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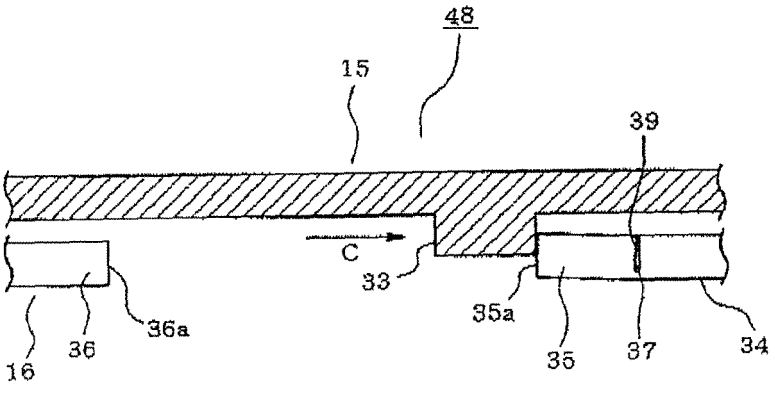
(54) Operation device

(57) An operation device includes a dial (11), a body (16) to which the dial (11) is rotatably attached, a projection section (33) provided on one of the dial (11) and the body (16), a first stopper section (35) and a second stopper section (36) provided on the other of the dial (11) and the body (16). The first stopper section (35) and the second stopper section (36) are arranged so as to be separated to each other in a rotation direction of the dial (11) with a predetermined distance. The projection section (33) is projected from one of the dial (11) and the body (16) in a projection direction. The projection section (33) is arranged between the first stopper section (35) and the second stopper section (36). The first stopper section (35) is elastically deformable in the projection direction of the projection section (33). The operation device is provided with a restricting section (39) that restricts deformation of the first stopper section (35) in a direction opposite to the projection direction of the projection section (33).

FIG.1



EP 2 453 335 A1

Description

BACKGROUND

[0001] The present invention relates to a dial operation device.

[0002] As a dial operation device, for example, there has been one used for air conditioning of a vehicle (e.g., see Patent Documents 1 and 2). The dial operation device has a dial and a body to which the dial is attached so as to be rotationally operated, and is configured so that the air conditioning of a vehicle, such as, for example, switching between circulation of inner air and induction of outer air can be performed by a rotational operation of the dial. For this reason, the dial can be rotated between an operation position for circulation of inner air and an operation position for induction of outer air. In other words, the rotation of the dial is restricted within an interval between both of the operation positions.

[0003] Figs. 9A to 9C show conventional structures of restricting rotation of the dial. A projection section 2 protruding in one direction of the axial direction (in Fig. 9B, a lower direction in upper and lower directions, see an arrow A) is provided on a dial 1, and one stopper section 4 and the other stopper section 5 are provided on a body 3 in such a manner that they are in a facing state with a predetermined distance therebetween in the rotational direction (the left-right direction, see arrows B and C in Fig. 9C) of the dial 1. In addition, the one stopper section 4 has a tapered protruding part 6 protruding toward a dial 1 side.

[0004] When the dial 1 is attached to the body 3 at a predetermined rotational anglular position in the above configuration, the projection section 2 is moved from a state that the projection section 2 faces the one stopper section 4 as shown in Fig. 9A to a state shown by the arrow A in Fig. 9B so as to press the protruding part 6 so that the one stopper section 4 is deformed. Next, when the dial 1 is rotated in the direction of separating from the one stopper section 4 (to an other stopper section 5 side) as shown by arrow B in Fig. 9C, the protruding part 6 is released from the pressing so as to restore the one stopper section 4 so that the projection section 2 is positioned within a facing interval between the one stopper section 4 and the other stopper section 5.

[0005] When the dial 1 is rotated in the direction shown by arrow C in the above condition, the projection section 2 is abutted and stopped on a stopper face 4a of the one stopper section 4, and when the dial 1 is rotated in the direction shown by arrow B, the projection section 2 is abutted and stopped on a stopper face 5a of the other stopper section 5. That is, the rotation of the dial 1 is restricted within the facing interval between the one stopper section 4 and the other stopper section 5. Meanwhile, a rotational position of the dial 1 where the projection section 2 is abutted and stopped on the stopper face 4a of the one stopper section 4 is, for example, an operation position for circulation of inner air in an air conditioning operation of the vehicle, and a rotational position of the dial 1 where the projection section 2 is abutted and stopped on the stopper face 5a of the stopper section 4 is, for example, an operation position for induction of outer air in the air conditioning operation of the vehicle.

Patent Document 1: JP-A-2005-96579
Patent Document 2: JP-A-2005-96580

[0006] In the above conventional case, when the dial 1 is rotated by an excessive force in the direction indicated by arrow C under the assembled condition, the projection section 2 moves beyond the protruding part 6 so as to deform the one stopper section 4 to make it as in the initial state as shown in Fig. 10 so that the projection section 2 is not abutted and stopped on the stopper face 4a of the stopper section 4. That is, the rotation of the dial 1 in the direction shown by arrow C is not restricted so that the dial 1 could not be stopped on the operation position for circulation of inner air in the air conditioning operation of the vehicle.

[0007] In order to avoid the above problems, it is preferable that rigidity of the protruding part 6 of the one stopper section 4 and its peripheral part is enhanced. However, in the case of enhancing the rigidity, a drag in the assembling is increased so that the assembling becomes difficult. When the assembling is tried too hard, the one stopper section 4 may be damaged so that the body 3 may be wasted.

SUMMARY

[0008] The invention is made in view of the above circumstances, and the purpose of the invention is to provide an operation device that can surely restrict rotation of a dial even when the dial is rotated by an excessive force, and can be achieved without enhancing the rigidity of a stopper section, thereby without making the assembling difficult nor causing the stopper section to be damaged.

[0009] In order to achieve the above object, according to the present invention, there is provided n operation device comprising:

a dial;
a body to which the dial is rotatably attached;
a projection section provided on one of the dial and the body; and
a first stopper section and a second stopper section provided on the other of the dial and the body,

wherein the first stopper section and the second stopper section are arranged so as to be separated to each other in a rotation direction of the dial with a predetermined distance;
wherein the projection section is projected from one of the dial and the body in a projection direction;
wherein the projection section is arranged between the

first stopper section and the second stopper section;
wherein the first stopper section is elastically deformable in the projection direction of the projection section; and
wherein the operation device is provided with a restricting section that restricts deformation of the first stopper section in a direction opposite to the projection direction of the projection section.

[0010] [NEW] Preferably, the first stopper section is elastically deformed by being pressed by the projection section due to attaching of the dial to the body, and the projection section in a state after the projection section elastically deforms the first stopper section is positioned between the first stopper section and the second stopper section by the rotation of the dial so as to restrict the rotation of the dial by the first stopper section and the second stopper section.

[0011] Preferably, the projection direction of the projection section is perpendicular to the rotation direction of the dial.

[0012] Preferably, the first stopper section is elastically deformable due to a cutout portion provided on the other of the dial and the body, and the restricting section is formed by one of the side wall faces of the cutout portion which is away from the first stopper section rather than the other.

[0013] Preferably, the first stopper section is elastically deformable due to a low thickness section provided on the other of the dial and the body, and a hole is formed in the low thickness section, and the restricting section is formed by a member inserted into the hole.

[0014] In accordance with the configurations described above, when the dial is rotated in the rotation direction toward the first stopper section by an excessive force, the restriction section restricts deformation of the first stopper section in the direction opposite to the projection direction of the projection section (the direction opposite to the direction of elastic deformation of the first stopper section in the assembling) so that it is possible to prevent the projection section from moving beyond the first stopper section and to continuously and surely restrict the rotation of the dial. In addition, accordingly, it is not necessary to enhance the rigidity of the first stopper section so that the assembling does not become difficult and the one stopper section is not damaged.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above objects and advantages of the present invention will become more apparent by describing in detail preferred exemplary embodiments thereof with reference to the accompanying drawings, wherein:

Fig. 1 is a development plan view of a main part according to a first embodiment of the invention while showing it in a functional condition;
Fig. 2 is an exploded perspective view showing an entirety of an operation device;
Fig. 3 is a perspective view showing a body of the operation device;
Fig. 4 is an enlarged perspective view showing a part IV in Fig. 3;
Fig. 5A to Fig. 5C are development plan views of the main part while showing it by the assembling sequence;
Fig. 6A to Fig. 6C are development plan views of a main part according to a second embodiment of the invention while corresponding to Figs. 5A to 5B;
Fig. 7 is a plan view showing one stopper section of the second embodiment;
Fig. 8 is a development plan view of the second embodiment while corresponding to Fig. 1;
Fig. 9A to Fig.9C are development plan views of a related device while corresponding to Figs. 5A to 5B; and
Fig. 10 is a development plan view of the related device while corresponding to Fig. 1.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0016] A first embodiment of the invention is described below with reference to Figs. 1 to 5C.

[0017] First, Fig. 2 shows, in an exploded condition, an entirety of an operation device which is to be used for an operation of air conditioning, e.g., a switching operation between circulation of inner air and induction of outer air and a control operation of a rate of air flow in a vehicle, particularly, in an automobile. Fig. 2 shows, sequentially from the left side, an inner dial 11, an outer dial knob 12, an indication piece 13, a indication panel 14, an outer dial knob holder 15, a body 16, a contact holder 17, a moderation spring 18, a moderation piece 19, contact springs 20, a movable contact 21, an insulator 22, a light emission unit 23 and a cable unit 24.

[0018] In the above, the inner dial 11 which is formed in a short cylindrical shape with a lid, has an indication section 25 having a light transmission property disposed at one position on an outer circumferential portion of a front face part.

[0019] The outer dial knob 12 which is formed in a short cylindrical shape having a diameter sufficiently larger than that of the inner dial 11, has a notch portion 26 disposed at one position on a front edge section and coupling holes 27 arranged at a plurality of positions on a large-diameter portion 12a of a rear edge section.

[0020] The indication piece 13 has a tapered tip portion and entirely has a light transmission property.

[0021] The indication panel 14 is formed in a disk shape having a hole 28 at a roughly central portion. The indication panel 14 has step indicators 29 for a set air flow rate, which are arranged in an arc shape along the outer circumference of the hole 28 at a portion above the hole 28, and a switching indicator 30 for circulation of inner air and induction of outer air, which is formed in an arc shape similar to the above along the outer circumference of the indication panel 14 at a portion above the

step indicators 29.

[0022] The outer dial knob holder 15 formed in a ring shape has a front section 15a of which the diameter is smaller than that of the large diameter section 12a of the dial knob 12 and a rear section 15b formed in a ring of which the diameter is roughly equal to that of the large diameter section 12a. The outer dial knob holder 15 has coupling pawls 31 disposed at the front section 15a while corresponding to the coupling holes 27 of the dial knob 12, and a projection 32 and a projection section 33 shown in Fig. 5.

[0023] The body 16 has a cylindrical section 16a of which the diameter is smaller than those of the outer dial knob holder 15 and the outer dial knob 12, and a small cylindrical section 16b which is provided in the cylindrical section 16a and of which the diameter is smaller than that of the cylindrical section 16a. The body 16 further has a rectangular box-like section 16c which is larger than the cylindrical section 16a and is disposed at the rear side, and a ridge-like section 34 disposed at a portion around the cylindrical section 16a of the rectangular box-like section 16c shown in Fig. 3. The ridge-like section 34 is formed in a ring shape of which the part is cut out in a range of 90 degrees, an end of one side is made to be one stopper section 35 and an end of the other side is made to be the other stopper section 36.

[0024] As shown in Fig. 4 in detail, in the stopper sections, the one stopper section 35 is elastically deformable (bendable) in the back-and-forth direction by a cutout portion 37 formed on a position at a predetermined distance from an end of the stopper section 35 of the ridge-like section 34 (body 16) and a hole 38 formed on the body 16 (the rectangular box-like section 16c) at a position of a rear side (a back side) of the stopper section 35. A wall face of the cutout portion 37 at the opposite side of the one stopper section 35 is made to be a restricting section 39. Meanwhile, in the above case, when the one stopper section 35 is formed so as to be separated from the body 16 (the rectangular box-like section 16c) to the forward direction, the hole 38 is not necessary. That is, it is sufficient that the one stopper section 35 is provided on the body 16 so as to be deformable in the back-and-forth direction (even when the cutout portion 37 and the hole 38 are not provided).

[0025] The contact holder 17 has a brim section 17b disposed at a rear end of a shaft section 17a, and a moderation spring housing section 40 is formed on the brim section 17b at one position of an outer circumferential portion thereof. The moderation spring 18 is accommodated in the moderation spring housing section 40. The moderation spring 18 is adapted to elastically urge the moderation piece 19 in the outer direction. Meanwhile, a series of moderation concaves (not shown) to be engaged with the moderation piece 19 are formed on the body 16.

[0026] In addition, a plurality of contact spring housing sections (not shown) are formed on the brim section 17b of the contact holder 17 at the rear face part (the back face part). The plurality of contact springs 20 are respectively accommodated in the contact spring housing sections. The contact springs 20 are adapted to elastically urge the plurality of movable contacts 21 to the backward direction, respectively.

[0027] The insulator 22 has fixed contacts 41 corresponding to the movable contacts 21 disposed at the front face (a movable contact 21 side), a through-groove 42 having an arc shape disposed at an upper part, a light transmission section 43 disposed at one side (at the right side in the drawing), and a light emission unit attachment section 44 disposed at the back side (the backward direction) thereof.

[0028] In this case, the light emission unit is a lamp.

[0029] The cable unit 24 is formed such that a cable 46 is drawn from a unit case 45, and has a winding member (not shown) for winding the cable 46 disposed in the unit case 45 and a lever 47 for rotating the winding member disposed at the forward direction of the unit case 45.

[0030] In the above configuration, the unit case 45 of the cable unit 24 is attached to the back face of the insulator 22. At that time, a tip portion of the lever 47 is allowed to pass through the through-groove 42 of the insulator 22. In addition, the light emission unit 23 is attached to the light emission unit attachment section 44 of the insulator 22 so as to cause the light emission unit 23 to face the light transmission section 43.

[0031] On the other hand, the contact holder 17 is attached to the back face part of the rectangular box-like section 16c in such a manner that the shaft section 17a is allowed to pass through a small cylindrical section 18b of the body 16. In addition, at that time, the moderation piece 19 urged by the moderation spring 18 accommodated in the moderation spring housing section 40 is engaged with one of the moderation concaves of the body 16.

[0032] The insulator 22 is attached to the back face of the rectangular box-like section 16c of the body 16 under the above condition. At that time, the plurality of contact springs 20 accommodated in the plurality of contact spring housing sections and the movable contacts 21 urged by the contact springs 20 are sandwiched between the brim section 17b of the contact holder 7 and the insulator 22, and thereby the movable contacts 21 are contacted with the respective fixed contacts 41 of the insulator 22.

[0033] The outer dial knob holder 15 is attached to the cylindrical section 16a of the body 16 from the forward direction at a predetermined rotational angular position. Then, the projection section 33 of the outer dial knob holder 15 is advanced from a state in which it faces the one stopper section 35 as shown in Fig. 5A to a state shown by arrow A in Fig. 5B and the projection section 33 presses the one stopper section 35 so that the stopper section 35 is bent and deformed to the backward direction from the cutout portion 37.

[0034] Next, when the outer dial knob holder 15 is rotated in the direction of separating from the one stopper

section 35 (to the other stopper section 36 side) as shown by arrow B in Fig. 5C, the one stopper section 35 is released from the pressing against the one stopper section 35 and the one stopper section 35 is restored, and thereby the projection section 33 is positioned within the facing interval between the one stopper section 35 and the other stopper section 36.

[0035] Meanwhile, in a stage wherein the outer dial knob holder 15 is attached to the cylindrical section 16a of the body 16 at the initial predetermined rotational angular position, the projection 32 of the outer dial knob holder 15 is engaged with the tip portion of the lever 47 of the cable unit 24 which is allowed to pass through the through-groove 42 of the insulator 22.

[0036] After that, the indication panel 14 is stuck to a front end face of the cylindrical section 16a, the inner dial 11 is attached to the small cylindrical section 18b of the body 16 by allowing it to pass through the hole 28 of the indication panel 14 and is coupled to the shaft section 17a of the contact holder 17 put through the small cylindrical section 18b.

[0037] Next, the indication piece 13 is attached to an inner circumferential section communicating with the notch portion 26 of the outer dial knob 12 at a predetermined portion and a tip portion of the indication piece 13 is positioned at the notch portion 26. The outer dial knob 12 under the above condition is fitted to the front part 15a so as to cause the coupling holes 27 to be engaged with the respective coupling pawls 31 of the outer dial knob holder 15, thereby coupling the outer dial knob 12 to the outer dial knob holder 15. The outer dial knob 12 and the outer dial knob holder 15 form an outer dial (a dial) 48 by the above coupling.

[0038] Thus, the entirety of the operation device is assembled.

[0039] When the inner dial 11 is operated and rotated under the assembled condition, the contact holder 17 is rotated together with the inner dial 11 via the shaft section 17a and the movable contact 21 is allowed to slide with respect to the fixed contacts 41 of the insulator 22, thereby switching the contact relationship. With this, adjusting of a flow rate of air during an air conditioning operation for an automobile can be performed. The adjusting can be performed in a stepwise fashion by positioning the indication section 25 of the inner dial 11, at each of the step indicators 29 in the indication panel 14, and the moderation can be obtained in such a manner that the moderation piece 19 urged by the moderation spring 18 is engaged with each of the series of moderation concaves (not shown) of the body 16.

[0040] On the other hand, when the outer dial 48 is operated and rotated, the lever 47 of the cable unit 24 is rotated by the projection 32 and the cable unit 24 pulls or returns the cable 46 so as to move a dumper (not shown), and thereby, switching between circulation of inner air and induction of outer air during an air conditioning operation for an automobile is performed.

[0041] In detail, when the outer dial 48 is rotated in the direction shown by arrow C in Fig. 5C, the projection section 33 is abutted and stopped on a stopper face 35a of the one stopper section 35, and when the outer dial 48 is rotated in the direction shown by arrow B, the projection section 33 is abutted and stopped on a stopper face 36a of the other stopper section 36. That is, the rotation of the outer dial 48 is restricted within the facing interval between the one stopper section 35 and the other stopper section 36.

[0042] Meanwhile, the rotational position of the outer dial 48 where the projection section 33 is abutted and stopped on the stopper face 35a of the one stopper section 35 is, for example, an operation position for circulation of inner air in the air conditioning operation of the automobile. The rotational position of the outer dial 48 where the projection section 33 is abutted and stopped on the stopper face 36a of the other stopper section 36 is, for example, an operation position for induction of outer air in the air conditioning operation of the automobile. The switching can be performed by positioning the tip portion of the indication piece 13 attached to the outer dial knob 12, at one of the switching indicators 30 of the indication panel 14.

[0043] Here, when the outer dial 48 is rotated by an excessive force in the direction shown by arrow C, the projection section 33 is abutted to the stopper face 35a of the one stopper section 35 as shown in Fig. 1 so as to tend to deform the stopper section 35 in the forward direction which is opposite to the resilient deforming direction (the direction of arrow A) in the assembling time. At that time, however, the stopper section 35 is abutted to the restricting section 39 formed by the wall face of the cutout portion 37 which is opposite side of the one stopper section 35 so that any further deformation in the forward direction is restricted.

[0044] Thus, it is possible to prevent the projection section 33 from moving beyond the one stopper section 35, and to continuously and surely restrict the rotation of the outer dial 48. In addition, accordingly, it is not necessary to enhance the rigidity of the one stopper section 35 and a drag in the assembling time is not increased so that the assembling does not become difficult and the one stopper section 35 is not damaged.

[0045] Meanwhile, when the light emitting unit 23 emits light, the indication piece 18 of the outer dial 48, the switching indicator 30 and step indicators 29 of the indication panel 14 and the indication section 25 of the inner dial 11 are illuminated by the light.

[0046] In addition to the above, Figs. 6A to 8 show a second embodiment of the invention, the sections or members the same as in the first embodiment are denoted by the same numerals, their descriptions are omitted, and only the sections or members different therefrom are described below.

[0047] In this case, the one stopper section 35 is provided on the body 16 via a low thickness section 51 so as to be elastically deformable in the back-and-forth direction (the direction of arrow A and a direction opposite

to the direction of arrow A). A hole 52 is formed in the low thickness section 51 at a portion opposite side of the other stopper section 36 from the one stopper section 35 and an L-shaped part of a member 53 at the tip portion is inserted into the hole 52 so that the L-shaped part is made to be a restricting section 54. Meanwhile, in this case, the member 53 is formed on the insulator 22.

[0048] Even in the above configuration, by attaching the outer dial knob holder 15 from the forward direction at a predetermined rotational anglular position in the assembling time, the projection section 33 of the outer dial knob holder 15 is advanced from a state in which it faces the one stopper section 35 as shown in Fig. 6A to a state shown by arrow A in Fig. 6B and the projection section 33 presses the one stopper section 35 so that the stopper section 35 bends the low thickness section 51 in the backward direction so as to cause it to be deformed.

[0049] Next, when the outer dial knob holder 15 is rotated in the direction of separating from the one stopper section 35 (to the other stopper section 36 side) as shown by arrow B in Fig. 6C, the one stopper section 35 is released from the pressing and the one stopper section 35 is restored, and thereby the projection section 33 is positioned within the facing interval between the one stopper section 35 and the other stopper section 36.

[0050] When the outer dial 48 is operated and rotated under the assembled condition, the projection section 33 is abutted and stopped on the stopper face 35a of the one stopper section 35 in the direction shown by arrow C in Fig. 6C, and the projection section 33 is abutted and stopped on the stopper face 36a of the other stopper section 36 in the direction shown by arrow B in Fig. 6C. These points are similar to the first embodiment. That is, the rotation of the outer dial 48 is to be restricted within the facing interval between the one stopper section 35 and the other stopper section 36.

[0051] When the outer dial 48 is rotated by an excessive force in the direction shown by arrow C, the projection section 33 is, as shown in Fig. 8, abutted and stopped on the stopper face 35a of the one stopper section 35 so as to tend to deform the stopper section 35 in the forward direction which is opposite to the resilient deforming direction (the direction of arrow A) in the assembling time. At that time, however, the stopper section 35 is abutted to the restricting section 54 formed by the L-shaped part of the member 53 at the tip portion which is inserted into the hole52 so that any further deformation in the forward direction is restricted.

[0052] Thus, it is possible to prevent the projection section 33 from moving beyond the one stopper section 35, and to continuously and surely restrict the rotation of the outer dial 48. Consequently, similarly to the first embodiment, it is not necessary to enhance the rigidity of the one stopper section 35 and a drag in the assembling time is not increased so that the assembling does not become difficult and the one stopper section 35 is not damaged.

[0053] Meanwhile, it is possible to provide the projection section 33 on the body 16 and to provide the one stopper section 35 and the other stopper section 36 on the outer dial (the dial) 48.

[0054] In addition, a member operated by the rotation of the outer dial 48 can be one other than the cable unit 24.

[0055] The invention is not limited to the embodiments described above and shown in the drawings, but can be modified if necessary without departing from the scope of the invention.

[0056] Description of Reference Numerals and Signs

16 body
33 projection section
35 one stopper
36 the other stopper
37 cutout portion
39 restricting section
48 outer dial (dial)
51 low thickness section
52 hole
53 member
54 restricting section

Claims

1. An operation device comprising:

a dial;
a body to which the dial is rotatably attached;
a projection section provided on one of the dial and the body; and
a first stopper section and a second stopper section provided on the other of the dial and the body,

wherein the first stopper section and the second stopper section are arranged so as to be separated to each other in a rotation direction of the dial with a predetermined distance;
wherein the projection section is projected from one of the dial and the body in a projection direction;
wherein the projection section is arranged between the first stopper section and the second stopper section;
wherein the first stopper section is elastically deformable in the projection direction of the projection section; and
wherein the operation device is provided with a restricting section that restricts deformation of the first stopper section in a direction opposite to the projection direction of the projection section.

2. The operation device according to claim 1, wherein the first stopper section is elastically deformed by being pressed by the projection section due to attaching of the dial to the body; and
wherein the projection section in a state after the projection section elastically deforms the first stop-

per section is positioned between the first stopper section and the second stopper section by the rotation of the dial so as to restrict the rotation of the dial by the first stopper section and the second stopper section.

3. The operation device according to claim 1 or 2, wherein the projection direction of the projection section is perpendicular to the rotation direction of the dial.

4. The operation device according to any one of claims 1 to 3, wherein the first stopper section is elastically deformable due to a cutout portion provided on the other of the dial and the body; and
wherein the restricting section is formed by one of the side wall faces of the cutout portion which is away from the first stopper section rather than the other.

5. The operation device according to any one of claims 1 to 3, wherein the first stopper section is elastically deformable due to a low thickness section provided on the other of the dial and the body; and
wherein a hole is formed in the low thickness section, and the restricting section is formed by a member inserted into the hole.

FIG.1

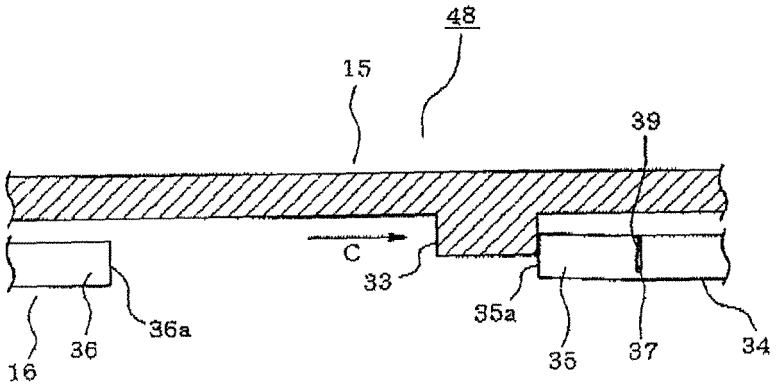


FIG.2

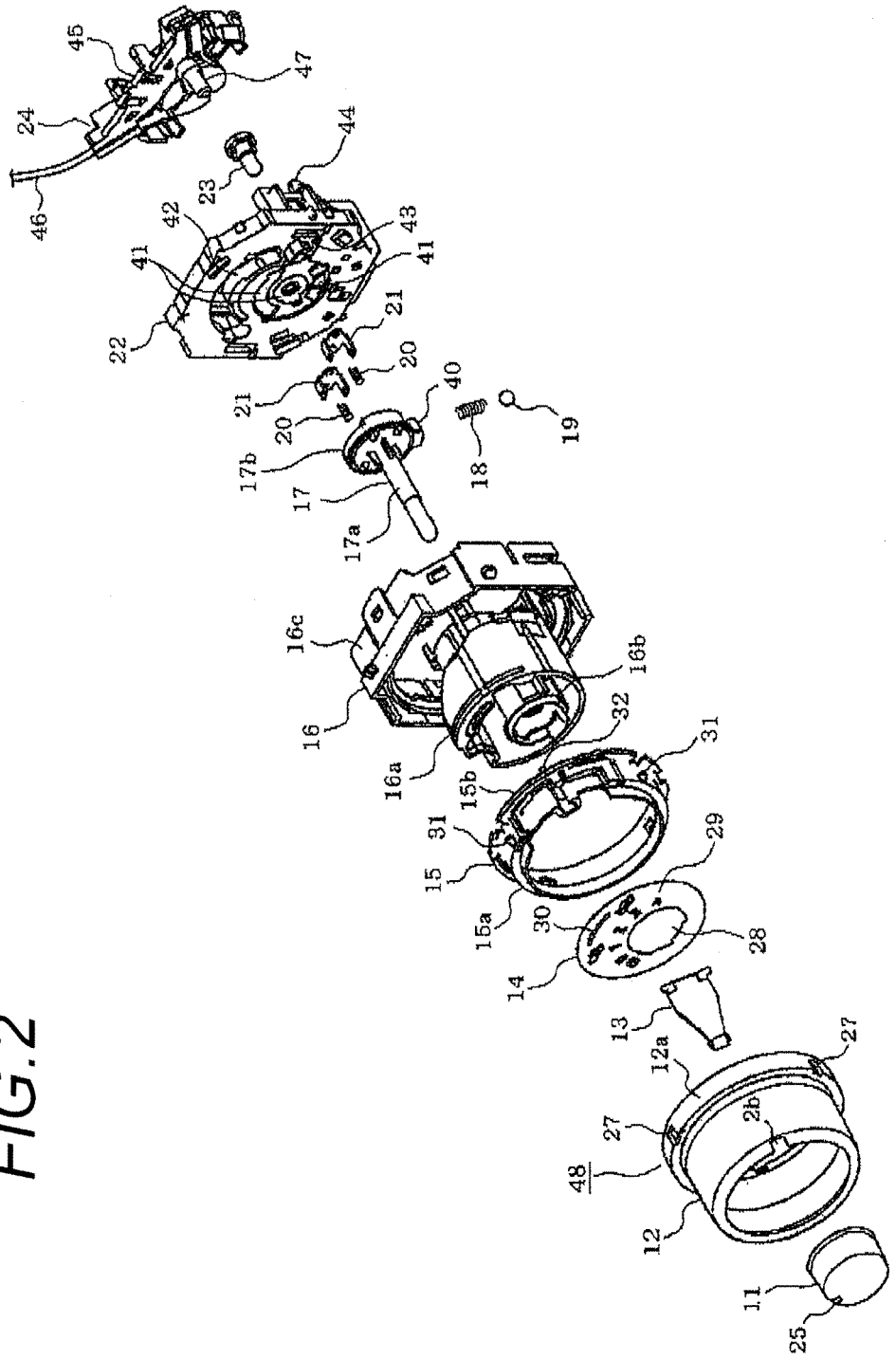

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FIG.3

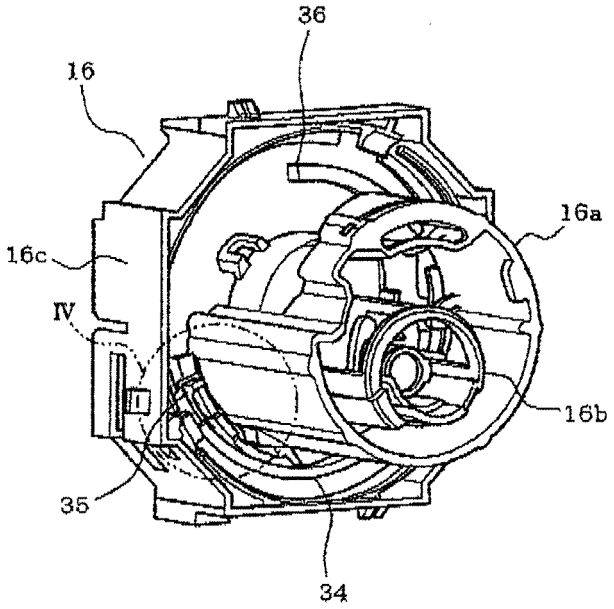


FIG.4

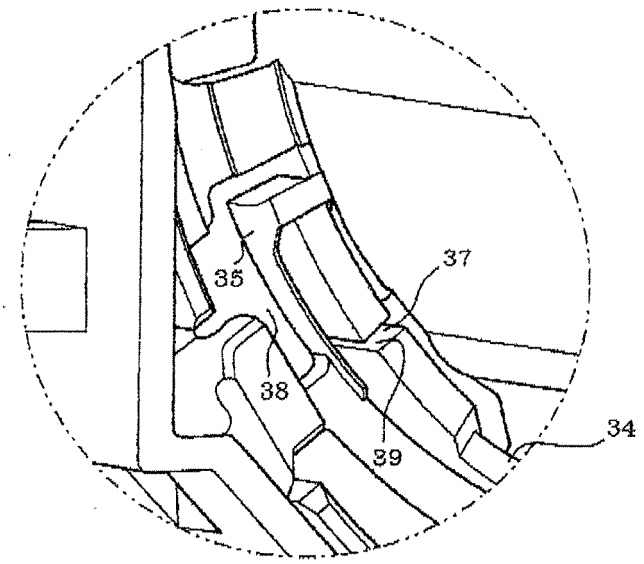


FIG.5A

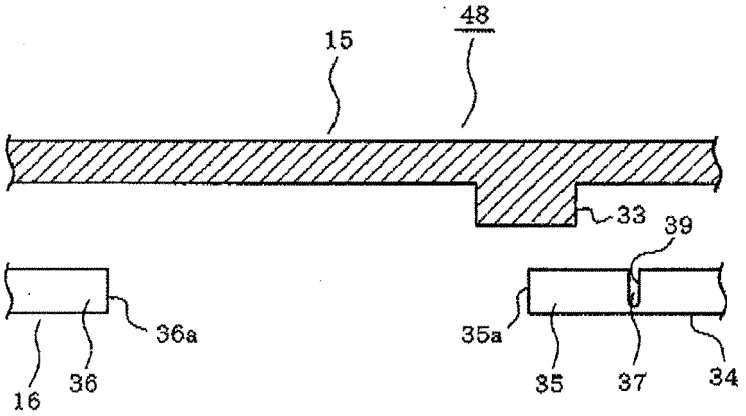


FIG.5B

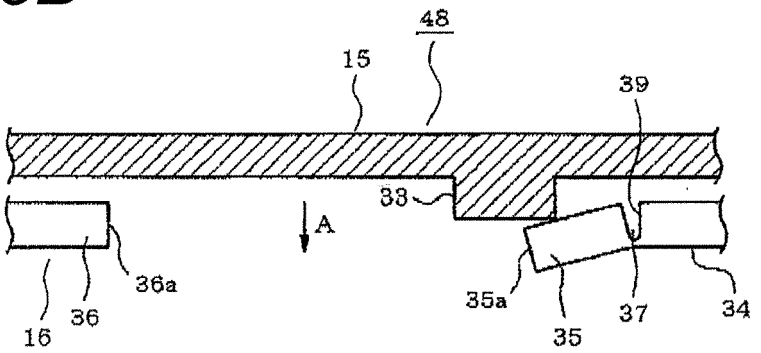


FIG.5C

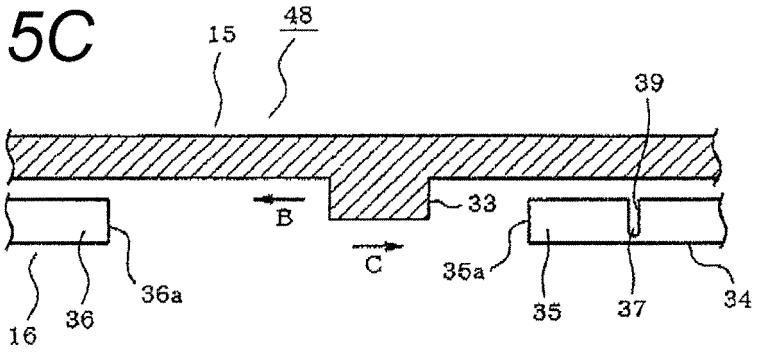


FIG.6A

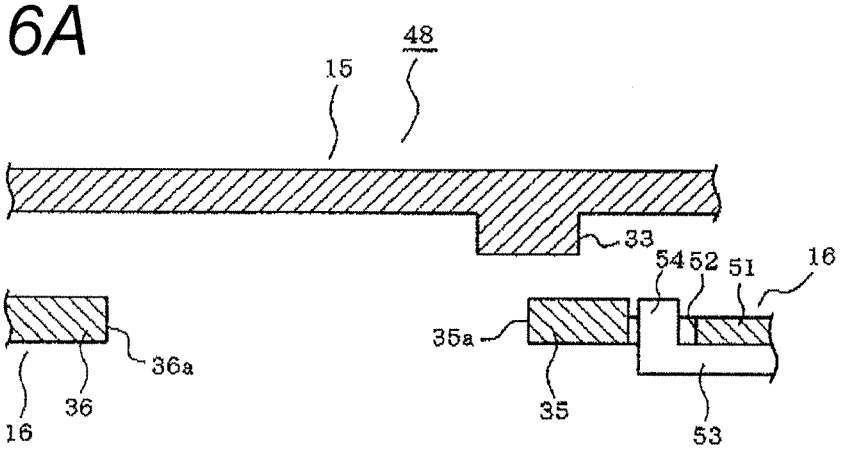


FIG.6B

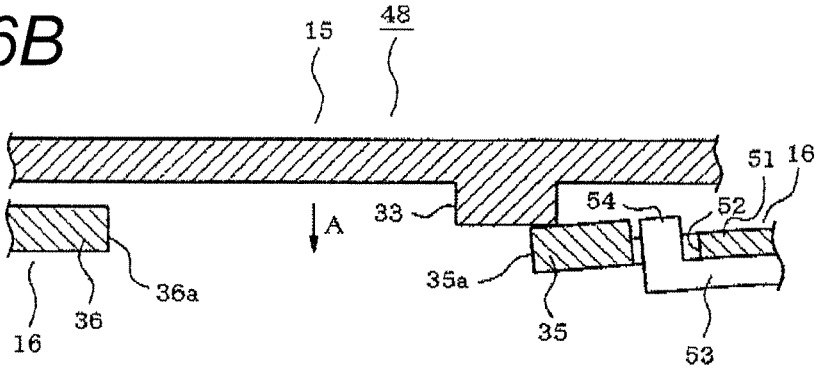


FIG.6C

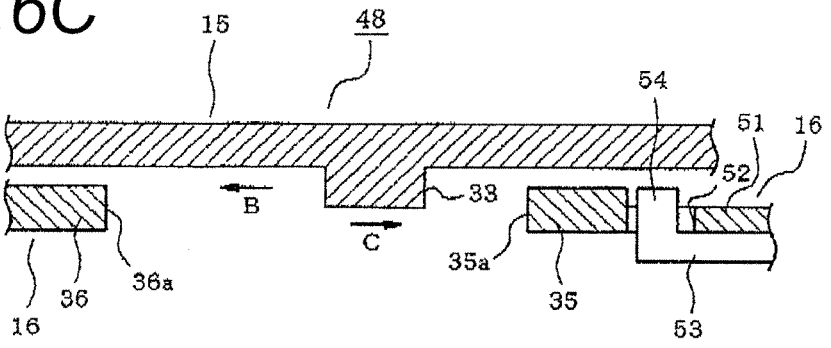


FIG.7

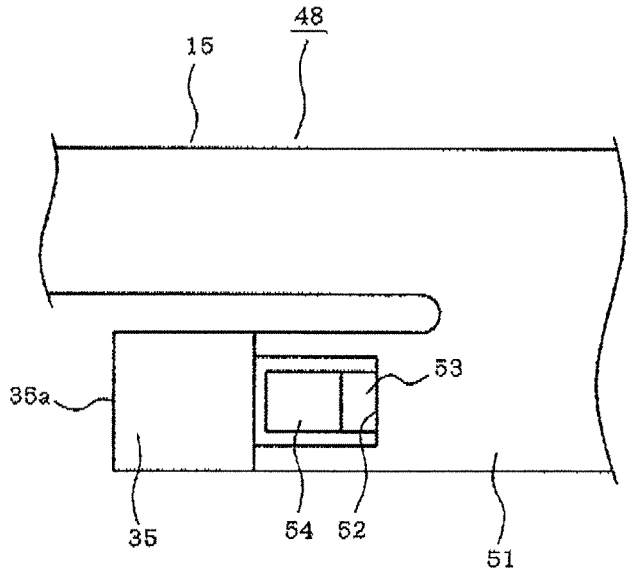


FIG.8

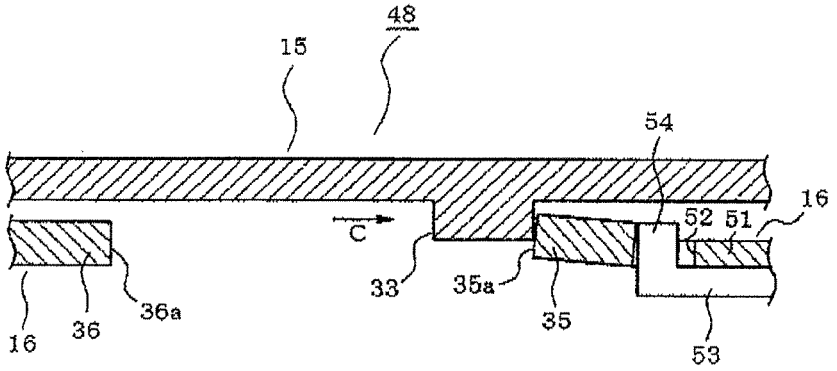


FIG.9A

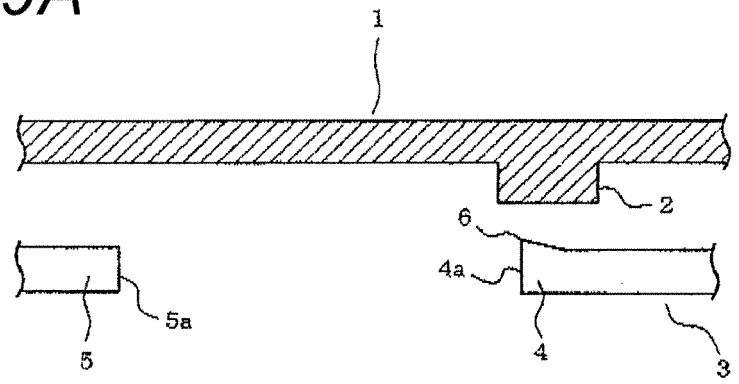


FIG.9B

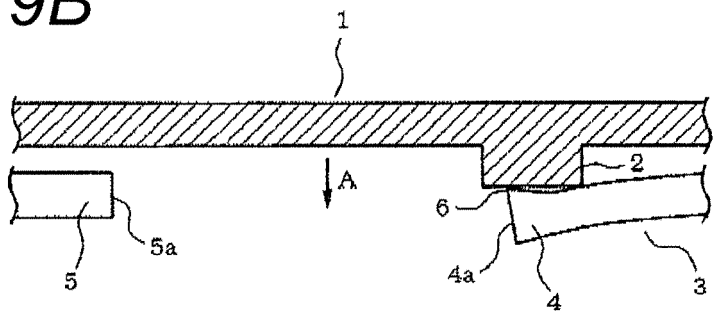


FIG.9C

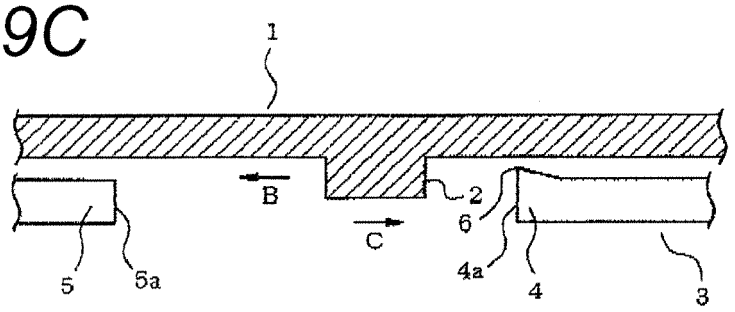
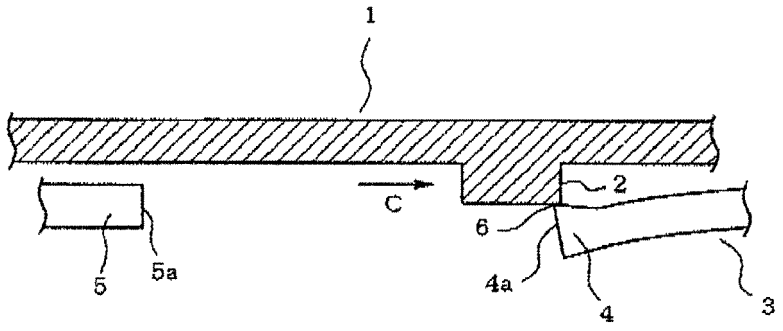


FIG.10



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EUROPEAN SEARCH REPORT

Application Number
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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G05G
B60H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 February 2012	Kamara, Amadou

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