adjacent the second part or end.

[0041] Main body of the connector 103 is hollow. The main body 401 comprises two abutment members 406 and 407 and a base 405.

[0042] In the preferred embodiment, the first and second fasteners 103A and 103B are structurally different making them distinguishable from one another. The first fastener 103A includes a stem 403 with two opposite projections 402A and 402B adjacent its free end. The surface of the projections 402A and 402B define another part of the complementary profiled engagement surfaces of the first and second pairs of formations respectively for engaging the L-shaped openings 201 on the first coupling member 101 to thereby prevent relative movement between the connector 103 and the first coupling member 101 in the first direction.

[0043] The second fastener 103B comprises a protruberance 408 on the abutment member 406. The protruberance 408 forms another part of the inter-engageable members of the second fastener 103B and the second coupling member 102.

[0044] In summary, the projections 402A and 402B and the respective L-shaped openings 201 define the first and second pair of formations. Once the formations are properly coupled, these features together prevent relative movement between the connector 103 and the first coupling member 101 in the direction along three axis X, Y and Z.

[0045] The second fastener 103B includes the two abutments 406 and 407 for abutment relative to the second coupling member 102 upon inter-engagement of the inter-engageable members, thereby fixing the relative position between the connector 103 and the second coupling member 102. In the preferred embodiment, the

abutments 406 and 407 extend co-parallel but are of different lengths. The abutments 406 and 407 each have a retainer 406A and 407A extending from free ends of the abutments 406 and 407. These retainers 406A and 407A extend generally and preferably substantially perpendicular to length of the abutments 406 and 407. The retainers 406A and 407A are rested on one side of the pane 11 and one side of the edge of the door 20 respectively. The different lengths of the abutments 406 and 407 allow accommodation of the pane 11 and the edge of the door 20 which are of different thickness.

[0046] The second coupling member 102 is arranged to be inserted into a space between the abutments 406 and 407 to prevent relative movement between the connector 103 and the second coupling member 102 in at least one directions Z perpendicular to the first direction Y.

[0047] The protuberance 408 and the protuberance 302 together form the inter-engageable members between the second fastener 103B and the second coupling member 102, for bodily engagement to prevent separation of the second fastener 103B and the second coupling member 102 in at least one direction parallel to the first direction Y.

[0048] As shown in Figures 6A and 6B, there is provided a method of coupling first and second frame members 101 and 102 together to form a frame 10 which holds a pane 11 to an opening in a door 20 or the like, comprising the steps of, providing a first coupling member 101 operatively connected to the first frame member 10A, providing a second coupling member 102 operatively connected to the second frame member 10B; and providing a connector 103 having opposite first and second parts for connecting with the first and second coupling members 101 and 102 respectively, the first part having a first fastener 103A for bodily engagement with the first coupling member 101 and the second part having a second fastener 103B for bodily engagement with the second coupling member 102; such that the first and second frame members 10A and 10B are coupled together, by the coupler 100, with the connector 103 extending through said opening and connecting with the first and second coupling members 101 and 102, on opposite sides of said door 20 or the like to hold said pane 11 in said opening.

[0049] When assembling/coupling the first coupling member 101 and the connector 103, the first fastener 103A is initially, releasably connected with the first coupling member 101 through relative linear movement in a direction followed by a relative angular or rotational movement about the direction of the relative linear movement. The direction of the linear movement is parallel to a longitudinal extent of the connector 103 and the rotational or angular movement is about the direction and on an imaginary plane A extending perpendicular to the connector 103. The respective protuberances 402A and 402B are inserted into the respective openings 201 through the same relative linear and rotational move-

ments between the first coupling member 101 and the first fastener 103A.

[0050] When assembling/coupling the second coupling member 102 to the connector 103, the second coupling member 102 being subsequently connected with the second fastener 103B through a linear movement of the second coupling member 102 relative to the second fastener 103B in a direction parallel to the connector 103. The second coupling member 102 is relatively moved towards the second fastener 103B linearly in a direction perpendicular to the imaginary plane A of the frame 10. The protuberance 302 slides pass the protuberance 406 and is accommodated below the protuberance 408 in the base 301. The protuberances 302 and 408 inter-engage to prevent relative movement between the second coupling member 102 and the connector 103 in the direction along axis Y. The protuberance 408 is provided on the abutment 407 which is flexible and resilient. It therefore can be forced to deform slightly permitting the protuberance 302 to slide pass the protuberance 408 and return to its default state/shape thereafter.

[0051] As the base 301 and the protuberance 302 are inserted between the abutments 406 and 407, these abutments 406 and 407 prevent the relative movement of the second coupling member 102 and the connector 103 in the direction along the axis Z. In a preferred embodiment, the retainers 406A and 407A may act as guards to prevent further insertion of the second coupling member 102 into a space between the abutment members 406 and 407. Also the retainers 406A and 407A are inserted into the respective voids or recesses 107 each having at least a wall to which the retainers 406A and 407A of the connector 103 abuts. This help to prevent relative movement between the connector 103 and the second coupling member 102 in a second direction along the axis Z.

[0052] In the preferred embodiment, the second coupling member 102 is snap fitted with the second fastener 103B.

[0053] There is at least one coupler 100 on each side of the frame 10 for coupling the frame parts 10A and 10B. The fastening of the second fastener 103B to the second coupling member 102 of the couplers 100 on two perpendicular sides of the frame 10 will prevent relative rotational and/or linear movement between the first coupling member 101 and the connector 103 and hence the disengagement between the first coupling member 101 and the first fastener 103A. It will also prevent relative linear movement between the second coupling member 102 and the connector in the direction along axis X.

[0054] The second coupling member 102 and the second fastener 103B are bodily engaged through the linear relative movement disallowing the angular movement of the connector thereby preventing disengagement between the first fastener and the first coupling member.

[0055] In the preferred embodiment, there are four couplers 100 on each side of the frame 10.

[0056] The term complementary used herein is intend-

ed to refer to being generally complementary but not exactly one being an exact inversion of the other. Thus, in the described embodiment, the shapes or cross-sections of the two formations 410 and 108 do not necessarily fill out or complete each other, so long as one formation is receivable in or capable of embracing the other to establish bodily inter-engagement.

[0057] The invention has been given by way of example only, and various other modifications of and/or alterations to the described embodiment may be made by persons skilled in the art without departing from the scope of the invention as specified in the appended claims.

Claims

1. A coupler for coupling together first and second frame members to form a frame which then holds a pane to an opening in a door or the like, the coupler comprising:

a first coupling member operatively connected to the first frame member;
 a second coupling member operatively connected to the second frame member; and
 a connector having opposite first and second parts for connecting with the first and second coupling members respectively, the first part having a first fastener for bodily engagement with the first coupling member and the second part having a second fastener for bodily engagement with the second coupling member;
 such that the first and second frame members are coupled together by the coupler, with the connector extending through said opening and connecting with the first and second coupling members, on opposite sides of said door or the like to thereby hold said pane in said opening.

2. The coupler as claimed in claim 1, wherein the first fastener and the first coupling member include corresponding engagement elements to effect bodily engagement between the first fastener and the first coupling member.
3. The coupler as claimed in claim 2, wherein the engagement elements include at least a pair of inter-engageable formations for inter-engagement to prevent relative movement between the connector and the first coupling member in at least a first direction.
4. The coupler as claimed in claim 3, wherein the pair of inter-engageable formations includes complementary profiled engagement surfaces co-operable to effect bodily engagement between the first fastener and the first coupling member.
5. The coupler as claimed in claim 4, wherein the com-

plementary profiled engagement surfaces include a protuberance and a recess for receiving the protuberance.

6. The coupler as claimed in claim 5, wherein the protuberance and the recess are inter-engageable to prevent relative movement between the connector and the first coupling member in three perpendicular directions.
7. The coupler as claimed in claim 6, wherein the recess includes an L-shaped opening on the first coupling for receiving the protuberance to effect bodily engagement between the connector and the first coupling member.
8. The coupler as claimed in claim 3, wherein the engagement elements include two pairs of inter-engageable formations each having complementary profiled engagement surfaces including a protuberance and an L-shaped opening for receiving the protuberance, the L-shaped opening in each of the pair of inter-engageable formations are arranged in mirror image to one another on the first coupling member.
9. The coupler as claimed in any one of claims 1 to 8, wherein the second fastener and the second coupling member include inter-engageable members for bodily engagement in a first direction to prevent separation of the second fastener and the second coupling member in at least one direction which is parallel to the first direction, optionally, the inter-engageable members include a pair of protuberances for inter-engagement therebetween, optionally, the second fastener includes an abutment for abutment relative to the second coupling member upon inter-engagement of the inter-engageable members, thereby fixing the relative position between the second fastener and the second coupling member in at least one of two mutually perpendicular directions, and optionally, the second fastener includes two said abutments which extend co-parallel but are of different lengths.
10. The coupler as claimed in claim 9, wherein the second coupling member is associated with a void arranged to receive the or each abutment for engagement therewith to prevent relative movement between the connector and the second coupling member in at least one of two mutually perpendicular directions perpendicular to the first direction.
11. The coupler as claimed in any one of claims 1 to 10, wherein the first coupling member and the first fastener are bodily engaged through linear relative

movement in a direction and subsequent angular relative movement about the direction of the linear relative movement,
optionally, the second coupling member and the second fastener are bodily engaged through linear relative movement disallowing angular movement of the connector thereby preventing disengagement between the first fastener and the first coupling member,

12. The coupler as claimed in any one of claims 1 to 11, wherein the first and second coupling members are integrally formed with the first and second frame parts respectively.

13. The coupler as claimed in any one of claims 1 to 12, wherein the first coupling member is generally cylindrical in shape,
optionally, the connector includes a cylindrical main body that flushes with the first coupling member upon engagement therebetween.

14. A method of coupling together first and second frame members to form a frame which then holds a pane to an opening in a door or the like by a coupler comprising the steps of:

providing a first coupling member operatively connected to the first frame member;
providing a second coupling member operatively connected to the second frame member; and
providing a connector having opposite first and second parts for connecting with the first and second coupling members respectively, the first part having a first fastener for bodily engagement with the first coupling member and the second part having a second fastener for bodily engagement with the second coupling member;
such that the first and second frame members are coupled together, by the coupler, with the connector extending through said opening and connecting with the first and second coupling members, on opposite sides of said door or the like to hold said pane in said opening.

15. The method as claimed in claim 14, wherein the first fastener and the first coupling member include corresponding inter-engageable formations for bodily inter-engagement to prevent separation between the first fastener and the first coupling member, the first fastener being connected with the first coupling member through at least relative angular movement.

16. The method as claimed in claim 15, wherein the first fastener being initially connected with the first coupling member through relative linear movement in a direction followed by angular relative movement about the direction of the linear movement.

17. The method as claimed in any one of claims 14 to 16, wherein the second fastener and the second coupling member include inter-engageable formations for bodily engagement through linear relative movement in a direction disallowing angular relative movement of the connector about the direction of the linear movement thereby preventing disengagement between the first fastener and the first coupling member.

18. The method as claimed in claim 17, wherein the second coupling member is snap fitted with the second fastener.

19. The method as claimed in claim 17 or claim 18, wherein the relative linear movement is in a direction parallel to a longitudinal extent of the connector.

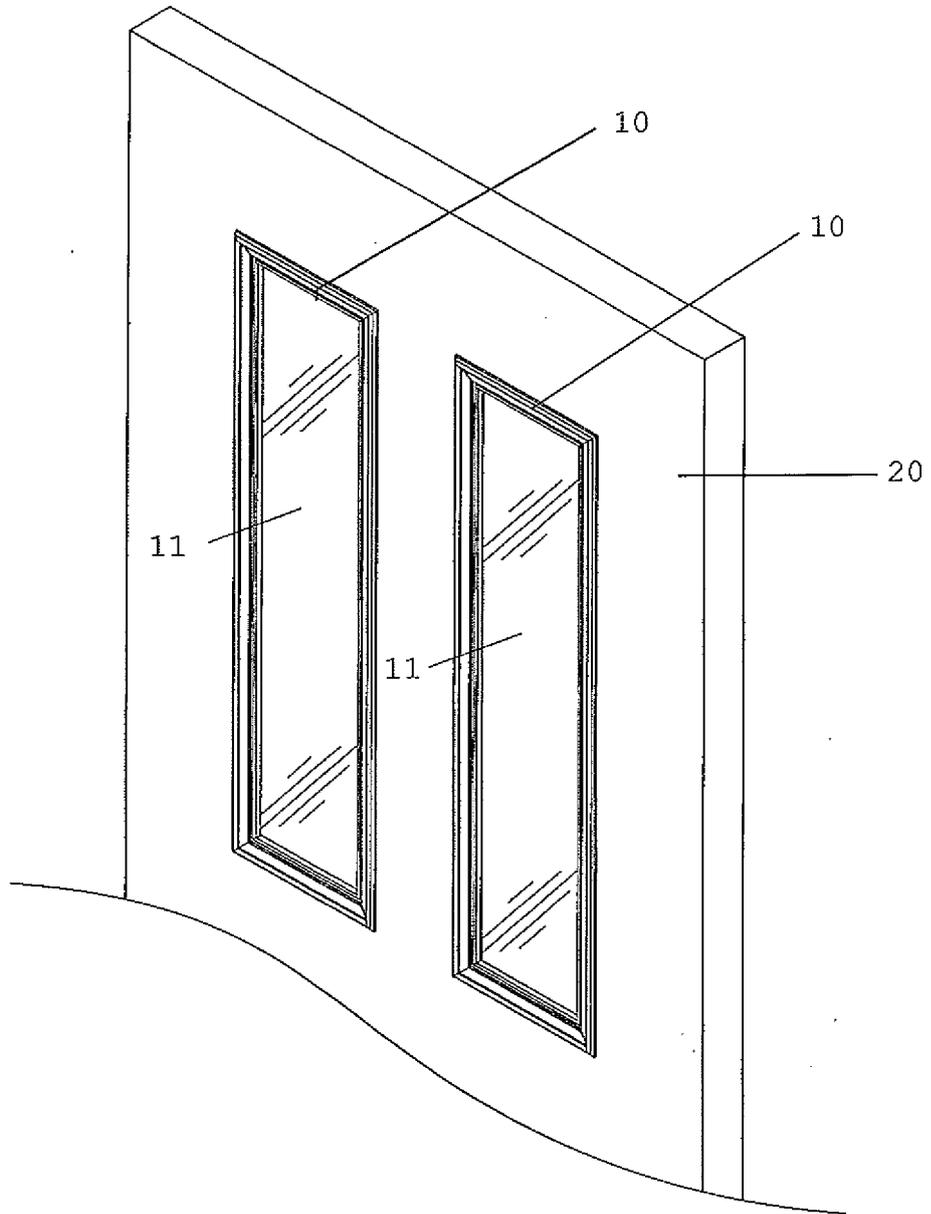


Figure 1.

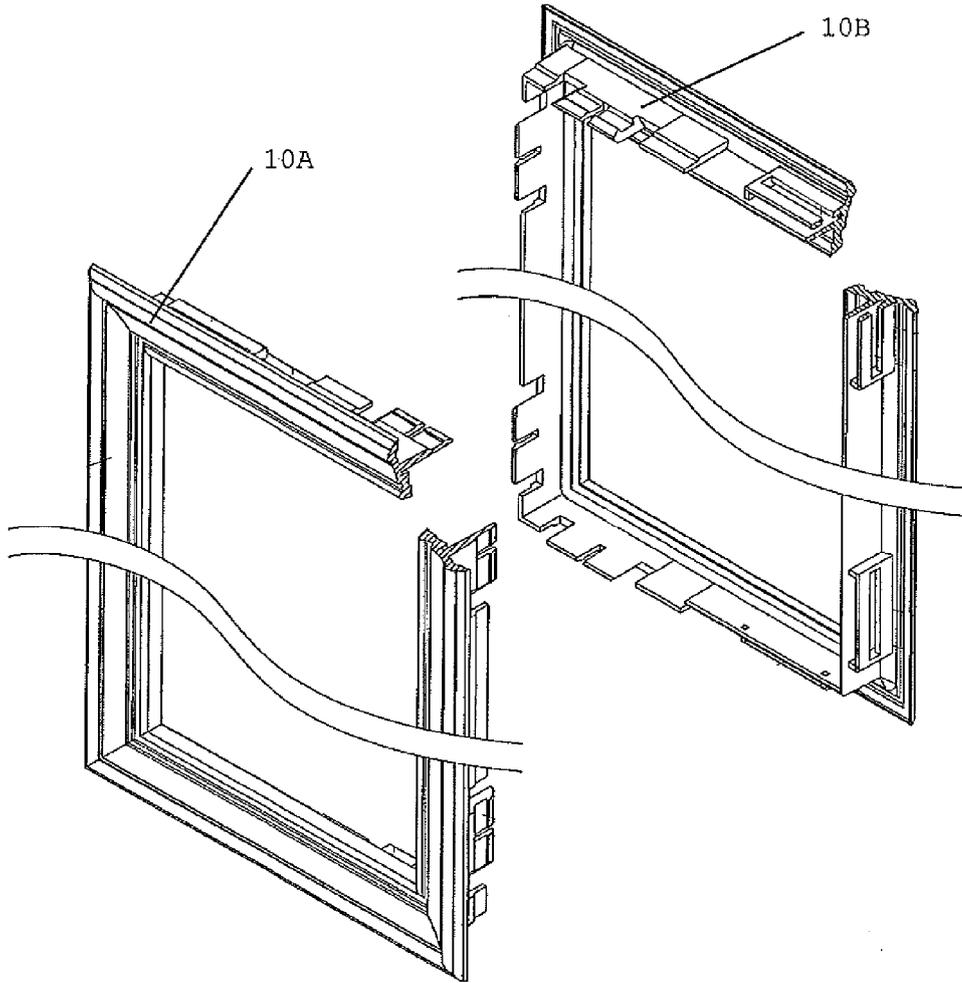


Figure 2

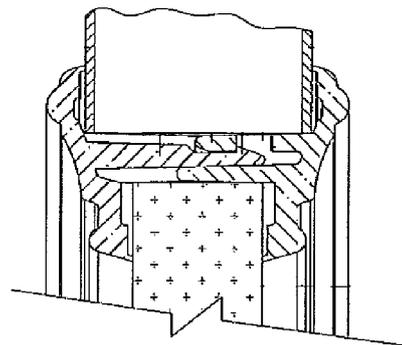


Figure 3

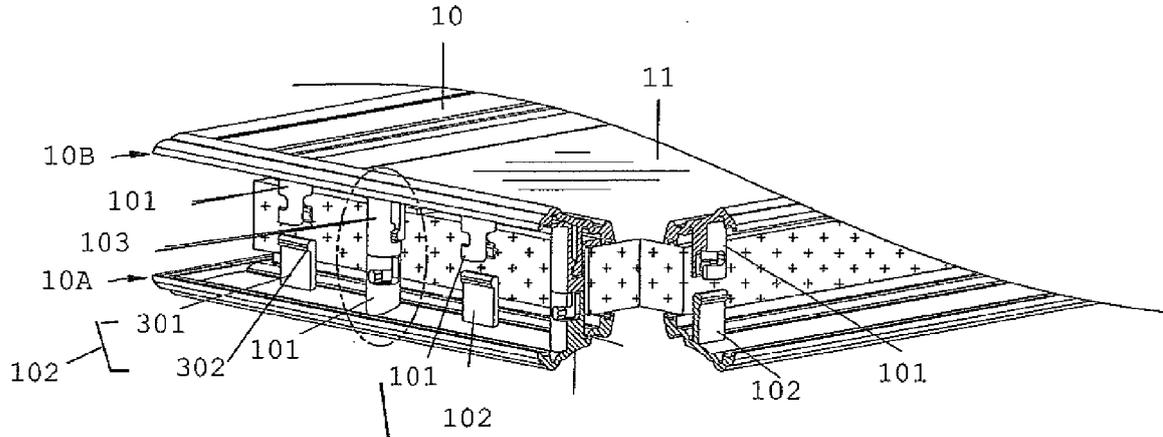


Figure 4A

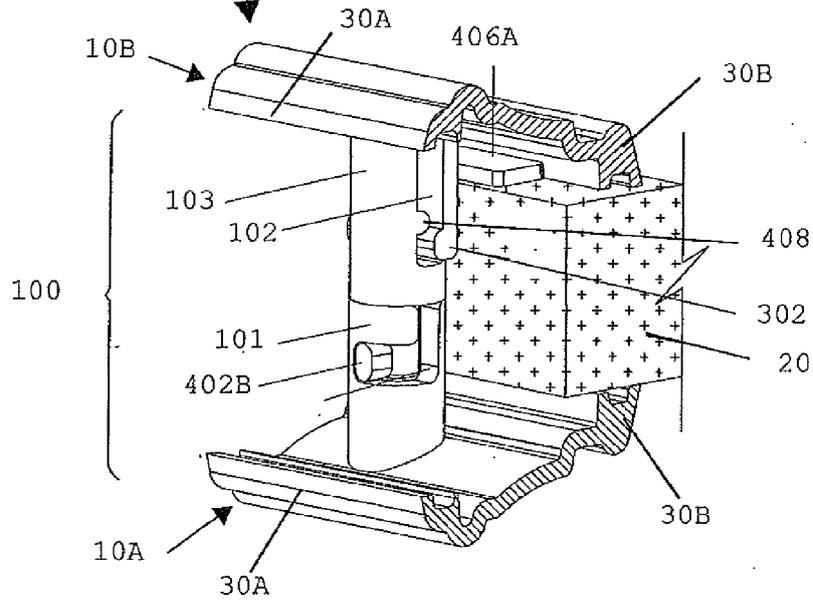


Figure 4B

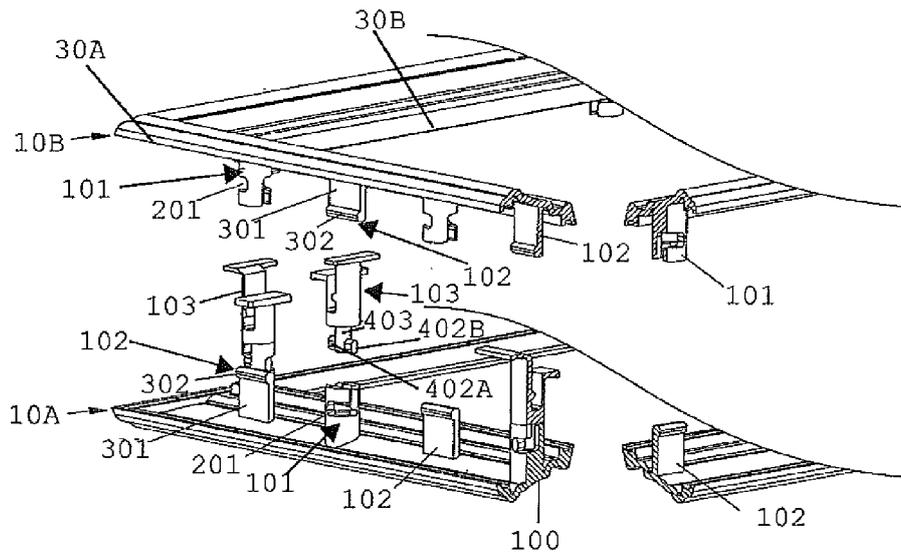


Figure 5

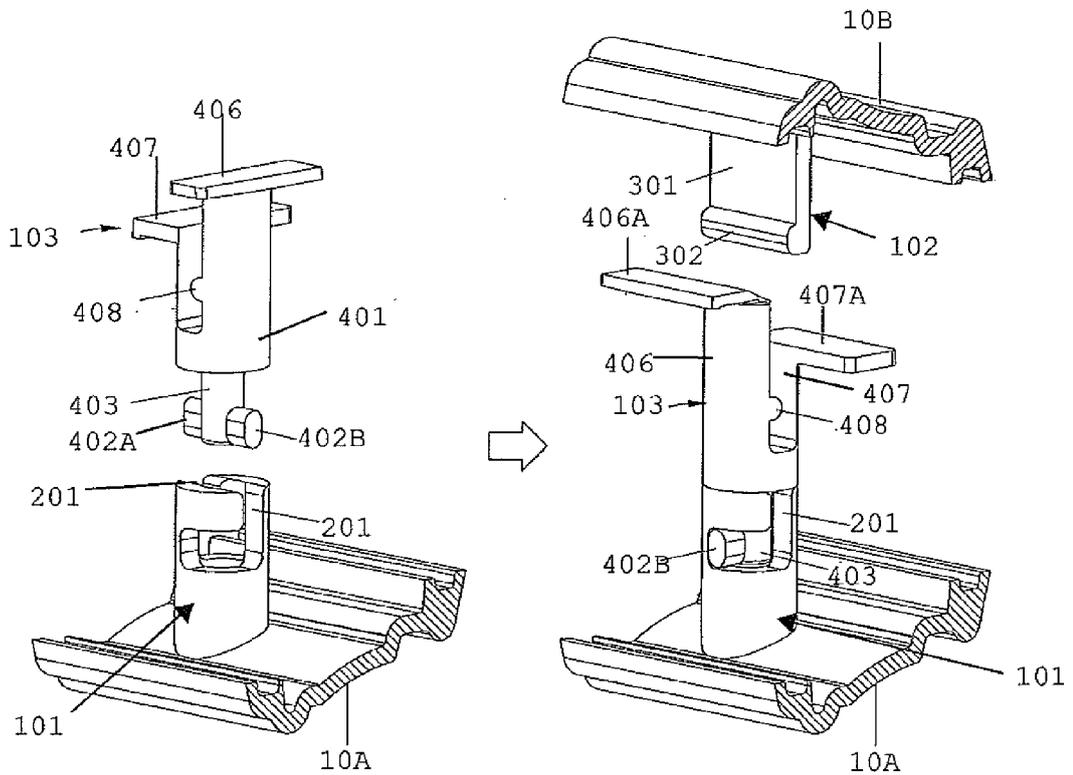


Figure 6A

Figure 6B



EUROPEAN SEARCH REPORT

Application Number
EP 13 15 6634

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 August 2013	Examiner Jülich, Saskia
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03/02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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