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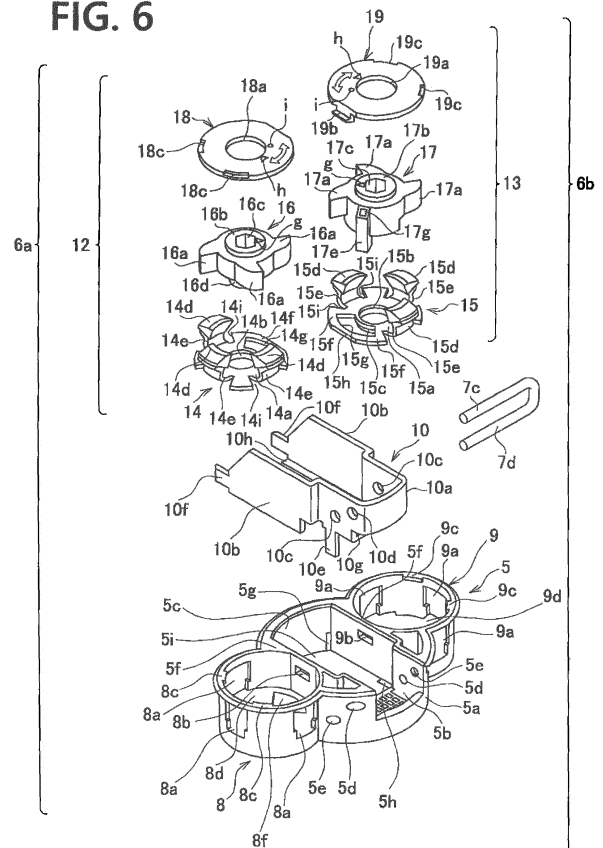
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(54) **SLIDE HINGE AND CABINET**

(57) To provide a slide hinge configured such that a coupling case can be attached to a honeycomb board in a single operation, wherein a fear of problems in terms of strength is eliminated, even if a coupling case composed of the coupling case and the attaching means are made of synthetic resin, as well as a cabinet using such a slide hinge, the slide hinge comprises a slide hinge main body attached to a cabinet main body, a coupling case inserted into and fixed to an attaching hole provided on a door, and a coupling piece for openably and closably coupling the cabinet main body and the coupling case via a hinge pin, wherein an attaching means capable of attaching the coupling case to the door even without using attaching screws is provided. The slide hinge further comprises diameter enlarging means provided in each of the attaching case portions, wherein a reinforcing frame body is provided by inserting the hinge pin at a spot to which the hinge pin is attached.

FIG. 6



Description

FIELD OF THE INVENTION

[0001] The invention relates to a slide hinge also referred to as a concealed hinge which is used for opening and closing a door in furniture such as cabinets intended for use in common households or offices; the invention also relates to a cabinet using such a slide hinge.

BACKGROUND ART

[0002] Some sorts of furniture, such as storage shed, large furniture, furnishing and storage box, are installed in common households, while other sorts are used in the office. For both categories of furniture, a cabinet is a representative item. The furniture as above described, and in particular cabinet, commonly uses a slide hinge structured as described in Japanese Laid-Open Patent Application No. 2003-367 or Japanese Utility Model Registration No. 3090408. Namely, the publicly known slide hinge of this sort basically comprises a slide hinge main body attached to a cabinet main body so as to be adjustable relative to the latter in a slidable manner, a coupling case housed in attaching holes provided on the door side and fixed into the hole using attaching screws, and a coupling piece for coupling the coupling case to the hinge main body.

[0003] If a conventional slide hinge as above described includes a coupling case attached to a door of wooden solid material, attaching screws well fasten the coupling case onto the door, so that the door will not easily escape from the coupling case; in recent years however, a different type of doors is increasingly used, wherein the door comprises a core, e.g. honeycomb cardboard, on which attaching screws do not work well, and thin dressing boards stuck onto the both surfaces of the core.

[0004] Even if an attempt is made in this case to fix a coupling case of a slide case (which is to be attached to the door) onto a door with a core of honeycomb cardboard, on which screws do not work well, there has been a problem in that the coupling case cannot be firmly fixed to the door or escapes from the door during usage after fixation.

[0005] Therefore, the Applicant's affiliated company, Katoh Electrical Machinery, proposed an inexpensive slide hinge configured such that a coupling case can be easily attached even to a door or a cabinet main body which uses a core of honeycomb cardboard, on which screws do not work, and a fear of escape following attachment is eliminated (Japanese Laid-Open Patent Application No. 2014-88755). Though the slide hinge according to the previous application has an excellent structure in that the coupling case of the slide hinge can be attached to a honeycomb board in a single operation with no use of attaching screws, etc., but in case of the coupling case and the attaching means made of synthetic resin, there is still a fear in terms of strength, thus it is

necessary to use an expensive resin material or a case of thick material, so that the product as a whole is expensive or the coupling case is greater in size. Therefore, countermeasures are required to such a situation.

SUMMARY OF THE INVENTION

[0006] An object of the invention is therefore to provide a slide hinge configured such that a coupling case can be attached to a honeycomb board in a single operation, wherein a fear of problems in terms of strength is eliminated, even if a coupling case composed of the coupling case and the attaching means are made of synthetic resin, as well as a cabinet using such a slide hinge.

[0007] To achieve the above-mentioned object, the invention according to claim 1 is a slide hinge comprising a slide hinge main body attached to a cabinet main body, a coupling case inserted into and fixed to an attaching hole provided on a door, and a coupling piece for openably and closably coupling the cabinet main body and the coupling case via a hinge pin, wherein attaching means capable of attaching the coupling case to the door even without using attaching screws are provided, and wherein the attaching means are composed of a pair of attaching case portions continuously provided integrally with both side portions of the coupling case, and of diameter enlarging means provided in each of the attaching case portions, characterised in that a reinforcing frame body is provided by inserting the hinge pin at a spot to which the hinge pin is attached.

[0008] The invention according to claim 2 is a slide hinge comprising a slide hinge main body attached to a cabinet main body, a coupling case of synthetic resin inserted into and fixed to an attaching hole provided on a door, and a coupling piece for openably and closably coupling the cabinet main body and the coupling case via a hinge pin, wherein attaching means capable of attaching the coupling case to the door even without using attaching screws are provided, and wherein the attaching means are composed of a pair of attaching case portions also made of synthetic resin continuously provided integrally with both side portions of the coupling case, and of diameter enlarging means provided in each of the attaching case portions, characterised in that the diameter enlarging means comprise a locking plate having a locking piece, wherein a claw portion is provided so as to protrude outside from the attaching case portions, and the locking piece is imparted with elasticity, an operating plate having a plurality of pressurizing portions rotatably housed in each locking plate and protruding from an outer circumference of the locking plate and a tool mounting portion toward a tip on a central portion, wherein a rotation angle of the operating plate is controlled by a stopper means within a predetermined range, and a cap having a bearing hole for pivotally supporting the tool mounting portion on a central portion of the cap, wherein the cap is attached to each pressurizing portion so as to be attachable and detachable, and that a reinforcing frame

body is provided by inserting the hinge pin at a spot to which the hinge pin is attached.

[0009] In an invention according to claim 3, the stopper means of each of the operating plates in an invention according to claim 2 can be composed of stopper pieces passing through a first guide hole provided on each locking plate and a second guide hole provided on each attaching case portion so as to overlap the first guide hole.

[0010] An invention according to claim 4 is characterised in that projecting portion(s) for controlling a slide of the stopper pieces are provided on one or both of the first guide hole and the second guide hole in the slide hinge according to claim 3.

[0011] An invention according to claim 5 is characterised in that each claw portion of each of the locking plates is normally housed inside each attaching case portion in an invention according to claim 2.

[0012] An invention according to claim 6 is characterised in that the reinforcing frame body according to one of claims 1 and 2 has substantially a U-shape in a plan view and runs along both inner sides of housing concave portions provided on the coupling case for housing a tip side of the slide hinge main body to reach both inner sides of coupling piece housing groove portions so that it is fixed.

[0013] In any of the above-mentioned inventions, an invention according to claim 7 is also applicable to the one, wherein an attaching hole of the coupling case is provided on the cabinet main body side.

[0014] An invention according to claim 8 is a cabinet characterised in that a slide hinge according to one of claims 1 to 6 is attached thereto.

[0015] The invention is constructed as described in the foregoing, so that in an invention according to claim 1, a slide hinge comprises a slide hinge main body attached to a cabinet main body, a coupling case inserted into and fixed to an attaching hole provided on a door, and a coupling piece for openably and closably coupling the cabinet main body and the coupling case via a hinge pin, wherein, in inserting and fixing the coupling case to an attaching hole provided on the side of the door made up of honeycomb cardboard, on which screws do not work, attaching case portions also made up of synthetic resin are connected with both sides of the coupling piece, diameter enlarging means are provided in the attaching case portions, and a reinforcing frame body is provided by inserting the hinge pin into the coupling case; in this manner, the coupling case can be firmly fixed to the attaching hole with no use of attaching screws and nails, so that a risk of escape following attachment is eliminated; furthermore, the strength of the coupling case can be enhanced by the reinforcing frame body, as well as its durability.

[0016] In an invention according to claim 2, when tools such as wrench are inserted one by one into a tool mounting portion provided on each of operating plates and the operating plates are thus rotated, pressurizing portions rotating together pushes a claw portion provided on a

locking piece of each of locking plates out of attaching case portions, and the claw portion provided on each of the locking pieces bites into a circumferential wall of the connecting hole; in this manner, the coupling case can be firmly fixed to the attaching hole with no use of attaching screws and nails, so that a risk of escape following attachment is eliminated; furthermore, the strength of the coupling case can be enhanced by the reinforcing frame body, as well as its durability.

[0017] If the invention is constructed as in claim 3, in addition to the operation and effect which it has according to claim 2, stopper means of each of locking plates move together with a rotation of operating plates to stop the rotation of the operating plates; in this manner, the rotation of pressurizing portions can be stopped when each claw portion of each of locking pieces bites into a circumferential wall of the connecting hole, so that it is possible to prevent the pressurizing portions from excessively rotating.

[0018] If the invention is constructed as in claim 4, in addition to the operation and effect which it has according to claim 2, this effectively prevents operating plates from return to the original position, when the diameter of the claw portions is enlarged.

[0019] If the invention is constructed as in claim 5, it has the operation and effect that the claw portion of the locking piece is not an obstacle to mounting the attaching case portion to the connecting hole.

[0020] If the invention is constructed as in claim 6, it has the operation and effect that the strength of a coupling case can be enhanced by a reinforcing frame body, as well as a durability of a slide hinge, in a simple structure.

[0021] If the invention is constructed as in claim 7, any of the above-mentioned inventions is applicable to a cabinet comprising the coupling case of the slide hinge attached on a cabinet main body using a board, wherein the board is made up of thin dressing boards being stuck onto the both surfaces of the honeycomb cardboard core.

[0022] And then, if the invention is constructed as in claim 8, the honeycomb door can be easily and firmly attached to the cabinet main body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1 shows a perspective view illustrating an example of a cabinet to which a slide hinge according to the invention is attached;

FIG. 2 shows an elevation view illustrating a state of a part of a cabinet to which a slide hinge according to the invention is attached;

FIG. 3 shows an elevation view illustrating a state of a cabinet to which a slide hinge according to the invention is attached, wherein a door is opened;

FIG. 4 shows a slide hinge according to the invention, FIG. 4A being a plan view illustrating a state shown

in FIG. 3 in a partial cross section, and FIG. 4B - a plan view a state shown in FIG. 4A, wherein a door is closed, also in a partial cross section; FIG. 5 shows a longitudinal cross section of a part including a coupling case as shown in FIG. 4; FIG. 6 shows an exploded perspective view of a part including a coupling case and attaching means of a slide hinge according to the invention; FIG. 7 shows an elevation view of a part including a coupling case and attaching case portions of a slide hinge according to the invention; FIG. 8 shows a locking plate of a slide hinge according to the invention, FIG. 8A being its plan view, FIG. 8B - its left-hand side view, and FIG. 8C - a cross section of FIG. 8A in line A-A; FIG. 9 shows an operating plate of a slide hinge according to the invention, FIG. 9A being its plan view, FIG. 9B - its elevation view, and FIG. 9C - a cross section of FIG. 9A in line B-B; FIG. 10 shows a cap of a slide hinge according to the invention, FIG. 10A being its plan view, FIG. 10B - its elevation view, FIG. 10C - a cross section of FIG. 10A in line C-C and FIG. 10D - a cross section of FIG. 10A in line D-D; FIG. 11 shows a reinforcing frame body according to the invention, FIG. 11A being its elevation view, FIG. 11B - its plan view, and FIG. 11C - its right-hand side view; FIG. 12 illustrates a state of attaching means of a slide hinge according to the invention before the operation, FIG. 12A being its plan view, and FIG. 12B - its longitudinal cross section; and FIG. 13 illustrates a state of attaching means of a slide hinge according to the invention after the completion of the operation, FIG. 13A being its plan view, and FIG. 13B - its longitudinal cross section.

EMBODIMENTS

[0024] In the following, the best modes for implementing the invention are described based the drawings. The best modes for implementing the invention have structure as shown in the following embodiments, namely: attaching means 6a, 6b are provided on a coupling case 5 side of a slide hinge 1, wherein the attaching means 6a, 6b and the coupling case 5 are both made of synthetic resin, and a third hinge pin 7c and a fourth hinge pin 7d are inserted through the coupling case 5 to attach a reinforcing frame body thereto; in this manner, these best modes ensure that the coupling case 5 can be fixed to a door 2b side or to a cabinet main body 2a side even without using attaching screws, so that a reinforcing effect of the coupling case can be enhanced, as well as its durability. In the following, reference is made to an embodiment of the coupling case 5 attached to the door 2b side, but needless to say, the invention is also applicable to the coupling case 5 attached to the cabinet main body 2a side. Normally two such slide hinges 1, one above and

one below, are used for a single door 2b, but since both have an identical structure, so in the following, reference is made to one slide hinge only.

5 [EMBODIMENT 1]

[0025] FIG. 1 illustrates an example of a cabinet 2 to which a slide hinge 1 according to the invention is attached. The slide hinge 1 according to the invention is also commonly referred to as concealed hinge and attached between a door 2b side and a cabinet main body 2a side of the cabinet 2. As shown in FIGS. 3 to 5 of the attached drawings, the slide hinge 1 comprises a slide hinge main body 3 attached to the cabinet main body 2a side; a first coupling piece 4a and a second coupling piece 4b being a pair, wherein their respective one end portions are rotatably coupled to the slide hinge main body 3 via hinge pins 7a, 7b; a coupling case 5 of synthetic resin inserted into and fixed to an attaching hole 2c provided on a door 2b side, wherein respective other end portions of the first coupling piece 4a and the second coupling piece 4b are also rotatably coupled to the coupling case via a third hinge pin 7c and a fourth hinge pin 7d; attaching means 6a, 6b provided so as to be connected with the coupling case 5 in connecting holes 2d, 2e provided on the door 2b side in communication with the attaching hole 2c at its upper and lower positions; and a reinforcing frame body 10 attached to the coupling case 5 side by inserting the third hinge pin 7c and the fourth hinge pin 7d therein. The coupling case 5 is inserted into and fixed to the attaching hole 2c in a single operation using the attaching means 6a, 6b, so that it is possible that the coupling case 5 is attached, with no use of nails and attaching screws, etc., to a door 2b, on which such nails and attaching screws do not work, the durability of the coupling case 5 is enhanced by the reinforcing frame body 10.

[0026] FIGS. 2 to 5 show a state of a slide hinge 1 attached to a cabinet 2, and especially as shown in FIG. 2, a slide hinge main body 3 is detachably attached to a catch 11 (though detailed explanation is not made here) attached to a cabinet main body 2a side, and the coupling case 5 can be attached to the attaching hole 2c provided on the door 2b side, as well as to connecting holes 2d, 2e in a single operation via the attaching means 6a, 6b. In other words, as per the coupling case 5, the coupling case 5 is housed in the attaching hole 2c provided on the door 2b side, and the attaching means 6a, 6b connected with the coupling case 5 are inserted into the connecting holes 2d, 2e provided in communication with the attaching hole 2c at its upper and lower positions, and thus the attaching means 6a, 6b are fixed to the connecting holes 2d, 2e in a single operation; in this manner, the coupling case 5 is fixed to the door 2b in a single operation. In the meantime, the slide hinge main body 3 is shown as the one attachable and detachable in a single operation to the catch 11, but it can be also constructed so as to be attachable to the cabinet main body 2a side using attach-

ing screws not shown. The catch 11 is a known art, so no explanation is made on its structure, as well as operation and effect in the following embodiments.

[0027] Especially as shown in FIG. 4, the door 2b according to the embodiment is made up of thin dressing plywood boards 2g, 2g, 2g stuck on outer surfaces of a honeycomb cardboard core 2f; however, needless to say, the door 2b is not limited thereto, but also applicable as a door made up of other materials on which nails and attaching screws do not work.

[0028] As seen in the drawings, the slide hinge main body 3, the first coupling piece 4a, the second coupling piece 4b and the coupling case 5 of the slide hinge 1 are not specifically limited in their structure, but various known parts can be used for these elements. In the meantime, reference is made to the one according to the embodiment: the slide hinge main body 3 is a pressed metallic piece, elongated and having the shape of U in cross section. Respective one end portions of the first coupling piece 4a and the second coupling piece 4b, both made of metal are rotatably coupled to a tip portion of the slide hinge main body 3 via the first hinge pin 7a and the second hinge pin 7b.

[0029] Especially as shown in FIGS. 4 to 7, the coupling case 5 is a moulded piece made of synthetic resin having a shape substantially of cup which comprises a bottom plate 5i, wherein a housing concave portion 5c is provided on its central portion for housing the first coupling piece 4a, the second coupling piece 4b and the tip portion side of the slide hinge main body 3, while the door 2b is closed relative to the cabinet main body 2a, as well as a coupling portion 5a for coupling the first coupling piece 4a and the second coupling piece 4b via the third hinge pin 7c; furthermore, the fourth hinge pin 7d and a coupling piece housing groove portion 5b slightly narrower than the housing concave portion 5c is provided on the coupling portion 5a. On the coupling portion 5a, coupling holes 5d, 5e have their respective openings facing the coupling piece housing groove portion 5b, and other end portions of the first coupling piece 4a and the second coupling piece 4b are coupled to the coupling holes 5d, 5e via one hinge pin, that is the third hinge pin 7c and other hinge pin, that is the fourth hinge pin 7d, both folded in the shape of U. Especially as shown in FIGS. 3, 6 and 11, the reinforcing frame body 10 made of stainless steel such as SUS and having substantially the shape of U is attached to the housing concave portion 5c and the coupling piece housing groove portion 5b, with the third hinge pin 7c and the fourth hinge pin 7d as mentioned above being inserted into hinge pin coupling holes 10c, 10d provided on a base portion 10a of the reinforcing frame body.

[0030] Especially as shown in FIGS. 3, 6 and 11, the reinforcing frame body 10 has substantially the shape of U and comprises a curved and narrow base portion 10a and a pair of slightly wider fixing portions 10b, 10b provided in connection with and in parallel to the base portion 10a; the hinge pin coupling holes 10c, 10d are provided on the base portion 10a, and a pair of first locking pieces

10e, 10e are provided on the base portion 10a of the fixing portions 10b, 10b; a pair of second locking pieces 10f, 10f are provided on their respective free end sides so as to protrude in a horizontal direction. Furthermore, locking holes 5g, 5g (only one is shown in FIG. 6) and locking holes 5h, 5h (shown in FIG. 7) in which the second locking pieces 10f, 10f provided on an open end side and the first locking pieces 10e, 10e provided on a free end side of the reinforcing frame body 10 are respectively inserted and fixed are provided on the housing concave portion 5c of the coupling case 5; a pair of first abutting portions 10g, 10g for abutting a bottom portion of the coupling case 5, and second abutting portions 10h, 10h are respectively provided.

[0031] As shown in FIGS. 3 to 7, the attaching means 6a, 6b are composed of a pair of attaching case portions 8, 9 connected with an upper and lower portions of the coupling case 5 over partition walls 5f, 5f, and diameter enlarging means 12, 13 mounted on the attaching case portions 8, 9. The attaching case portions 8, 9 are both made of synthetic resin, that is the same material as the coupling case 5; each of them comprises three insertion holes 8a, 9a; 8a, 9a; 8a, 9a on its circumferential wall, and a locking hole 5h, 5h is provided on the side of the partition wall 5f, 5f between the coupling case 5 and the attaching case portions. Two each of locking holes 8c, 9c; 8c, 9c for locking a locking piece 18b, 19b of a cap 18, 19 inwardly are provided so as to protrude from each upper end edge of the attaching case portion 8, 9, and each bearing hole 8e, 9e is provided on a central portion in an axial direction of its each bottom plate 8d, 9d. An arc-shaped first guide hole 8f, 9f is provided to respectively surround each bearing hole 8e, 9e, and a projecting portion 8i, 9i is provided on one side on the central portion of the first guide hole 8f, 9f. In the meantime, the projecting portions 8i, 9i can be also provided on the side of the second guide holes 14g, 15g, either separately or one over the other. Furthermore, the housing concave portion 8g, 9g provided on the attaching case portions 8, 9 for housing the diameter enlarging means 12, 13 comprises a flat portion 8h, 9h on the side of a partition wall 5f, 5f as seen from a plane.

[0032] The diameter enlarging means 12, 13 are respectively composed of a pair of locking plates 14, 15, a pair of operating plates 16, 17, and a pair of caps 18, 19. Each locking plate 14, 15 is e.g. moulded of synthetic resin having mechanical strength such as ABS, has a disc shape in a plan view, and especially as shown in FIG. 8, comprises a bearing hole 14b, 15b on an upper surface side of a central portion of its bottom plate portion 14a, 15a; furthermore, a boss portion 14c, 15c inserted into a bearing hole 8e, 9e provided on each attaching case portion 8, 9 is provided on a lower surface side, having an axis centre common with the bearing hole 14b, 15b. A locking piece 14e, 15e; 14e, 15e; 14e, 15e comprising each claw portion 14d, 15d; 14d, 15d; 14d, 15d, respectively erected at predetermined intervals and provided on respective tips is provided so as to protrude

upward from an outer circumference of the bottom plate portion 14a, 15a; a second guide hole 14g, 15g in the arc shape is provided on a protruding piece 14f, 15f protruding in a direction of an identical plane from the bottom plate portion 14a, 15a; thus, when each locking plate 14, 15 is mounted in each attaching case portion 8, 9, each protruding piece 14f, 15f abuts against each flat portion 8h, 9h to prevent each locking plate 14, 15 from rotating, and each second guide hole 14g, 15g overlaps each first guide hole 8f, 9f. Especially as shown in FIG. 8, a locking piece 14e, 15e; 14e, 15e; 14e, 15e is moulded so as to fall inward, so that each claw portion 14d, 15d; 14d, 15d; 14d, 15d does not protrude outward from each insertion hole 8a, 9a; 8a, 9a; 8a, 9a of the attaching case portion 8, 9, but is housed inside to have elasticity.

[0033] Each operating plate 16, 17 is preferably made of synthetic resin, and as shown in FIGS. 12 and 13, comprises a plurality of pressurizing portions 16a, 17a; 16a, 17a; 16a, 17a provided so as to radially protrude from its outer circumference; an insertion hole 16c, 17c into which e.g. wrench is inserted is provided on a disc-shaped tool mounting portion 16b, 17b, and further a stopper piece 16f, 17f for passing through the second guide hole 14g, 15g provided on each locking plate 14, 15 and the first guide hole 8f, 9f provided on each attaching case portion 8, 9 is also provided downward from one side portion of the insertion hole. Still further, an axis portion 16d, 17d inserted into the bearing hole 14b, 15b provided on each locking plate 14, 15, having an axis centre in common with the tool mounting portion 16b, 17b, is also provided on a lower surface side. Each stopper piece 16f, 17f has its inner portion shaped to be a cavity 16g, 17g, so that it is structured so as to exhibit resistance to some degree, when it slides through the first guide hole 8f, 9f and the second guide hole 14g, 15g and abuts against the projecting portion 8i, 9i, as well as to deform to allow for its own passage.

[0034] Each cap 18, 19 is also preferably made of synthetic resin, and in this embodiment, as shown in FIGS. 3, 6 and 10, it has substantially a disc shape; a bearing hole 18a, 19a is provided on its central portion in an axial direction; although not all is shown on each cap 18, 19, but as is apparent from comparison between the caps 18, 19 as they are shown, a locking piece 18b, 19b (only one is shown) inserted into and locked by the locking hole 8b, 9b provided on the attaching case portion 8, 9 is provided on one side on its circumference; furthermore, a pair of locking concave portions 18c, 19c; 18c, 19c locked by the locking pieces 8c, 9c; 8c, 9c provided on the attaching case portion 8, 9 are provided, each having an interval of 120 degrees from the locking piece 18b, 19b, on its outer circumference.

[0035] In the meantime, a bearing hole 8e, 9e is provided on a central portion on the bottom plate 8d, 9d of each attaching case portion 8, 9. Still further, on each locking plate 14, 15, a boss portion 14c, 15c provided with a bearing hole 14b, 15b for housing the axis portion 16d, 17d of the operating plate 16, 17 is provided in the

centre of its bottom plate 14a, 15a, and the boss portion 14c, 15c is inserted into and borne by the bearing hole 8e, 9e provided on a central portion on the bottom plate 8d, 9d of each attaching case portions 8, 9. Still further, six notches 14i, 15i are provided on a peripheral portion of the bottom portion 14a, 15a of the locking plate 14, 15, so as to sandwich base portions of respective locking pieces 14e, 15e; 14e, 15e; 14e, 15e.

[0036] A triangle mark g, h and a circle mark i are respectively provided in vicinity of the tool mounting portion 16b, 17b of each operating plate 16, 17 and of the bearing hole 18a, 19a of each cap 18, 19. Each operating plate 16, 17 comprises the axis portion 16d, 17d extending downward from the tool mounting portion 16b, 17b; the tool mounting portion 16b, 17b is borne by the bearing hole 18a, 19a of each cap 18, 19, and a small diameter pivotally supporting portion 16f, 17f is inserted into and borne by the bearing hole 14b, 15b of each locking plate 14, 15, which assures a stable rotation movement with no axis deviation during rotation of the operating plate.

[0037] Still further, the boss portion 14c, 15c of the locking plate 14, 15 is borne by the bearing hole 8e, 9e of each attaching case portion 8, 9; in this manner, it is possible that the claw portion 14d, 15d; 14d, 15d; 14d, 15d protrudes equally outward from each attaching case portions 8, 9 through each insertion hole 8a, 9a; 8a, 9a; 8a, 9a at the time of enlarging diameter, so that it has an advantage of stable attached state.

[0038] In the following, reference is made to the procedure of installing the diameter enlarging means 12, 13 of the slide hinge 1 according to the invention in each attaching case portion 8, 9. First, each locking plate 14, 15 is inserted into the housing concave portion 8g, 9g, so as to align the straight portion 14h, 15h provided on the protruding piece 14f, 15f of the bottom plate portion 14a, 15a with the flat portion 8h, 9h of the housing concave portion 8g, 9g of each attaching case portion 8, 9. Here, the boss portion 14c, 15c provided on the bottom plate portion 14a, 15a is fitted into the bearing hole 8e, 9e provided in the attaching case portion 8, 9, and thus mounted and fixed to it, without rotating neither to the right nor to the left. Next, each operating plate 16, 17 is inserted into each locking piece 14e, 15e of the locking plate 14, 15 so as to align its pressurizing portion 16a, 17a between each locking piece 14e, 15e, as well as such that each stopper piece 16e, 17e can be inserted into the second guide hole 14g, 15g, so that the boss portion of the locking plate 14, 15 is inserted and housed into the bearing hole 14b, 15b provided on the locking plate. Then, each cap 18, 19 is pushed downward, while its locking piece 18b, 19b is engaged with the locking hole 8b, 9b and its bearing hole 18a, 19a is aligned with the tool mounting portion 16b, 17b, so that each locking concave portion 18c, 19c; 18c, 19c is locked by the locking piece 8c, 9c; 8c, 9c to be mounted in each attaching case portion 8, 9. This is the procedure of installing the diameter enlarging means 12, 13. In this state, as shown in FIGS. 12A and 12B, each claw portion 14d, 15d; 14d,

15d; 14d, 15d of each locking plate 14, 15 does not protrude outward from the insertion hole 8a, 9a; 8a, 9a; 8a, 9a of the attaching case portion 8, 9; in this manner, the invention has an advantage that it has neat appearance, and that it is easy to insert the coupling case 5 and the attaching case portion 8, 9 into the attaching hole 2c and the connecting holes 2d, 2e provided on the door 2b of the cabinet 2 of Embodiment 1, at its attachment. Moreover, when the coupling case 5 of the slide hinge 1 is detached from the door 2b, the operating plate 16, 17 is rotated anticlockwise; then, each claw portion 14d, 15d; 14d, 15d; 14d, 15d of each locking plate 14, 15 is automatically retracted through each insertion hole 8a, 9a; 8a, 9a; 8a, 9a into the attaching case portion 8, 9; in this manner, the invention has an advantage that the attaching case portion 8, 9 can be easily detached from the attaching hole 2c and the connecting holes 2d, 2e, together with the coupling case 5.

[0039] In assembly of the locking plate 14, 15, the operating plate 16, 17 and the cap 18, 19 to each attaching case portion 8, 9, first, the locking plate 14, 15 is inserted into each attaching case portion 8, 9, while the second guide hole 14g, 15g is aligned with the first guide hole 8f, 9f. Here, each claw portion 14d, 15d; 14d, 15d; 14d, 15d is structured to be fitted into the insertion hole 8a, 9a; 8a, 9a; 8a, 9a, not to protrude outward from the insertion hole; in this manner, its insertion position is stable. Next, the stopper piece 16e, 17e of the operating plate 16, 17 is inserted into the second guide hole 14g, 15g and the first guide hole 8f, 9f, as one overlaps the other, in order that it is placed toward their start-end portion. In this state, each pressurizing portion 16a, 17a; 16a, 17a; 16a, 17a is placed between respective claw portions 14d, 15d; 14d, 15d; 14d, 15d. Next, the cap 18, 19 is placed on the top of the attaching case portion 8, 9 and locked thereto as described above, then the assembly is completed. In the meantime, the triangle mark g, g provided on each tool mounting portion 16b, 17b of the operating plate 16, 17 points to the circle mark i, i provided on the cap 18, 19 at the time of completion of assembly.

[0040] At the time of attachment of the slide hinge 1 to the cabinet 2, first, the slide hinge main body 3 is pushed into the catch 11 attached to the cabinet main body 2a, so that the slide hinge can be attached to the cabinet in a single operation. Of course, it is also possible in this regard that the attaching piece not shown of known structure is provided on the slide hinge main body 3, and that this attaching piece is attached via the attaching screw. Next, the attaching case portion 8, 9 constituting the coupling case 5 and the attaching means 6a, 6b is inserted into the attaching hole 2c and the connecting holes 2d, 2e provided on the door 2b. A state of the attaching case portion 8, 9 as inserted into the connecting holes 2d or 2e is shown in cross section in FIG. 5.

[0041] Then, the tools such as wrench are inserted one by one into the insertion hole 16c, 17c provided on the tool mounting portion 16b, 17b of each operating plate 16, 17, and each operating plate 16, 17 is rotated from

the circle mark i, i provided on the cap 18, 19 in clockwise direction, until the tip of the triangle mark g provided on the operating plate 16, 17 meets that of the triangle mark h provided on the cap 18, 19; here, each pressurizing portion 16a, 17a; 16a, 17a; 16a, 17a pushes outward each claw portion 14d, 15d; 14d, 15d; 14d, 15d of each locking piece 14e, 15e; 14e, 15e; 14e, 15e of the locking plate 14, 15, so that the claw portion 14d, 15d; 14d, 15d; 14d, 15d protrudes outward through each insertion hole 8a, 9a; 8a, 9a; 8a, 9a of each attaching case portion 8, 9, and they bites into the circumferential wall of the connecting holes 2d or 2e of the door 2b; in this manner, the coupling case 5 is firmly fixed to the door 2b side.

[0042] In the meantime, the stopper means 20, 21 is provided for preventing the operating plate 16, 17 from excessively rotating at the time of rotating the operating plate 16, 17. As shown in FIGS. 6 and 9, the stopper means 20, 21 are composed of the stopper piece 16e, 17e provided on the operating plate 16, 17, the second guide hole 14g, 15g provided on each locking piece 14e, 15e and the first guide hole 8f, 9f provided on each attaching case portion 8, 9, wherein the stopper piece 16e, 17e is fitted into the second guide hole and the first guide hole; when the stopper piece 16e, 17e moves from respective start-end portions to respective terminal end portions of the first guide hole 8f, 9f and the second guide hole 14g, 15g to stop at the terminal end portions, the claw portion 14d, 15d; 14d, 15d; 14d, 15d protrudes most outward, to bite into the circumferential wall of the connecting holes 2d, 2e, as shown in FIG. 13. When returning the rotated operating plate 16, 17 to the original position, they work to prevent the operating plate from excessively returning. When the stopper piece 16e, 17e moves through the first guide hole 8f, 9f and the second guide hole 14g, 15g, the projecting portion 8i, 9i restricts the operating plate from returning to the original position, when the latter rotates to the right or to the left but does not stop movement of the stopper piece 16e, 17e. This is mentioned above.

[0043] Furthermore, it is possible that the stopper means 20, 21 is structured by providing projecting portions on the pressurizing portions 16a, 17a; 16a, 17a; 16a, 17a of the operating plate 16, 17, at the positions where the operating plate 16, 17 abuts against each locking piece 14e, 15e; 14e, 15e; 14e, 15e, when it is rotated at a predetermined angle. When the stopper means is structured as described above, its structure is simplified, and the costs are reduced.

[0044] Furthermore, reference is made to only one example of structure of the attaching means 6a, 6b in the foregoing description, but the attaching means 6a, 6b are not limited thereto. They are also applicable to respective embodiments described in Japanese Laid-Open Patent Application No. 2014-88755, the previous application of the Applicant's affiliated company (Katoh Electrical Machinery).

[0045] Since the invention is constructed as described in the foregoing, it is suitably used as a slide hinge made

e.g. of a core of honeycomb cardboard and applicable to cabinets intended for use in common households or offices, as well as a cabinet using such a slide hinge.

Claims

1. A slide hinge comprising a slide hinge main body attached to a cabinet main body, a coupling case of synthetic resin inserted into and fixed to an attaching hole provided on a door, and a coupling piece for openably and closably coupling the cabinet main body and the coupling case via a hinge pin, wherein an attaching means capable of attaching the coupling case to the door even without using attaching screws is provided, and wherein the attaching means is composed of a pair of attaching case portions continuously provided integrally with both side portions of the coupling case, and of diameter enlarging means provided in each of the attaching case portions, **characterised in that** a reinforcing frame body is provided by inserting the hinge pin at a spot to which the hinge pin is attached.
2. A slide hinge comprising a slide hinge main body attached to a cabinet main body, a coupling case of synthetic resin inserted into and fixed to an attaching hole provided on a door, and a coupling piece for openably and closably coupling the cabinet main body and the coupling case via a hinge pin, wherein an attaching means capable of attaching the coupling case to the door even without using attaching screws is provided, and wherein the attaching means is composed of a pair of attaching case portions continuously provided integrally with both side portions of the coupling case, and of diameter enlarging means provided in each of the attaching case portions, **characterised in that** the diameter enlarging means comprise a locking plate having a locking piece, wherein claw portions provided so as to protrude outside from said attaching case member, and the locking piece is imparted with elasticity, an operating plate having a plurality of pressurizing portions rotatably housed in the locking plate and protruding from an outer circumference of the operating plate and a tool mounting portion toward a tip on a central portion, wherein a rotation angle of the operating plate is controlled by stopper means within a predetermined range, and a cap having a bearing hole for pivotally supporting the tool mounting portion on a central portion of the cap, wherein the cap is attached to the attaching case member so as to be attachable and detachable, and that a reinforcing frame body is provided by inserting the hinge pin at a spot to which the hinge pin is attached.
3. The slide hinge according to claim 2, **characterised in that** the stopper means of each of the operating

plates are composed of stopper pieces passing through a first guide hole provided on each of the locking plates and a second guide hole provided on each of the attaching case portions so as to overlap the first guide hole.

4. The slide hinge according to claim 3, **characterised in that** projecting portion(s) for controlling a slide of the stopper pieces are provided on one or both of the first guide hole and the second guide hole.
5. The slide hinge according to one of claims 2 to 4, **characterised in that** each claw portion of each of the locking plates is normally housed inside each of the attaching case portions.
6. The slide hinge according to one of claims 1 and 2, **characterised in that** the reinforcing frame body has substantially a U-shape in a plan view, and runs along both inner sides of housing concave portions provided on the coupling case for housing a tip side of the slide hinge main body to reach both inner sides of coupling piece housing groove portions so that it is fixed.
7. The slide hinge according to one of claims 1 to 6, **characterised in that** an attaching hole of the coupling case is provided on the cabinet main body side.
8. A cabinet **characterised in that** a slide hinge according to one of claims 1 to 6 is attached thereto.

FIG. 1

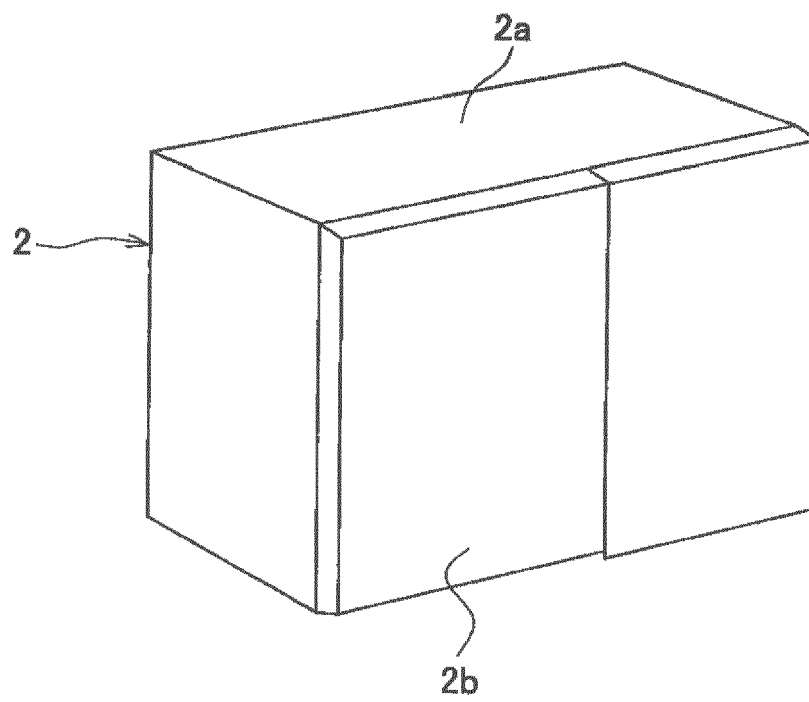
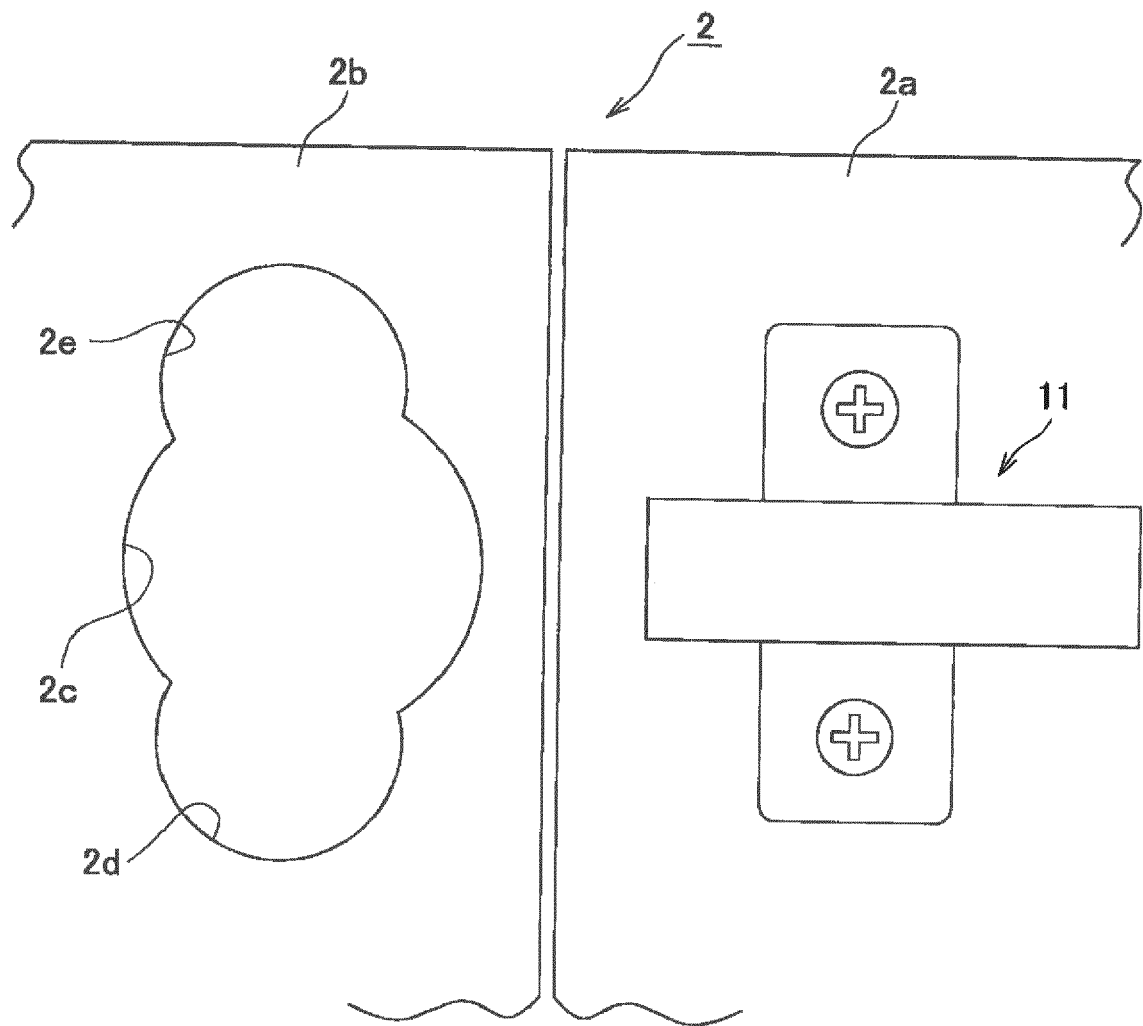


FIG. 2



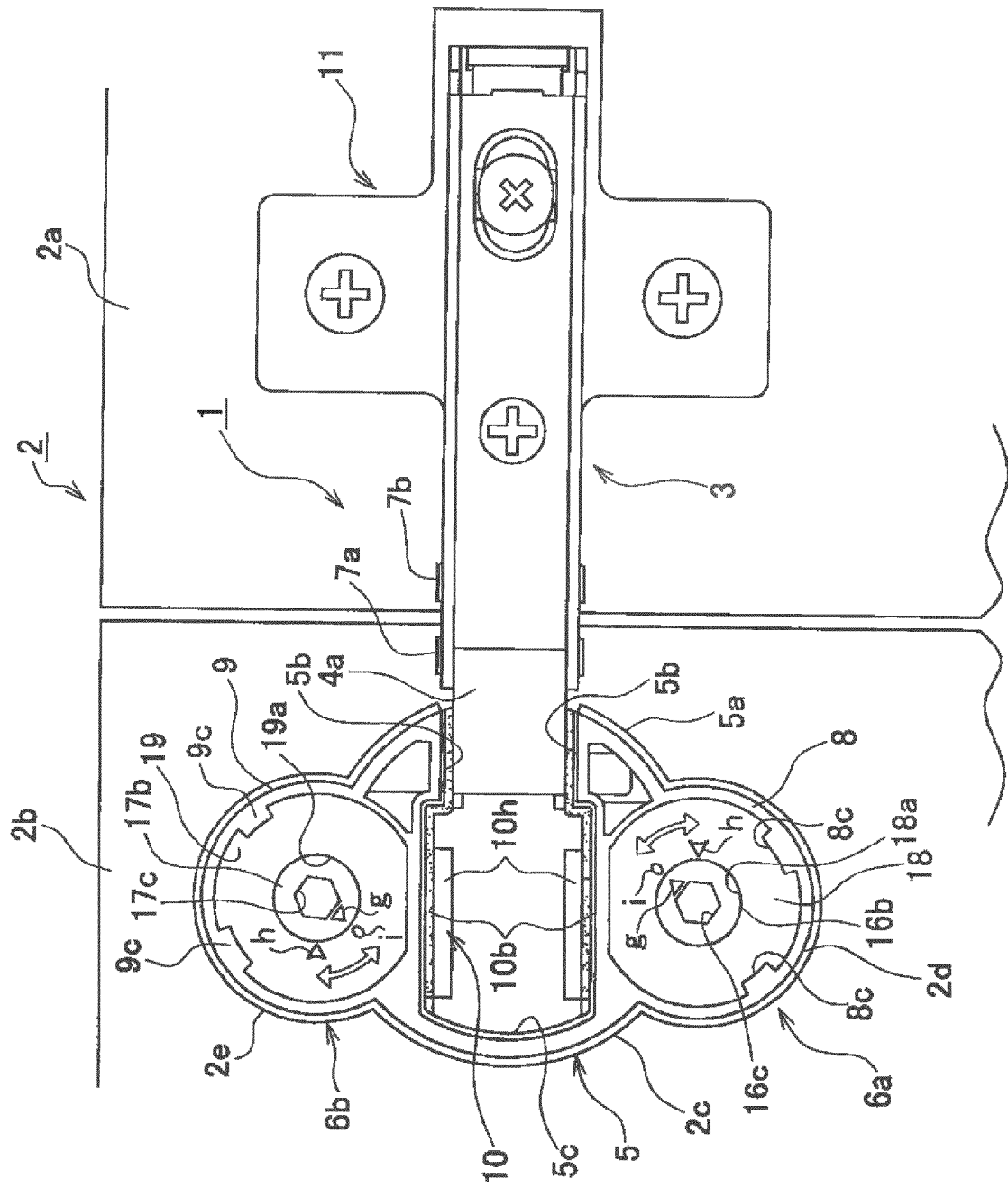


FIG. 3

FIG. 4A

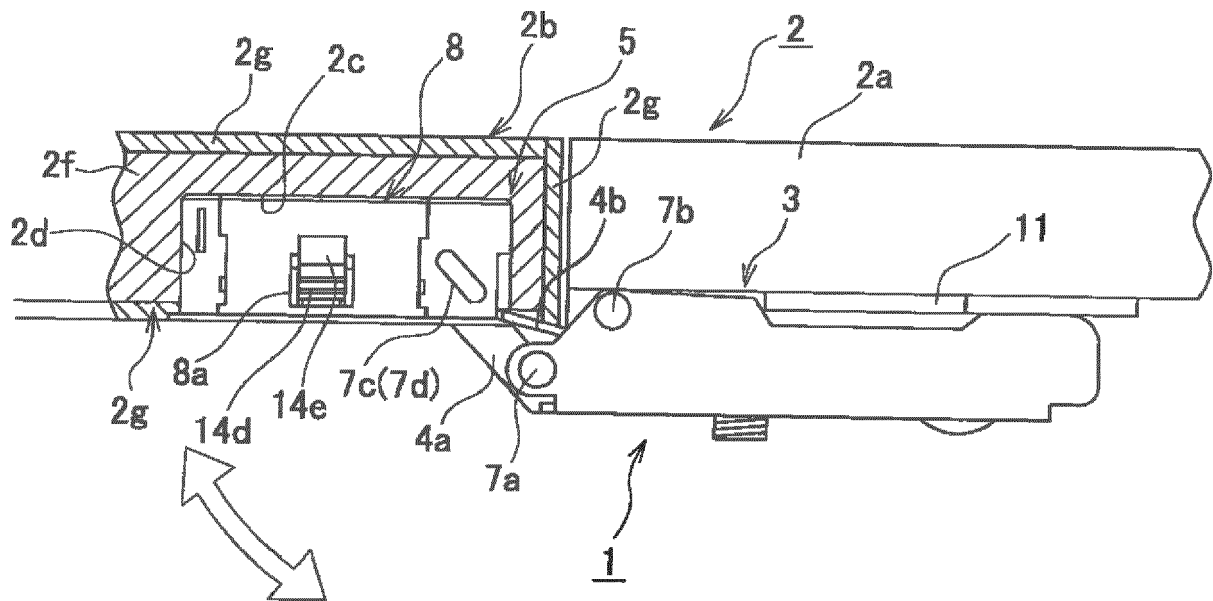


FIG. 4B

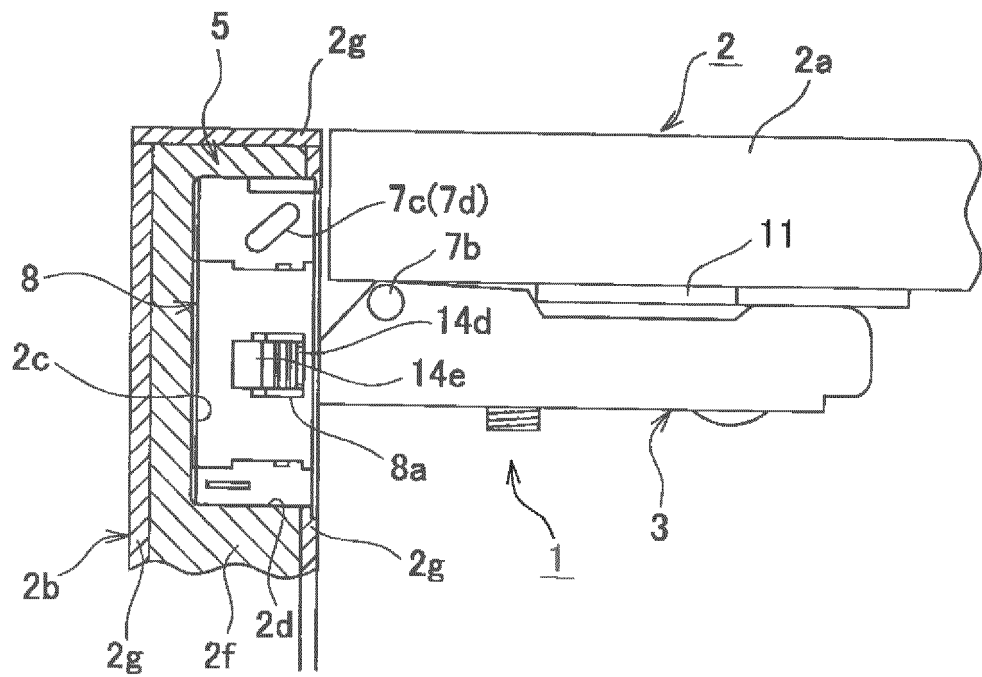


FIG. 5

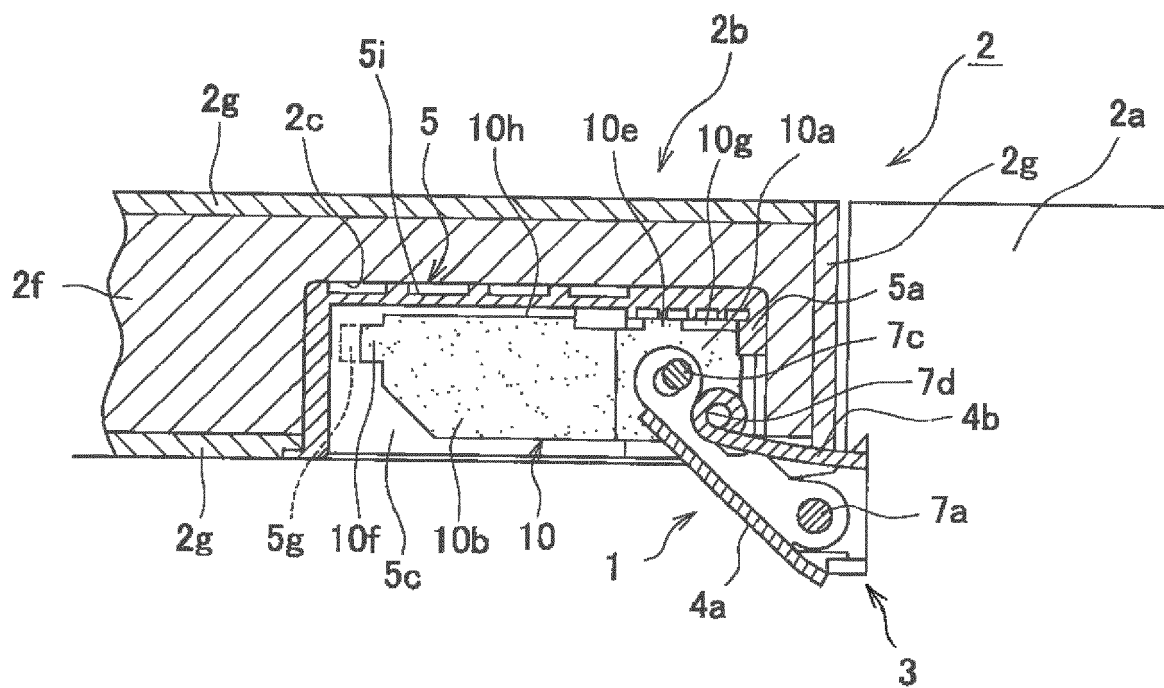


FIG. 6

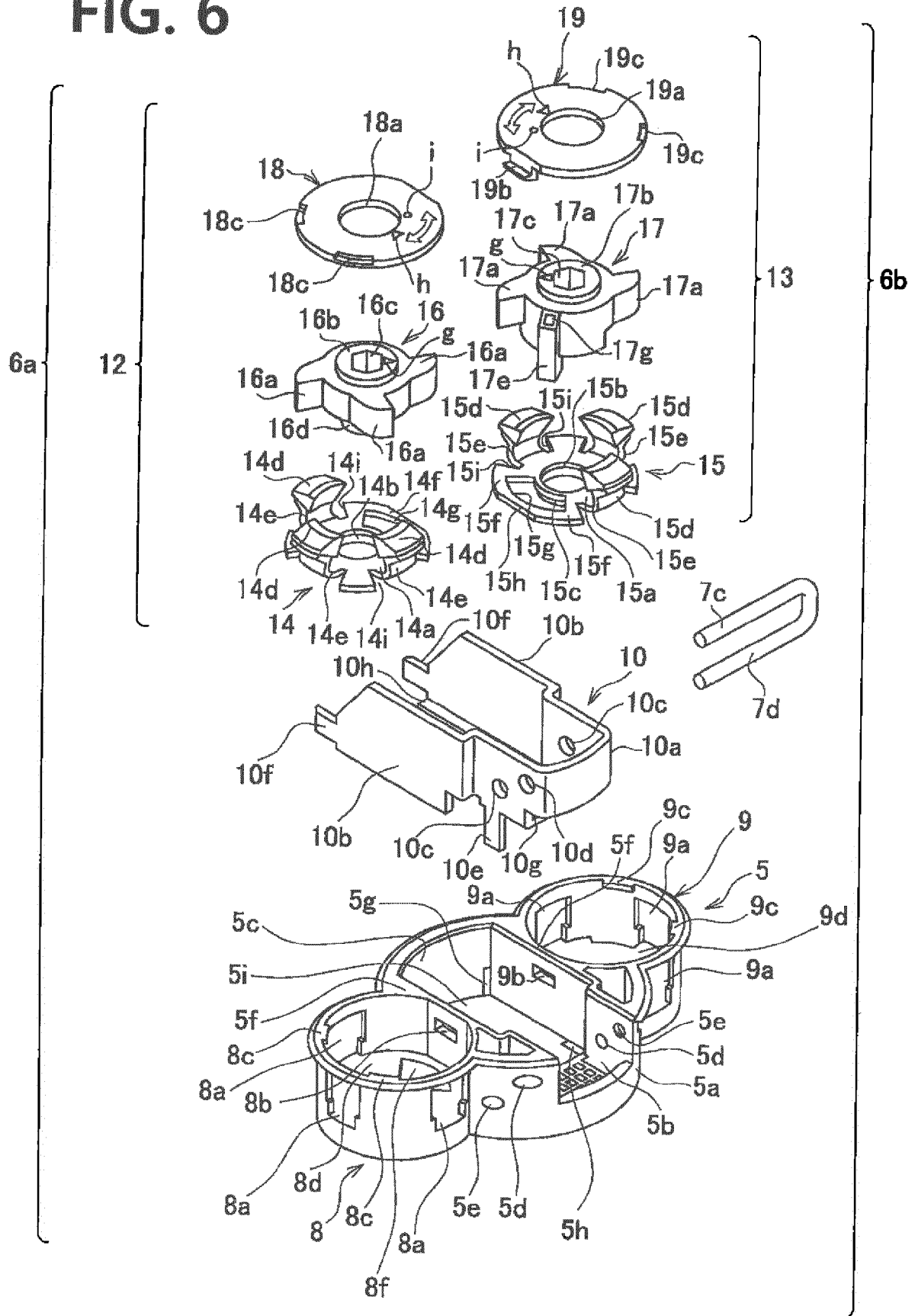


FIG. 7

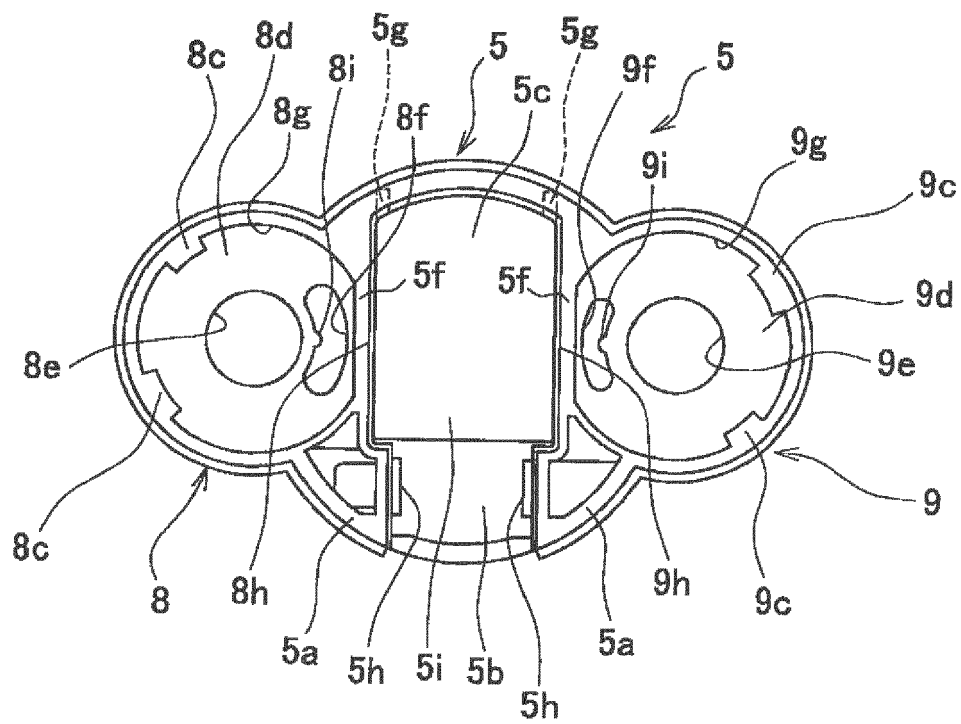


FIG. 8A

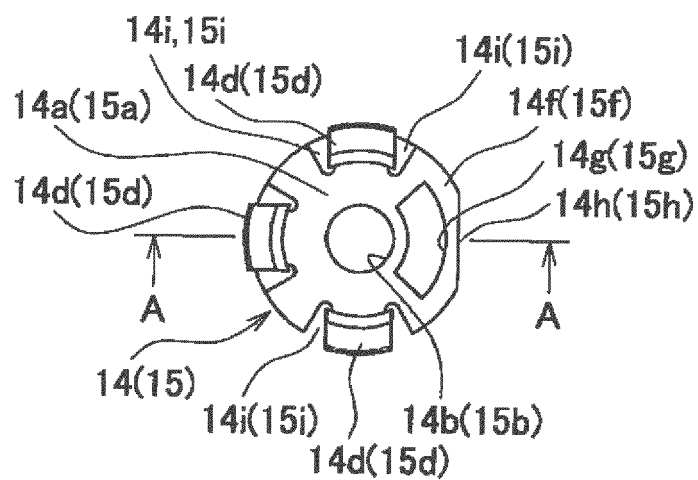


FIG. 8B

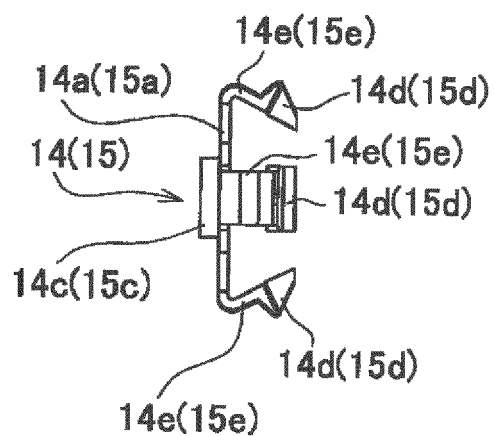


FIG. 8C

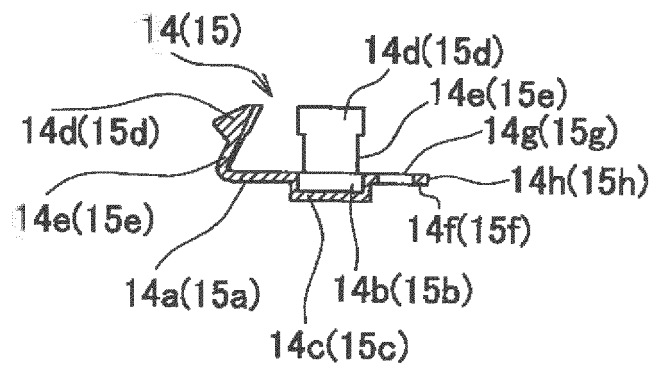


FIG. 9A

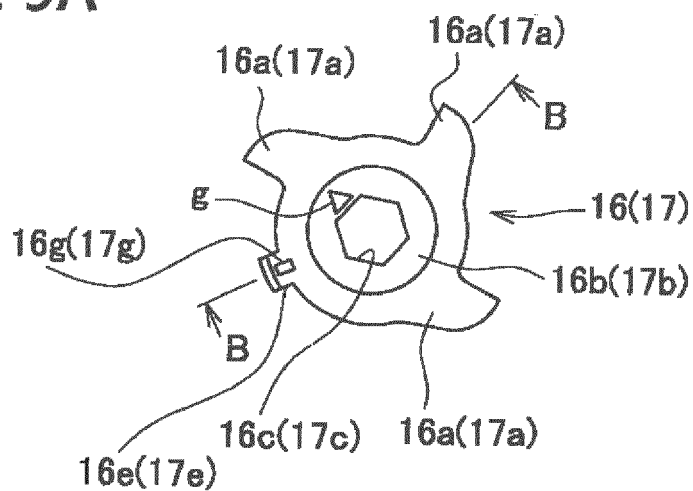


FIG. 9B

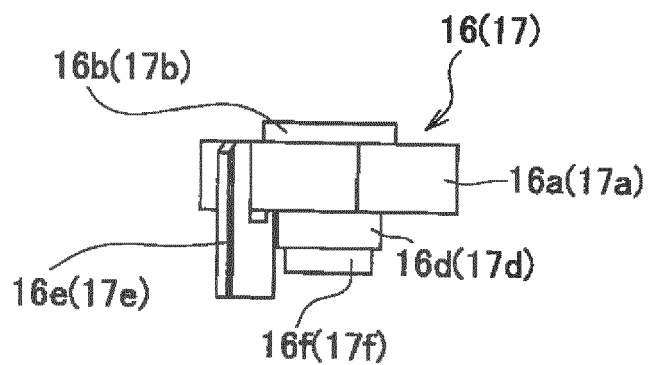


FIG. 9C

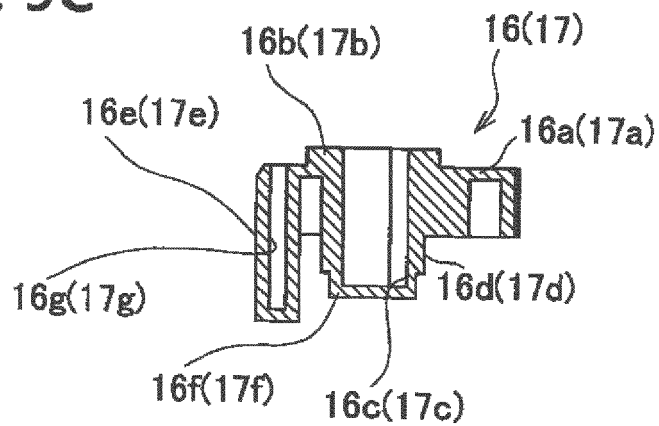


FIG. 10A

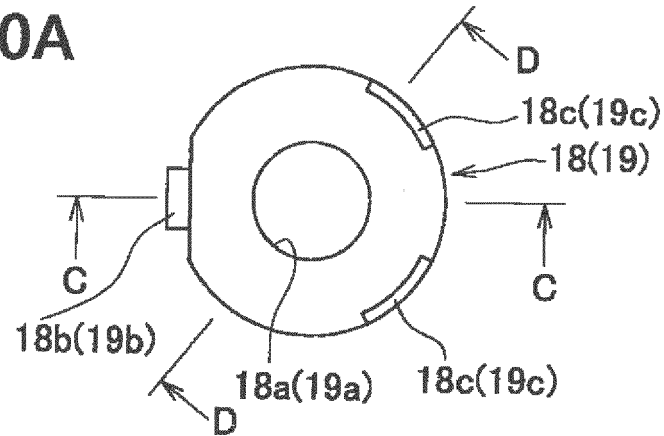


FIG. 10B

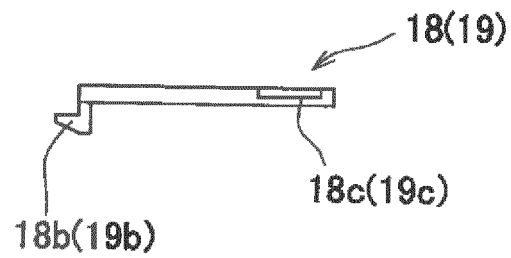


FIG. 10C

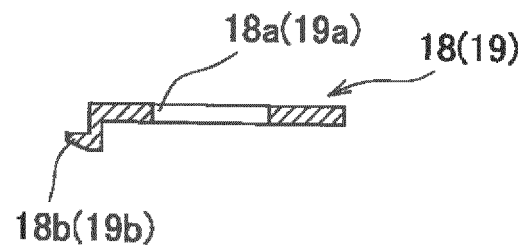


FIG. 10D

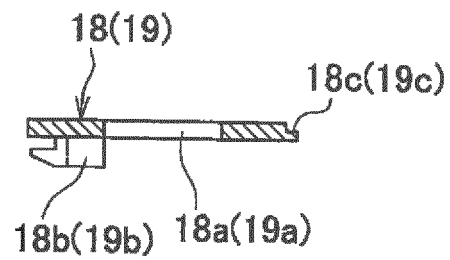


FIG. 11A

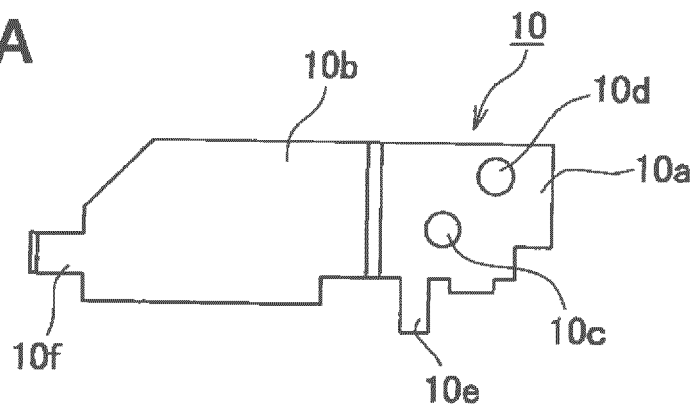


FIG. 11B

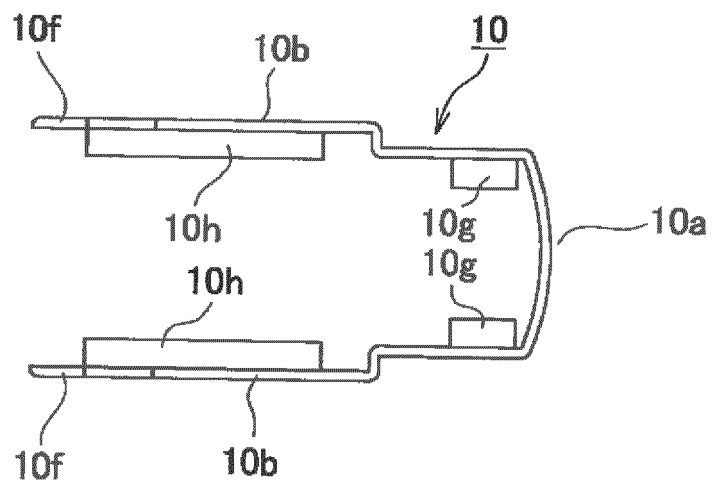


FIG. 11C

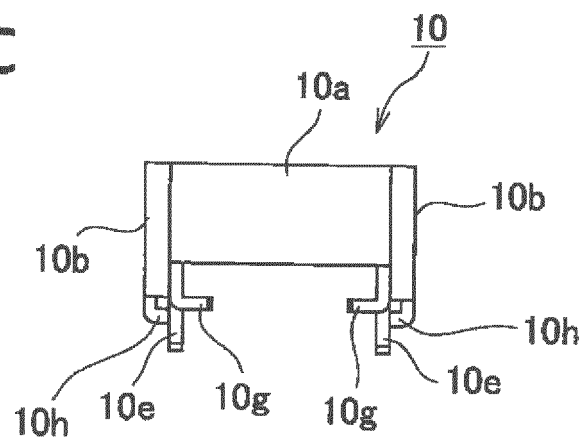


FIG. 12A

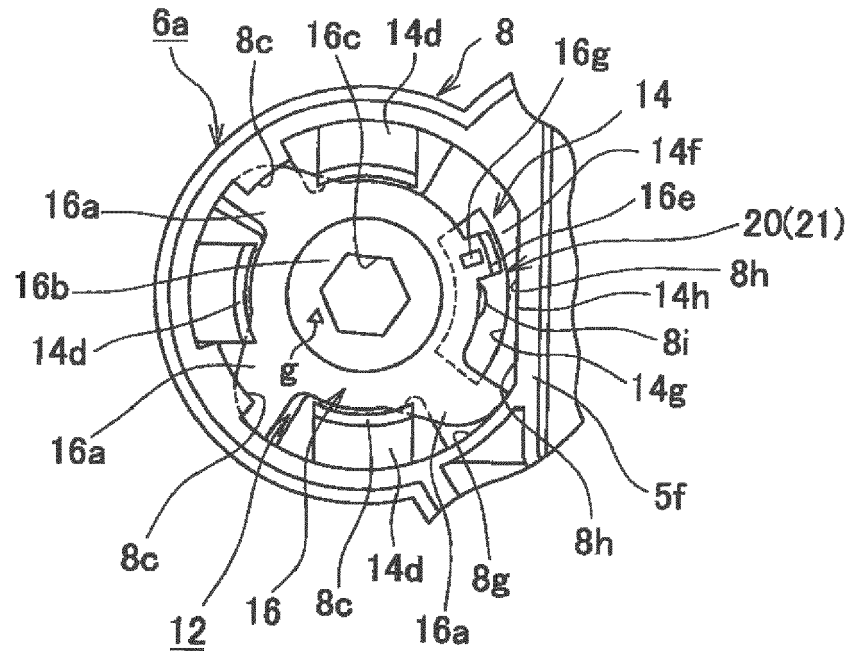


FIG. 12B

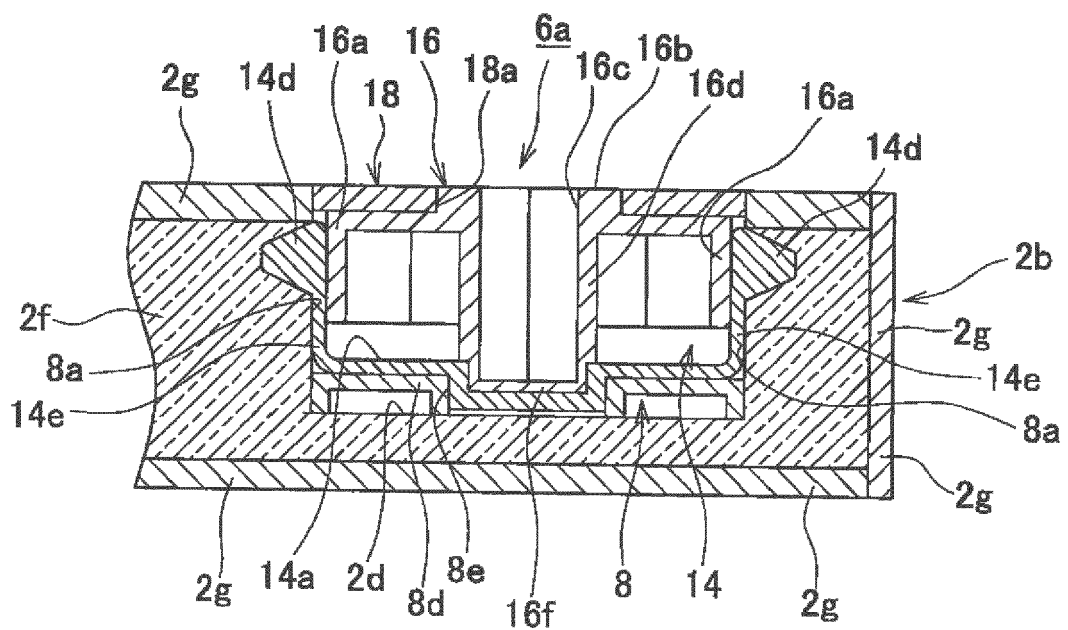


FIG. 13A

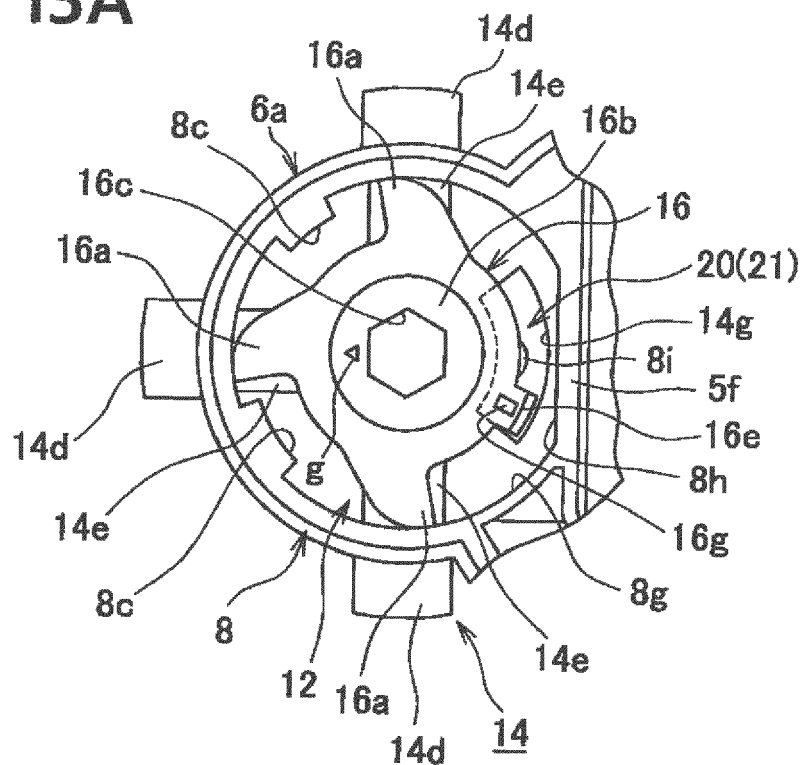
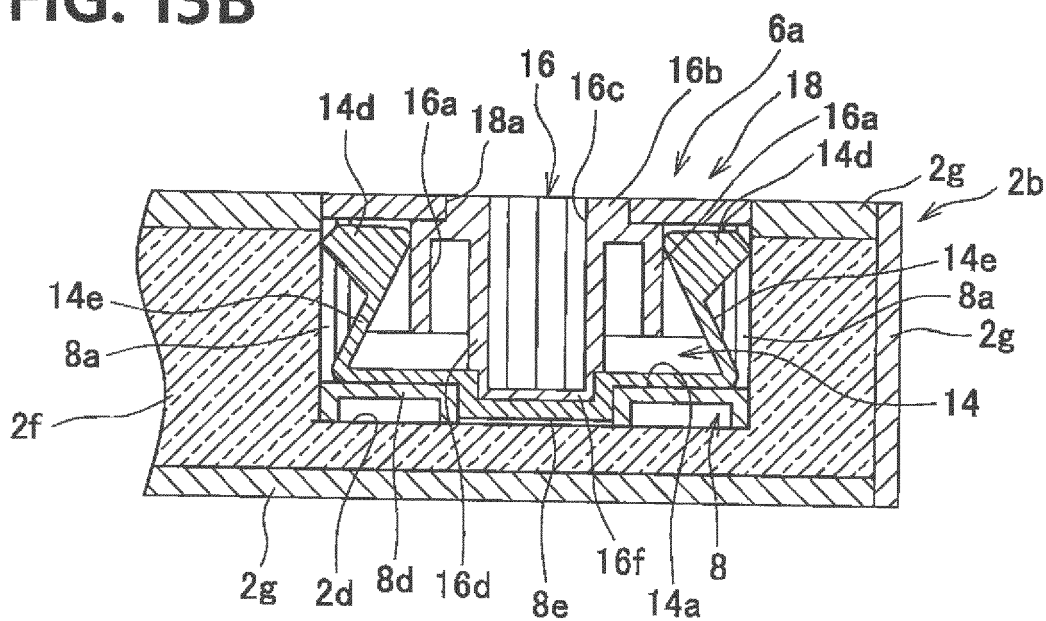


FIG. 13B





EUROPEAN SEARCH REPORT

Application Number
EP 18 18 9307

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			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 January 2019	Examiner Mund, André
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 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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