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(54) **Buckle**

(57) With respect to a buckle, by selecting a lock position, a lock state of an insertion portion of a male member is prevented from being released abruptly by a release button passing through an opening portion and pushed in.

A lock member (70) includes a locking piece (72) locking insertion portion (32) of male member (30), which have been inserted from insertion mouth (51), into the insertion mouth (51); a release button (80) provided in the locking piece (72), protruding outwardly from an opening portion (52) provided in a female main body (50),

and also capable of releasing the lock state by a push operation toward an inside of the female main body (50); and return spring (73) positioned between the release button (80) and the inside of the female main body (50), and urging the release button (80) in a direction of outwardly protruding from the opening portion (52) of the female main body (50). The release button (80) can be selected between a release position, wherein the release button can pass the opening portion (52) in the lock state, and a lock position, wherein the release button can abut against a circumferential edge of the opening portion (52).

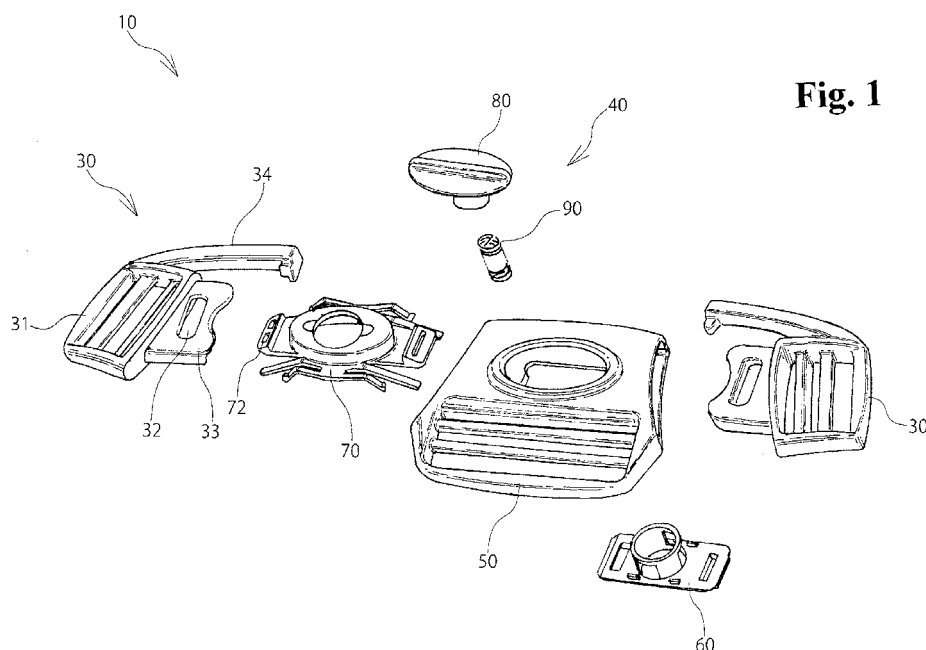


Fig. 1

Description

Background of the Invention and Related Art Statement

[0001] The present invention relates to a buckle, wherein by selecting a lock position, a lock state of an insertion portion of a male member is prevented from being released abruptly by a release button passing through an opening portion and pushed in.

[0002] Conventionally, there is described a "Seatbelt connecting device" comprising a connectable male member and a female member, and in the female member, there is provided a push-in-type release button which can release a connected state between the female member and the male member (see paragraphs [0034] to [0037], [0049] and [0050], and [0058] and [0059], and Figs. 1, 12, and 13 of Patent Document 2).

Prior Art Document

[0003] Patent Document 1: Japanese Patent No. 4302038

[0004] In the aforementioned conventional "Seatbelt Connecting Device", however, there has been a problem in that when the release button is abruptly pressed by mistake, the connected state between the female member and the male member might be released.

[0005] Therefore, each invention respectively described in each aspect is made in view of the aforementioned problem of the conventional technology and an object thereof is as follows.

(First aspect)

[0006] The invention described in the first aspect has the following object.

[0007] Namely, in the invention described in the first aspect, by selecting the lock position, a lock state of an insertion portion of a male member is prevented from being released abruptly by a release button passing through an opening portion and pushed in.

(Second aspect)

[0008] The invention described in a second aspect has the following object in addition to the object of the invention described in the first aspect.

[0009] Namely, in the invention described in the second aspect, by turning the release button, a release position and the lock position can be selected.

(Third aspect)

[0010] The invention described in a third aspect has the following object in addition to the object of the invention described in the first aspect.

[0011] Namely, in the invention described in the third aspect, by reciprocating the release button, the release

position and the lock position can be selected.

(Fourth aspect)

[0012] The invention described in a fourth aspect has the following object in addition to the object of the invention described in any one of the first to third aspects.

[0013] Namely, in the invention described in the fourth aspect, the release button is urged toward the lock position so as to make a selection operation allowing the release button to transfer from the release position to the lock position unnecessary; to be capable of adding an automatic lock function; and to be capable of preventing negligence of locking the release button.

[0014] Additionally, in the invention described in the fourth aspect, when the release button which has been transferred to the lock position is transferred to the release position, the selection operation allowing the release button to transfer to the release position against the urging of an urging device becomes necessary so as to be capable of appropriately preventing the lock state from being abruptly released from a viewpoint of the selection operation as well.

(Fifth aspect)

[0015] The invention described in a fifth aspect has the following object in addition to the object of the invention described in the second aspect.

[0016] Namely, in the invention described in the fifth aspect, there is provided an engaging claw deterring the release button from turning so as to be capable of preventing the release button from being abruptly turned and being transferred from the release position to the lock position.

(Sixth aspect)

[0017] The invention described in a sixth aspect has the following object in addition to the object of the invention described in the fourth aspect.

[0018] Namely, in the invention described in the sixth aspect, there is provided a coil spring on an axis line of the turning of the release button so as to be capable of providing both functions of a return spring allowing the release button to protrude, and the urging device urging the release button toward the lock position, by a twist and compression thereof.

[0019] Further objects and advantages of the invention will be apparent from the following description of the invention.

Summary of the Invention

[0020] Each invention respectively described in each aspect is made in order to achieve the aforementioned respective objects, and characteristics of each invention will be explained hereinafter using an embodiment of the

invention shown in drawings.

[0021] Incidentally, symbols shown in parentheses represent the symbols used in the embodiment of the invention, and do not limit a technical scope of the present invention.

[0022] Also, figure numbers represent the figure numbers used in the embodiment of the invention, and do not limit the technical scope of the present invention.

(First aspect)

[0023] The invention according to the first aspect has the following characteristics.

[0024] First, a buckle (10) comprises the following structure as shown in, for example, Fig. 1.

(1) Male member (30)

[0025] For example, as shown in Fig. 8, a male member (30) is for fixing a free end portion of a belt (20).

(2) Female member (40)

[0026] For example, as shown in Figs. 2 to 4, and 8, a female member (40) is for connecting the male member (30).

[0027] Secondly, the female member (40) comprises the following structure, for example, as shown in Fig. 1.

(3) Female main body (50)

[0028] For example, as shown in Figs. 8, 18, and 20, a female main body (50) has a hollow cylinder shape including an insertion mouth (51) in which an insertion portion (32) of the male members (30) is inserted.

(4) Lock member (70)

[0029] For example, as shown in Fig. 8, a lock member (70) is positioned in an inside of the female main body (50), and is for locking the insertion portion (32) of the male member (30), which has been inserted from the insertion mouth (51), into the insertion mouth (51).

[0030] Thirdly, the lock member (70) comprises the following structure, for example, as shown in Fig. 1.

(5) Locking piece (72)

[0031] For example, as shown in Fig. 8, a locking piece (72) is for locking the insertion portion (32) of the male member (30), which has been inserted from the insertion mouth (51), into the insertion mouth (51).

(6) Release button (80)

[0032] For example, as shown in Figs. 8 and 10, a release button (80) is provided in the locking piece (72), and protrudes outwardly from an opening portion (52)

provided in the female main body (50). Also, the release button (80) can release a lock state by a push operation toward the inside of the female main body (50).

5 (7) Return spring (73)

[0033] For example, as shown in Fig. 11, a return spring (73) is positioned between the release button (80) and the inside of the female main body (50), and is for urging the release button (80) in a direction of outwardly protruding from the opening portion (52) of the female main body (50).

[0034] Fourthly, the release button (80) can be selected between a release position which can pass the opening portion (52) in the lock state, for example, as shown in Figs. 15 and 16, and a lock position which can abut against a circumferential edge of the opening portion (52), for example, as shown in Figs. 12 and 13.

20 (Second aspect)

[0035] The invention according to a second aspect has the following characteristic in addition to the characteristics of the invention described in the first aspect.

25 **[0036]** Namely, for example, as shown in Fig. 1, the release button (80) is turnably provided in the lock member (70).

(Third aspect)

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[0037] The invention according to a third aspect has the following characteristic in addition to the characteristics of the invention described in the first aspect.

35 **[0038]** Namely, although it is not shown in the figures, the release button is reciprocatingly provided in parallel with an insertion direction of the male member relative to the lock member.

(Fourth aspect)

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[0039] The invention according to a fourth aspect has the following characteristic in addition to the characteristics of the invention described in any one of the first to third aspects.

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[0040] Namely, for example, as shown in Fig. 1, between the release button (80) and the lock member (70), there is provided an urging device (for example, a coil spring 90) urging the release button (80) toward the lock position.

(Fifth aspect)

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[0041] The invention according to a fifth aspect has the following characteristic in addition to the characteristic of the invention described in the second aspect.

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[0042] Namely, for example, as shown in Fig. 14, the release button (80) comprises an engaging claw (85) deterring the release button (80) from turning.

(Sixth aspect)

[0043] The invention according to a sixth aspect has the following characteristic in addition to the characteristic of the invention described in the fourth aspect.

[0044] Namely, for example, as shown in Fig. 14, the urging device is the coil spring (90) provided on an axis line of the turning of the release button (80).

[0045] Since the present invention is structured as mentioned above, the following effects can be provided.

(First aspect)

[0046] According to the invention described in the first aspect, the following effect can be provided.

[0047] Namely, according to the invention described in the first aspect, by selecting the lock position, the lock state of an insertion portion of the male member is prevented from being released abruptly by the release button passing through the opening portion and pushed in.

(Second aspect)

[0048] According to the invention described in the second aspect, the following effect can be provided in addition to the effect of the invention described in the first aspect.

[0049] Namely, according to the invention described in the second aspect, by turning the release button, the release position and the lock position can be selected.

(Third aspect)

[0050] According to the invention described in the third aspect, the following effect can be provided in addition to the effect of the invention described in the first aspect.

[0051] Namely, according to the invention described in the third aspect, by reciprocating the release button, the release position and the lock position can be selected.

(Fourth aspect)

[0052] According to the invention described in the fourth aspect, the following effect can be provided in addition to the effect of the invention described in any one of the first to third aspects.

[0053] Namely, according to the invention described in the fourth aspect, by urging the release button toward the lock position, a selection operation allowing the release button to transfer from the release position to the lock position becomes unnecessary, so that an automatic lock function can be added so as to be capable of preventing negligence of locking the release button.

[0054] Additionally, according to the invention described in the fourth aspect, when the release button which has been transferred to the lock position is transferred to the release position, the selection operation allowing the release button to transfer to the release position

against the urging of the urging device becomes necessary so as to be capable of appropriately preventing the lock state from being abruptly released from a viewpoint of the selection operation as well.

(Fifth aspect)

[0055] The invention described in the fifth aspect has the following effect in addition to the effect of the invention described in the second aspect.

[0056] Namely, according to the invention described in the fifth aspect, the engaging claw deterring the release button from turning is provided so as to be capable of preventing the release button from abruptly turning, and from being transferred from the release position to the lock position.

(Sixth aspect)

[0057] The invention according to the sixth aspect has the following effect in addition to the effect of the invention described in the fourth aspect.

[0058] Namely, according to the invention described in the sixth aspect, the coil spring is provided on the axis line of the turning of the release button so as to be capable of providing both functions of the return spring allowing the release button to protrude, and the urging device urging the release button toward the lock position, by a twist and compression thereof.

Brief Description of the Drawings

[0059]

Fig. 1 is an exploded perspective view of a buckle; Fig. 2 is a perspective view of the buckle from a lateral direction in a state wherein a female main body is removed, and a male member is connected; Fig. 3 corresponds to Fig. 2, and is a perspective view of a state wherein the buckle is viewed from above; Fig. 4 corresponds to Fig. 2, and is a perspective view of a state wherein the buckle is viewed from below; Fig. 5 corresponds to Fig. 3, and is a perspective view of a state wherein a release button is turned; Fig. 6 follows Fig. 5, and is a perspective view when the male members come out; Fig. 7 follows Fig. 6, and is a perspective view of a state wherein a force turning the release button is released; Fig. 8 is a cross-sectional view of Fig. 3; Fig. 9 follows Fig. 8, and is a cross-sectional view of a state wherein the release button is turned; Fig. 10 follows Fig. 9, and is a cross-sectional view of a state wherein the release button is pushed in; Fig. 11 follows Fig. 10, and is a cross-sectional view of a state wherein the male members are pulled out;

Fig. 12 is a perspective view of a female member;
Fig. 13 corresponds to Fig. 12, and is a perspective
view of a state wherein a base and the release button
are assembled;

Fig. 14 is an exploded perspective view of the base,
the release button, and a coil spring;

Fig. 15 corresponds to Fig. 12, and is a perspective
view of a state wherein the release button is turned;

Fig. 16 corresponds to Fig. 13, and is a perspective
view of the state wherein the release button is turned;

Fig. 17 is a plan view of the female main body;

Fig. 18 is a side view of the female main body;

Fig. 19 is a bottom view of the female main body;

Fig. 20 is a cross-sectional view taken along line A
to A in Fig. 17;

Fig. 21 is a plan view of the male member;

Fig. 22 is a side view of the male member;

Fig. 23 is a bottom view of the male member;

Fig. 24 is a cross-sectional view taken along line B
to B in Fig. 21;

Fig. 25 is a cross-sectional view taken along line C
to C in Fig. 21;

Fig. 26 is a cross-sectional view taken along line D
to D in Fig. 23;

Fig. 27 is an enlarged view of an E portion in Fig. 23;

Fig. 28 is a plan view of the release button;

Fig. 29 is a side view of the release button;

Fig. 30 is a bottom view of the release button;

Fig. 31 is a cross-sectional view taken along line F
to F in Fig. 31;

Fig. 32 is an enlarged view of an H portion in Fig. 31;

Fig. 33 is a cross-sectional view taken along line G
to G in Fig. 30;

Fig. 34 is a plan view of a lock member;

Fig. 35 is a front view of the lock member;

Fig. 36 is a side view of the lock member;

Fig. 37 is a plan view of the base;

Fig. 38 is a front view of the base;

Fig. 39 is a side view of the base;

Fig. 40 is a bottom view of the base;

Fig. 41 is a cross-sectional view taken along line I
to I in Fig. 37;

Fig. 42 is an enlarged view of a J portion in Fig. 41;

Fig. 43 is an enlarged view of a K portion in Fig. 41;

Fig. 44 is a side view of the coil spring; and

Fig. 45 is a plan view of the coil spring.

Detailed Description of Preferred Embodiments

(Buckle 10)

[0060] In the drawings, the reference numeral 10 represents a buckle, and as shown in Figs. 8 to 11, the buckle 10 is for connecting a belt 20.

[0061] Although it is not shown in the drawings, the belt 20 is used for, for example, a stroller, a car seat, a baby rack, and the like, and is used as a five-point seatbelt. Although it is not shown in the drawings, the five-

point seatbelt is structured by two waist belts which are wrapped around the waist of a child; two shoulder belts which are respectively put on both shoulders of the child; and one crotch belt which passes between both legs of the child.

[0062] Incidentally, as usage of the belt 20, although the stroller, the car seat, and the baby rack are illustrated as an example, the usage of the belt 20 is not limited to the above. Also, although the five-point seatbelt is illustrated as an example, the usage is not limited to the above, and may be used for a two-point seatbelt, a three-point seatbelt, and a four-point seatbelt.

[0063] As shown in Fig. 1, the buckle 10 roughly comprises the following parts.

[0064] Incidentally, the following (1) and (2) will be described later.

(1) A right-and-left pair of male members 30 and 30

(2) Female member 40

[0065] Incidentally, the parts of the buckle 10 are not limited to the aforementioned (1) and (2).

(Male members 30)

[0066] As shown in Fig. 8, the male members 30 are for fixing free end portions of the belt 20.

[0067] As shown in Fig. 1, the male members 30 are formed as a right-and-left pair, and are integrally molded by thermoplastic synthetic resin having rigidity, for example, POM (polyacetal). Incidentally, although the male members 30 are formed as a pair, they are not limited to the above, and may be formed as one piece. Also, although the male members 30 are made of synthetic resin, they are not limited to the above, and may be made of metal.

[0068] Namely, as shown in Figs. 1, and 21 to 27, the male member 30 comprises the respective following portions.

[0069] Incidentally, the following (1) to (4) will be described later.

(1) First belt stationary portion 31

(2) Insertion portion 32

(3) Lock hole 33

(4) Second belt stationary portion 34

[0070] Incidentally, each portion of the male member 30 is not limited to the aforementioned (1) to (4).

(First belt stationary portion 31)

[0071] As shown in Figs. 8, 21, 23, and 25, the first belt stationary portion 31 is positioned in one end portion of the male member 30, and is for fixing the free end portion of the belt 20. The first belt stationary portion 31 is formed in a ladder form in such a way as to pass the free end portion of the belt 20 by snaking the free end portion of

the belt 20.

[0072] Incidentally, although the first belt stationary portion 31 is formed in the ladder form, it is not limited to the above, and may be formed in a simple ring shape.

(Insertion portion 32)

[0073] As shown in Figs. 8, and 21 to 24, the insertion portion 32 is positioned in the other end portion of the male member 30, and is for being inserted in the later-mentioned insertion mouth 51 of the female member 40.

[0074] The insertion portion 32 extends from the first belt stationary portion 31 in a plate shape, and a transverse width of the insertion portion 32 is formed narrower than that of the first belt stationary portion 31.

[0075] Incidentally, the transverse width of the first belt stationary portion 31 is formed larger than an opening width of the insertion mouth 51.

(Lock hole 33)

[0076] As shown in Figs. 8, 21, 23, and 24, the lock hole 33 is formed in the insertion portion 32, and is for locking the insertion portion 32, which has been inserted from the insertion mouth 51, in a hollow interior portion of the female member 40. The lock hole 33 is formed in a square shape in which the insertion portion 32 is passed through up and down, and is for allowing the later-mentioned locking piece 72 of the female member 40 to be fitted in.

[0077] Incidentally, although the lock hole 33 is formed in the square shape, it is not limited to the above, and may be formed in a circular shape, an oval shape, or a polygonal shape except for the square shape.

(Second belt stationary portion 34)

[0078] As shown in Figs. 21 to 23, 26, and 27, the second belt stationary portion 34 extends from the first belt stationary portion 31 in a rod shape in the same direction as the insertion portion 32, and is for fixing the belt 20. Incidentally, although it is not shown in the drawings, the belt 20 is fixed by passing the belt 20 through the rod-like second belt stationary portion 34 in a state of making the belt 20 in a loop shape, or of folding back the belt 20.

[0079] Incidentally, although the second belt stationary portion 34 is formed in the rod shape, it is not limited to the above, and may be formed in the simple ring shape.

(Female member 40)

[0080] As shown in Figs. 2 to 4, and 8, the female member 40 is for connecting the male members 30.

[0081] The female member 40 roughly comprises the following parts.

[0082] Incidentally, the following (1) to (5) will be described later.

(1) Female main body 50

(2) Base 60

(3) Lock member 70

(4) Release button 80 (oval shape)

(5) Coil spring 90 (urging device)

5

[0083] Incidentally, the parts of the female member 40 are not limited to the aforementioned (1) to (5).

10 (Female main body 50)

[0084] As shown in Figs. 8, and 17 to 20, the female main body 50 has a hollow cylinder shape including the insertion mouths 51 in which the insertion portions 32 of the male members 30 are inserted.

15

[0085] The female main body 50 is integrally molded by thermoplastic synthetic resin having rigidity, for example, POM (polyacetal).

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[0086] Incidentally, although the female main body 50 is made of synthetic resin, it is not limited to the above, and may be made of metal.

[0087] Namely, as shown in Figs. 17 to 20, the female main body 50 comprises the respective following portions.

25

[0088] Incidentally, the following (1) to (5) will be described later.

(1) Insertion mouths 51

(2) Opening portion 52

30

(3) Belt stationary portion 53

(4) Bottom hole 54

(5) Base stoppers 55

35

[0089] Incidentally, each portion of the female main body 50 is not limited to the aforementioned (1) to (5).

(Insertion mouths 51)

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[0090] As shown in Figs. 8, 12, 18 and 20, a pair of insertion mouths 51 is formed on both end portions of the female main body 50, and is for the insertion portions 32 of the male members 30 to be respectively fitted in.

(Opening portion 52)

45

[0091] As shown in Figs. 8, 10, 17, and 20, the opening portion 52 is for the later-mentioned oval head portion 71 of the lock member 70, and an oval button main body 81 of the release button 80, which has been turned, to be fitted in.

50

[0092] The opening portion 52 passes through an upper wall of the female main body 50 up and down, and is formed in the oval shape having a long side in a direction including the insertion mouths 51.

55

[0093] Incidentally, although the opening portion 52 is formed in the oval shape, it is not limited to the above, and may be formed in an elongated circular shape or a rectangular shape as long as the shape of the opening

portion 52 has the long side and a short side.

(Belt stationary portion 53)

[0094] As shown in Figs. 3, 4, and 17 to 19, the belt stationary portion 53 is positioned in a direction orthogonal to a pair of the insertion mouths 51, and is for fixing the free end portion of the belt 20. The belt stationary portion 53 is formed in the ladder form in such a way as to pass through the free end portion of the belt 20 by snaking the free end portion of the belt 20.

[0095] Incidentally, although the belt stationary portion 53 is formed in the ladder form, it is not limited to the above, and may be formed in the simple ring shape.

(Bottom hole 54)

[0096] As shown in Figs. 19 and 20, the bottom hole 54 is positioned on a downside of the opening portion 52, passes through a bottom wall of the female main body 50 up and down, and is formed in the square shape.

[0097] Incidentally, although the bottom hole 54 is formed in the square shape, it is not limited to the above, and may be formed in the oval shape, the elongated circular shape, or the polygonal shape except for the square shape.

(Base stoppers 55)

[0098] As shown in Figs. 8, 19, and 20, the base stoppers 55 are for fixing the base 60 to the bottom hole 54, and protrude in a hook shape downwardly from the bottom wall of the female main body 50. A pair of the base stoppers 55 is formed by sandwiching the bottom hole 54, and is mutually fitted in the later-mentioned stop receiver 65 of the base 60.

(Base 60)

[0099] As shown in Figs. 1, 8, 13, 14, and 37 to 43, the base 60 is attached from a reverse face side of the female main body 50, protrudes one portion to an inside of the female main body 50, and is for supporting the later-mentioned lock member 70, the release button 80, and a coil spring 90.

[0100] The base 60 is integrally molded by thermoplastic synthetic resin having rigidity, for example, POM (polyacetal).

[0101] Incidentally, although the base 60 is made of synthetic resin, it is not limited to the above, and may be made of metal.

[0102] Namely, as shown in Figs. 37 to 43, the base 60 comprises the respective following portions.

[0103] Incidentally, the following (1) to (5) will be described later.

- (1) Bottom plate 61
- (2) Outer cylinder 62

(3) Boss 63

(4) Guide holes 64

(5) Stop receivers 65

[0104] Incidentally, each portion of the base 60 is not limited to the aforementioned (1) to (5).

(Bottom plate 61)

[0105] As shown in Figs. 8, 13, 14, and 37 to 41, the bottom plate 61 blocks the bottom hole 54 of the female main body 50, and is formed in a square plate shape.

[0106] Although the bottom plate 61 is formed in the square shape, it is not limited to the above, and may be formed in the oval shape, the elongated circular shape, or the polygonal shape except for the square shape.

(Outer cylinder 62)

[0107] As shown in Figs. 8, 13, 14, and 37 to 39, the outer cylinder 62 is provided to stand at the center of the bottom plate 61, protrudes to the inside of the female main body 50, and is for turnably supporting the later-mentioned release button 80.

[0108] Incidentally, although the outer cylinder 62 is formed in the base 60, and the later-mentioned inner cylinder 82, which is fitted into the outer cylinder 62, is formed in the release button 80, the inner cylinder may be formed in the base 60, and the outer cylinder may be formed in the release button 80 vice versa.

(Boss 63)

[0109] As shown in Figs. 8, 14, 37, and 41, the boss 63 is provided to stand at a bottom of the outer cylinder 62, and is divided by an insertion groove 63a passing the center of the boss 63.

[0110] In the boss 63, there is externally fitted the later-mentioned coil spring 90, and either one of end portions 92 or 93 thereof is inserted into the insertion groove 63a so as to unturnably support a lower end portion of the coil spring 90 inside the outer cylinder 62.

(Guide holes 64)

[0111] As shown in Figs. 8, 13, 14, 16, 38, 39, and 41, the guide holes 64 are for controlling a turning angle of the release button 80 within a range of, for example, 90 degrees by fitting the later-mentioned engaging claws 85 of the release button 80 in.

[0112] A pair of guide holes 64 is formed in a diametrical direction of the outer cylinder 62, and is structured by a square-shaped hole passing through the outer cylinder 62 in and out.

[0113] Incidentally, although the guide holes 64 are formed in the base 60, and the later-mentioned engaging claws 85, which are fitted into the guide holes 64, are formed in the release button 80, they are not limited to

the above, and the engaging claws may protrude from an inner circumferential face of the outer cylinder 62, and the guide holes may be formed in the release button 80. Also, although the turning angle of the release button 80 is controlled to 90 degrees, it is not limited to the above, and may be set in an angle of less than 90 degrees, or an angle of more than 90 degrees.

(Stop receivers 65)

[0114] As shown in Figs. 8, and 38 to 43, a pair of stop receivers 65 is formed on both end portions of the bottom plate 61 by sandwiching the outer cylinder 62, and is mutually fitted into the base stoppers 55 of the female main body 50.

(Lock member 70)

[0115] As shown in Figs. 1, 8, 11, and 34 to 36, the lock member 70 is positioned in the inside of the female main body 50, and is for locking the insertion portions 32 of the male members 30, which have been inserted from the insertion mouths 51, into the insertion mouths 51.

[0116] The lock member 70 is integrally molded by thermoplastic synthetic resin having appropriate elasticity and rigidity, for example, POM (polyacetal).

[0117] Incidentally, although the lock member 70 is made of synthetic resin, it is not limited to the above, and may be made of metal.

[0118] Namely, as shown in Figs. 34 to 36, the lock member 70 comprises the respective following portions.

[0119] Incidentally, the following (1) to (5) will be described later.

- (1) Head portion 71
- (2) Locking pieces 72
- (3) Return springs 73
- (4) Pressing springs 74
- (5) Through-hole 75

[0120] Incidentally, each portion of the lock member 70 is not limited to the aforementioned (1) to (5).

(Head portion 71)

[0121] As shown in Figs. 8, and 34 to 36, the head portion 71 is positioned at the center of the lock member 70, and a planar face of the head portion 71 is formed in an oval cylinder shape. The head portion 71 can be fitted into the oval opening portion 52 of the female main body 50.

[0122] Incidentally, although the head portion 71 is formed in the cylinder shape whose planar face is the oval shape, it is not limited to the above, and may be formed in a shape which is fitted into the oval opening portion 52 of the female main body 50. Also, the head portion 71 is not limited to the cylinder shape.

(Locking pieces 72)

[0123] As shown in Figs. 8, and 34 to 36, the locking pieces 72 are for locking the insertion portions 32 of the male members 30, which have been inserted from the insertion mouths 51, into the insertion mouths 51.

[0124] Namely, the locking pieces 72 extend from both end portions of the long side of the oval shape of the head portion 71 in the plate shape, protrude from an upper face of an end portion thereof. In a state wherein an upside, i.e., the lock member 70 is housed in the inside of the female main body 50, the locking piece 72 is formed in a triangular shape inclining toward the insertion mouth 51.

[0125] The locking piece 72 is fitted into the lock hole 33 of the insertion portion 32 of the male member 30, which has been inserted from the insertion mouth 51, from the downside in the inside of the female main body 50.

(Return springs 73)

[0126] As shown in Figs. 11, and 34 to 36, the return springs 73 are positioned between the release button 80 and the inside of the female main body 50, and are for urging the release button 80 in a direction of outwardly protruding from the opening portion 52 of the female main body 50.

[0127] Namely, four pieces of the return springs 73 protrude from four directions of the head portion 71, abut against the locking pieces 72, and extend obliquely downward in parallel with the locking pieces 72 in the rod shape.

[0128] Incidentally, although the return springs 73 are integrally formed in the lock member 70, they are not limited to the above, and may be formed as a separate body. Also, although four pieces of the return springs 73 are formed, the number of the return springs 73 is not limited to the above, and may be formed with one to three pieces, or five pieces or above.

(Pressing springs 74)

[0129] As shown in Figs. 11, and 34 to 36, the pressing springs 74 are for pressing the insertion portions 32 of the male members 30 in a direction of coming out of the insertion mouths 51.

[0130] Four pieces of the pressing springs 74 are positioned outside the four pieces of the return springs 73, are bent in a mountain shape, and extend obliquely downward in the rod shape. The pressing springs 74 are formed short compared to the return springs 73.

[0131] Incidentally, although the pressing springs 74 are integrally formed in the lock member 70, they are not limited to the above, and may be formed as a separate body. Also, although four pieces of the pressing springs 74 are formed, the number of the pressing springs 74 is not limited to the above, and may be formed with one to

three pieces, or five pieces or above. Also, the pressing springs 74 are not limited to be positioned outside the return springs 73.

(Through-hole 75)

[0132] As shown in Fig. 34, the through-hole 75 is positioned at the center of the head portion 71, passes through up and down, and is for fitting the outer cylinder 62 of the base 60 in, and also for fitting the inner cylinder 82 of the release button 80 in through the outer cylinder 62.

(Release button 80)

[0133] As shown in Figs. 8, 10, 12 to 16, and 28 to 33, the release button 80 is provided in the locking pieces 72, protrudes outwardly from the opening portion 52 provided in the female main body 50, and also can release a lock state by a push operation toward the inside of the female main body 50.

[0134] The release button 80 is integrally molded by thermoplastic synthetic resin having appropriate elasticity and rigidity, for example, POM (polyacetal).

[0135] Incidentally, although the release button 80 is made of synthetic resin, it is not limited to the above, and may be made of metal.

[0136] Also, the release button 80 can be selected between a release position to be capable of passing the opening portion 52 in the lock state as shown in Figs. 15 and 16, and a lock position to be abutable against a circumferential edge of the opening portion 52 as shown in Figs. 12 and 13.

[0137] Moreover, as shown in Fig. 1, the release button 80 is turnably provided in the lock member 70.

[0138] Incidentally, although it is not shown in the drawings, the release button 80 may be reciprocatingly provided in parallel with an insertion direction of the male members 30 relative to the lock member 70.

[0139] Namely, as shown in Figs. 14, and 28 to 33, the release button 80 comprises the following respective portions.

[0140] Incidentally, the following (1) to (5) will be described later.

- (1) Button main body 81
- (2) Inner cylinder 82
- (3) Knob portion 83
- (4) Boss 84
- (5) Engaging claws 85

[0141] Incidentally, each portion of the release button 80 is not limited to the aforementioned (1) to (5).

(Button main body 81)

[0142] As shown in Figs. 2, 3, 10, 14, and 28 to 31, the button main body 81 is formed in the plate shape whose

planar face has the oval shape, and is fittable into the oval opening portion 52 of the female main body 50.

[0143] Namely, the long side of the oval shape of the outer diameter of the button main body 81 is formed to be equal to or less than, for example, the long side of the inner diameter of the opening portion 52, and also the short side of the oval shape of the outer diameter of the button main body 81 is formed to be equal to or less than, for example, the short side of the inner diameter of the opening portion 52, respectively.

[0144] Consequently, as shown in Fig. 10, the long side of the button main body 81 is fittable into the opening portion 52 at a position wherein the long side of the button main body 81 corresponds to the long side of the opening portion 52. On the other hand, when the button main body 81 turns, for example, turns by 90 degrees from the position wherein the long sides of both the button main body 81 and the opening portion 52 correspond, the long side of the oval of the button main body 81 is positioned on the upside of the short side of the oval of the opening portion 52, so that as shown in Figs. 3 and 8, a lower face of the button main body 81 abuts against an upper face of the female main body 50 around the opening portion 52, and the button main body 81 cannot be fitted into the opening portion 52.

[0145] Incidentally, although the button main body 81 is formed in the plate shape whose planar shape has the oval shape, it is not limited to the above, and may be formed in the elongated circular shape or the rectangular shape as long as the button main body 81 corresponds to the opening portion 52, and the shape of the button main body 81 has the long side and the short side. Also, the shape of the button main body 81 is not limited to the plate shape. (Inner cylinder 82)

[0146] As shown in Figs. 8, 14, and 29 to 33, the inner cylinder 82 droops from the center of the lower face of the button main body 81, and is formed in the cylinder shape. The outer diameter of the inner cylinder 82 is set to be approximately equal to the inner diameter of the outer cylinder 62 of the base 60, and the release button 80 is turnably supported at the center of the outer cylinder 62 of the base 60.

[0147] Incidentally, although the inner cylinder 82 is formed in the release button 80, and the outer cylinder 62 is formed in the base 60, the outer cylinder may be formed in the release button 80, and the inner cylinder may be formed in the base 60 vice versa.

(Knob portion 83)

[0148] As shown in Figs. 2, 3, 8, 12 to 16, 28, 29, and 33, the knob portion 83 protrudes from the upper face of the button main body 81 in a convex shape, and the planar face is formed in a straight line, or in a minus shape. The knob portion 83 is formed in parallel with the long side of the oval of the button main body 81.

[0149] Incidentally, although the planar face of the knob portion 83 is formed in the straight line, or in the

minus shape, it is not limited to the above, and may be formed in an across shape, or in a plus shape.

(Boss 84)

[0150] As shown in Figs. 10, and 31 to 33, the boss 84 is provided to stand at a bottom of the inner cylinder 82, and is divided by an insertion groove 84a passing the center of the boss 84.

[0151] In the boss 84, there is externally fitted the later-mentioned coil spring 90, and either one of end portions 92 or 93 thereof is inserted into the insertion groove 84a so as to unturnably support an upper end portion of the coil spring 90 inside the inner cylinder 82.

(Engaging claws 85)

[0152] As shown in Figs. 13, 14, 16, and 29 to 32, the engaging claws 85 are for deterring the release button 80 from turning.

[0153] The engaging claws 85 protrude from an outer circumference of the inner cylinder 82, and a pair of the engaging claws 85 is formed in a diametrical direction thereof, and is positioned in parallel with the knob portion 83. The engaging claw 85 protrudes in a triangular shape whose inclined face faces the downside. The lower end portion thereof becomes a hinge, and the upper end portion becomes a free end.

[0154] Incidentally, although the engaging claws 85 are formed in the release button 80, and the guide holes 64 are formed in the base 60, they are not limited to the above, and the guide holes may be formed in the release button 80, and the engaging claws may protrude from the inner circumferential face of the outer cylinder 62 of the base 60.

(Coil spring 90 (urging device))

[0155] As shown in Figs. 1, 8, 14, 44, and 45, the coil spring 90 is positioned between the release button 80 and the lock member 70, is for urging the release button 80 toward the lock position, and functions as the urging device.

[0156] As shown in Fig. 14, the coil spring 90 is provided on an axis line of the turning of the release button 80.

[0157] As shown in Figs. 14, 44, and 45, the coil spring 90 is made of metal, one end portion 91 of a wire material thereof is folded back in such a way as to pass the center of the coil spring 90, and the other end portion 92 of the wire material is folded back in such a way as to pass the center of the coil spring 90. Also, the coil spring 90 is twisted by a predetermined angle, for example, 20 degrees relative to one end portion 91.

[0158] Incidentally, although as a twisting angle of the other end portion 92, 20 degrees are illustrated as an example, the twisting angle of the other end portion 92 is not limited to the above, and the other end portion 92

may be positioned in parallel without any twisting, or may be twisted within a range of 1 to 19 degrees, or may be twisted by 21 degrees or above. Also, a phase difference may be provided on the insertion grooves 63a and 84a wherein the end portions of the coil spring 90 are respectively inserted.

[0159] Also, although as the urging device, the metal coil spring 90 is illustrated as an example, it is not limited to the above, and a metal plate spring or a resin plate spring may be used. Also, although the female main body 50 and the release button 80 are provided as a separate part, they may be integrally formed in at least either one of the base 60 or the lock member 70.

[0160] As shown in Figs. 8 and 14, an upper half portion of the coil spring 90 is inserted into the inner cylinder 82 of the release button 80, and is externally fitted into the boss 84 while inserting one end portion 91 into the insertion groove 84a. A lower half portion of the coil spring 90 is inserted into the outer cylinder 62 of the base 60, and is externally fitted into the boss 63 while inserting into the insertion groove 63a thereof.

[0161] The inner cylinder 82 of the release button 80 is fitted in the outer cylinder 62 of the base 60, and is inserted into the outer cylinder 62 of the base 60. When the inner cylinder 82 is inserted, the engaging claws 85 thereof are pressed against the inner circumferential face of the outer cylinder 62 so as to be bent toward a cylinder interior portion of the inner cylinder 82. When the engaging claws 85 are positioned in the guide holes 64 of the outer cylinder 62, the engaging claws 85 elastically restore to original state, and as shown in Fig. 13, the engaging claws 85 protrude through the guide holes 64 so as to prevent the inner cylinder 82 from coming out of the outer cylinder 62. At that time, as shown in Fig. 8, the coil spring 90 is compressed between the bottom of the inner cylinder 82 and the bottom of the outer cylinder 62, and due to a compression restoring force thereof, the coil spring 90 urges the release button 80 in the direction of outwardly protruding from the opening portion 52 of the female main body 50.

[0162] Also, as shown in Fig. 13, in a position wherein the engaging claws 85 abut against side edges in a circumferential direction of the guide holes 64, the knob portion 83 of the release button 80, whose planar face is formed in the straight line, or in the minus shape, is positioned orthogonal to an imaginary line connecting the insertion portions 32 on both sides as shown in Figs. 2, 3, 7, 8, 12, and 13. At that time, as shown in Fig. 8, both the insertion grooves 63a and 84a face up and down, and are positioned in the same direction.

[0163] Also, since the other end portion 92 of the coil spring 90 is twisted by the predetermined angle, for example, 20 degrees relative to one end portion 91, a restoring force which attempts to twist back acts, and the engaging claws 85 elastically abut against the side edges in the circumferential direction of the guide holes 64 so as to prevent the wobbling.

[0164] On the other hand, when the knob portion 83 of

the release button 80 is turned, the engaging claws 85 move in the circumferential direction of the guide holes 64, and as shown in Fig. 16, the engaging claws 85 abut against the other side edges in the circumferential direction of the guide holes 64 thereof, and the turning angle of the release button 80 is controlled to the predetermined angle, for example, 90 degrees.

[0165] At that time, the knob portion 83 of the release button 80 whose planar face is formed in the straight line, or in the minus shape, is positioned to be parallel to the imaginary line connecting the insertion portions 32 on both sides as shown in Figs. 5, 6, 9 to 11, 15, and 16.

[0166] Also, when the release button 80 is turned, the coil spring 90 is twisted, and it is necessary to turn the release button 80 against the restoring force which attempts to twist back.

[0167] Next, in a position wherein the engaging claw 85 abuts against the other side edge of the guide hole 64, when one's hand is released from the knob portion 83, due to the restoring force in which the coil spring 90 attempts to twist back, the release button 80 turns back, and as shown in Fig. 13, the engaging claw 85 elastically abuts against the one side edge in the circumferential direction of the guide hole 64, so that the turning halts.

(Usage method of buckle 10)

[0168] Next, a usage method of the buckle 10 including the aforementioned structure will be explained.

[0169] First, as shown in Figs. 2, 3, and 8, in a state wherein the male members 30 are connected, in order to remove the male members 30, as shown in Figs. 5, 9, 15, and 16, with the knob portion 83 of the release button 80, the release button 80 is turned by 90 degrees.

[0170] Next, in a state wherein the release button 80 is turned, as shown in Fig. 10, the release button 80 may be pushed toward the opening portion 52 of the female main body 50.

[0171] As shown in Fig. 10, when the release button 80 is pushed in, the head portion 71 of the lock member 70 is pressed, and in the inside of the female main body 50, the whole lock member 70 sinks in, and at that time, the return springs 73 and the pressing springs 74 respectively bend so as to accumulate a restoring force.

[0172] Also, when the whole lock member 70 has sunk in, the locking pieces 72 come off downwardly from the lock holes 33 of the insertion portions 32 of the male members 30 so as to release the lock state.

[0173] At that time, due to the restoring force which has been accumulated in the pressing springs 74, the insertion portions 32 of the male members 30 are pressed in the direction of coming out of the insertion mouths 51.

[0174] Consequently, as shown in Figs. 6 and 11, by taking out the insertion portions 32 of the male members 30, which have been pushed out of the insertion mouths 51, from the insertion mouths 51, a connected state between the male members 30 and the female member 40 can be released.

[0175] On the other hand, when one's hand is released from the knob portion 83, a force pressing the head portion 71 of the lock member 70 is released, so that as shown in Fig. 11, due to the restoring force which has been accumulated in the return springs 73, the lock member 70 emerges in the inside of the female main body 50.

[0176] At the same time, the release button 80 is pushed back by the emerging lock member 70, and also due to the compression restoring force of the coil spring 90, the release button 80 protrudes outwardly from the opening portion 52 of the female main body 50.

[0177] Also, as shown in Fig. 7, due to the restoring force of the coil spring 90 which attempts to twist back, the release button 80 turns back, and automatically returns to the lock state.

(Connecting method of male members 30)

[0178] Next, in order to connect the male members 30, as shown in Fig. 7, the insertion portions 32 thereof may be fitted in the insertion mouths 51 of the female main body 50, and may be inserted into the insertion mouths 51 of the female main body 50.

[0179] When the insertion portions 32 are inserted, the locking pieces 72 of the lock member 70 are pushed by the insertion portions 32, and in the inside of the female main body 50, the lock member 70 sinks in once. At that time, the return springs 73 bend, and a restoring force is accumulated.

[0180] When the locking pieces 72 are positioned in the lock holes 33 of the insertion portions 32 of the male members 30, due to the restoring force which has been accumulated in the return springs 73, as shown in Fig. 8, the lock member 70 emerges in the inside of the female main body 50. At that time, the locking pieces 72 are fitted into the lock holes 33 of the insertion portions 32 of the male members 30 from the downside, and the male members 30 are locked inside the insertion mouths 51 of the female main body 50.

[0181] Also, when the insertion portions 32 are inserted, the pressing springs 74 bend, and accumulate the restoring force. Also, the pressing springs 74 elastically abut against the insertion portions 32 so as to prevent the wobbling of the insertion portions 32 inside the insertion mouths 51.

(Prevention of malfunction of release button 80)

[0182] On the other hand, in the state wherein the male members 30 are connected, without turning the release button 80, when the release button 80 is attempted to be pushed toward the opening portion 52 of the female main body 50, as shown in Figs. 3 and 8, since the long side of the oval shape thereof is positioned in the short side of the opening portion 52 of the oval shape likewise, the release button 80 hits the upper face of the female main body 50 around the opening portion 52 thereby prohibiting pushing of the release button 80 in.

[0183] Incidentally, the same applies to a case where the release button 80 is turned only by the turning angle of less than 90 degrees.

[0184] Consequently, in the male members 30, the lock state is maintained so as to be capable of preventing the male members 30 from abruptly coming off.

[0185] The disclosure of Japanese Patent Application No. 2011-168284, filed on August 1, 2011, is incorporated in the application.

[0186] While the invention has been explained with reference to the specific embodiments of the invention, the explanation is illustrative and the invention is limited only by the appended claims.

Claims

1. A buckle, comprising:

a male member (30) fixing a free end portion of a belt; and
a female member (40) connecting the male member,

wherein the female member includes:

a female main body (50) having a hollow cylinder shape having an insertion mouth (51) in which an insertion portion of the male member is inserted; and
a lock member (70) positioned in an inside of the female main body, and locking the insertion portion of the male member, which has been inserted from the insertion mouth, into the insertion mouth,

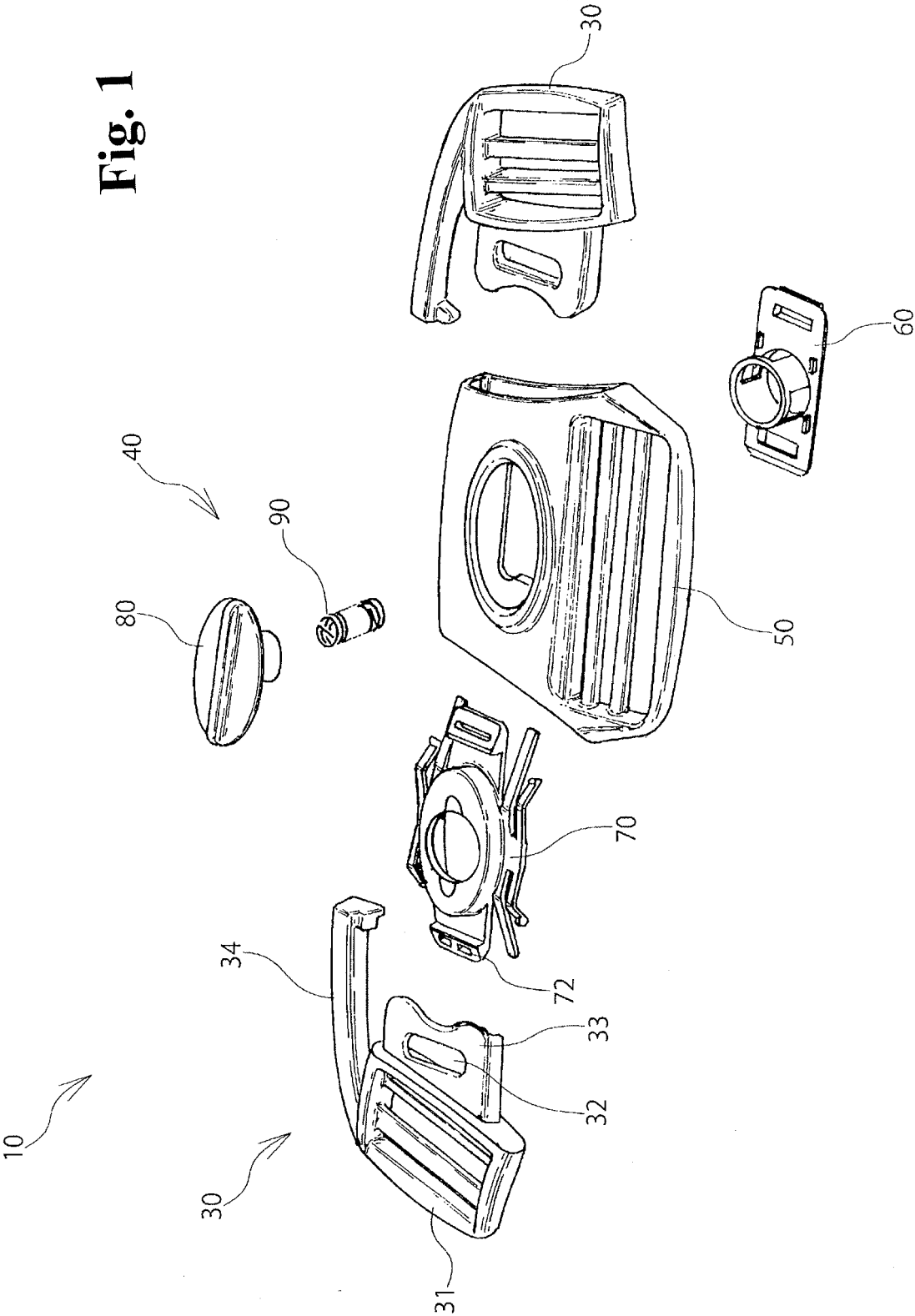
wherein the lock member includes:

a locking piece (72) locking the insertion portion of the male member, which has been inserted from the insertion mouth, into the insertion mouth;
a release button (80) provided in the locking piece, protruding outwardly from an opening portion provided in the female main body, and also capable of releasing the lock state by a push operation toward the inside of the female main body; and
a return spring (73) positioned between the release button and the inside of the female main body, and urging the release button in a direction of outwardly protruding from the opening portion of the female main body, and
wherein the release button (80) can be selected between a release position wherein the release button can pass the opening portion in the lock state, and a lock position wherein the release button can abut against a circumferential edge

of the opening portion.

2. A buckle according to claim 1, wherein the release button (80) is turnably provided in the lock member.
3. A buckle according to claim 1, wherein the release button (80) is reciprocatingly provided in parallel with an insertion direction of the male member relative to the lock member.
4. A buckle according to any one of claims 1 to 3, wherein an urging device (90) urging the release button toward the lock position is provided between the release button and the lock member.
5. A buckle according to claim 2, wherein the release button (80) includes an engaging claw deterring the release button from turning.
6. A buckle according to claim 4, wherein the urging device (90) is a coil spring provided on an axis line of the turning of the release button.

Fig. 1



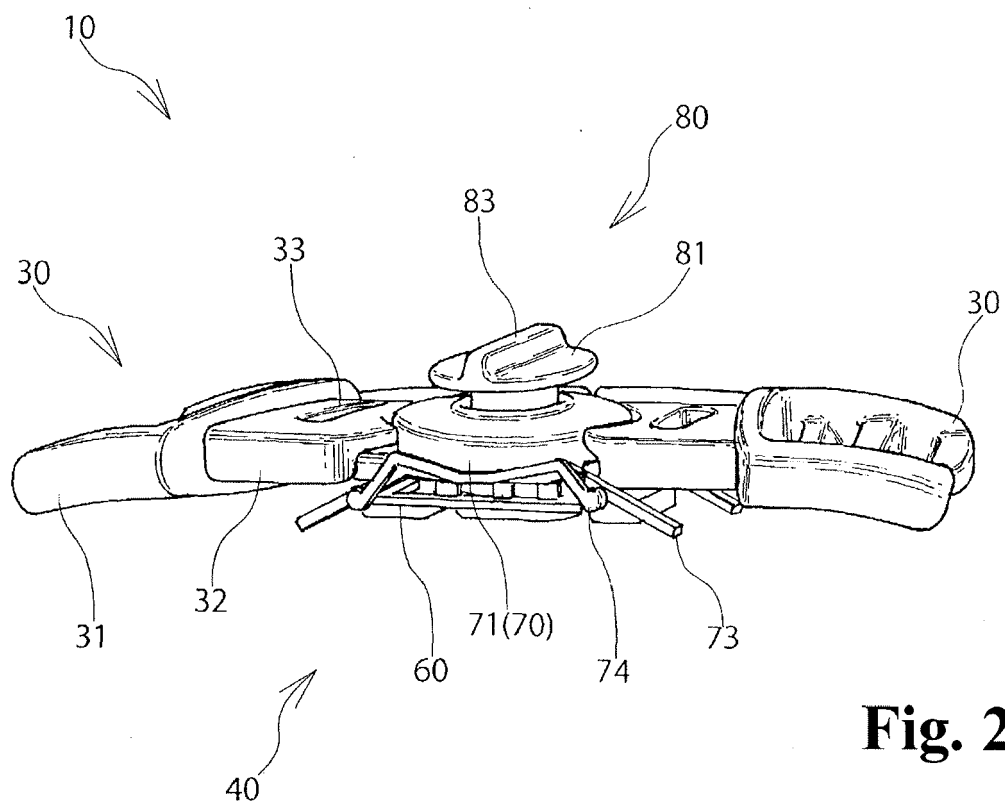


Fig. 2

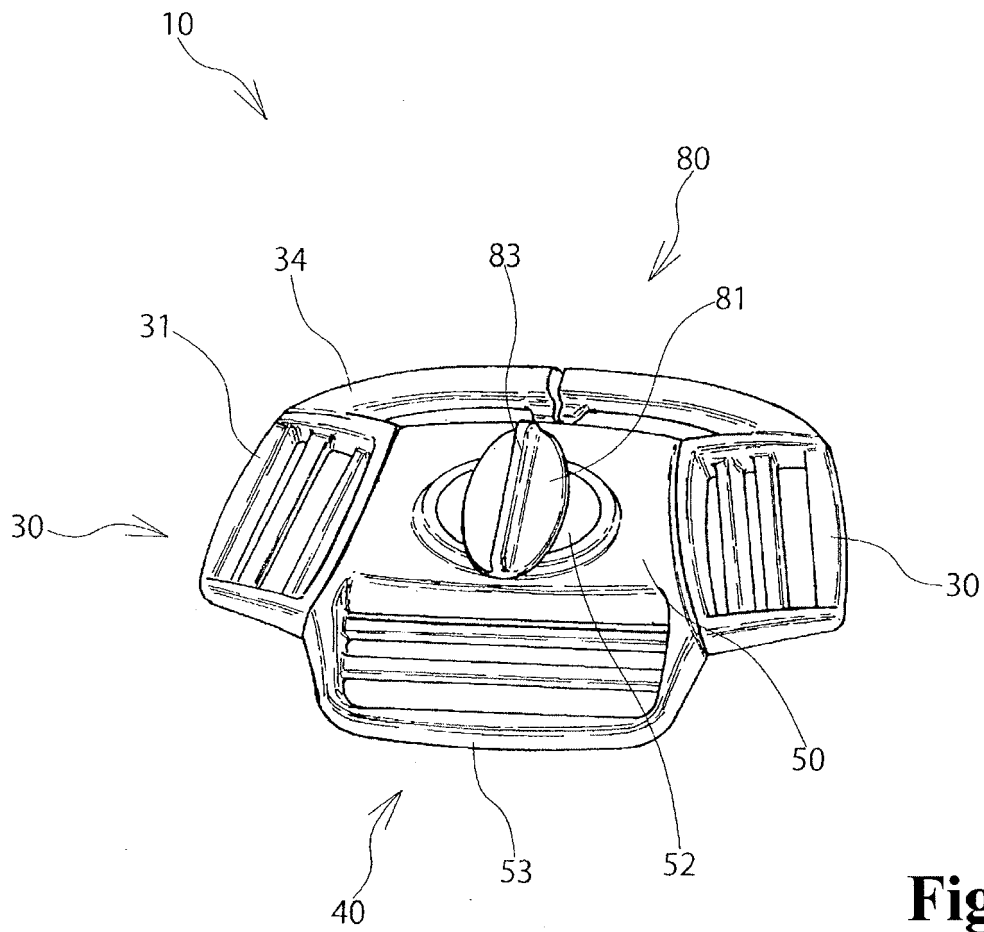


Fig. 3

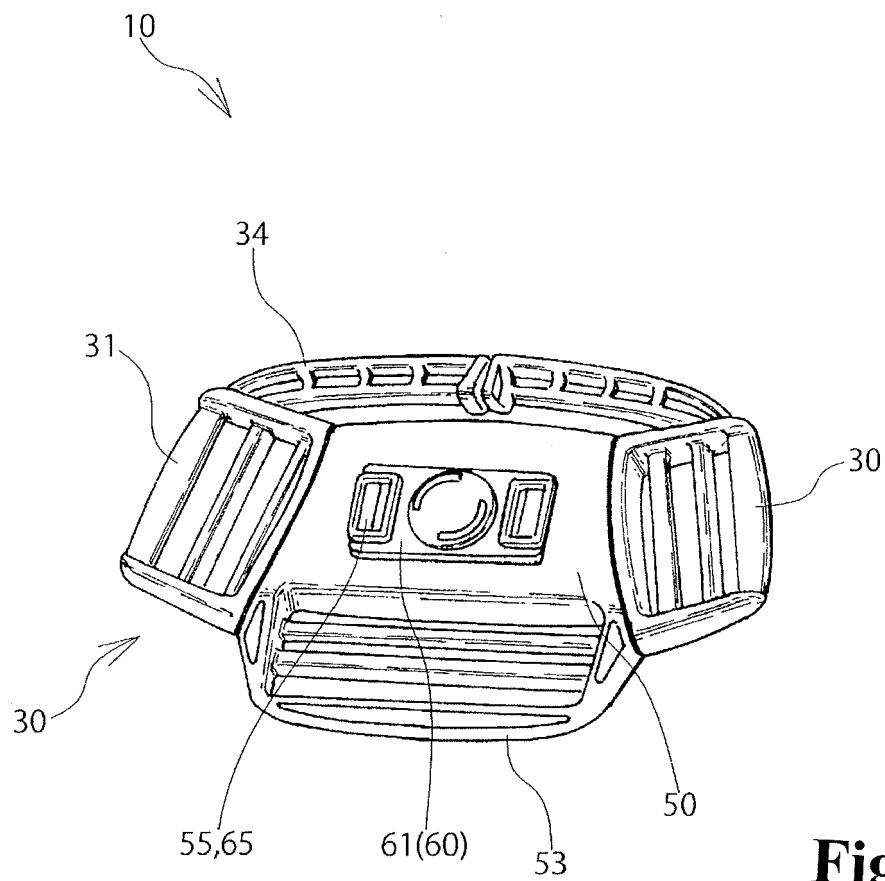
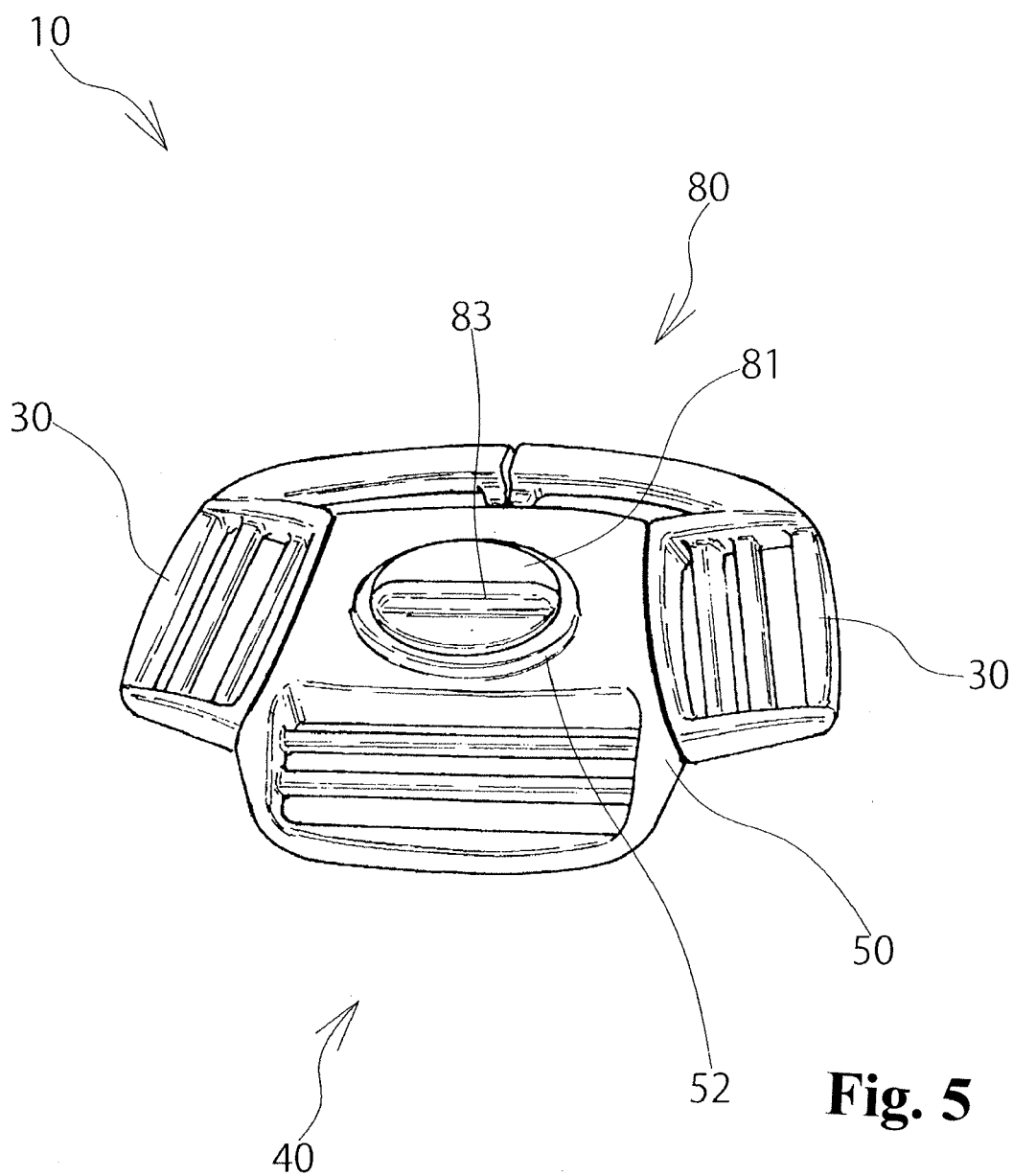


Fig. 4



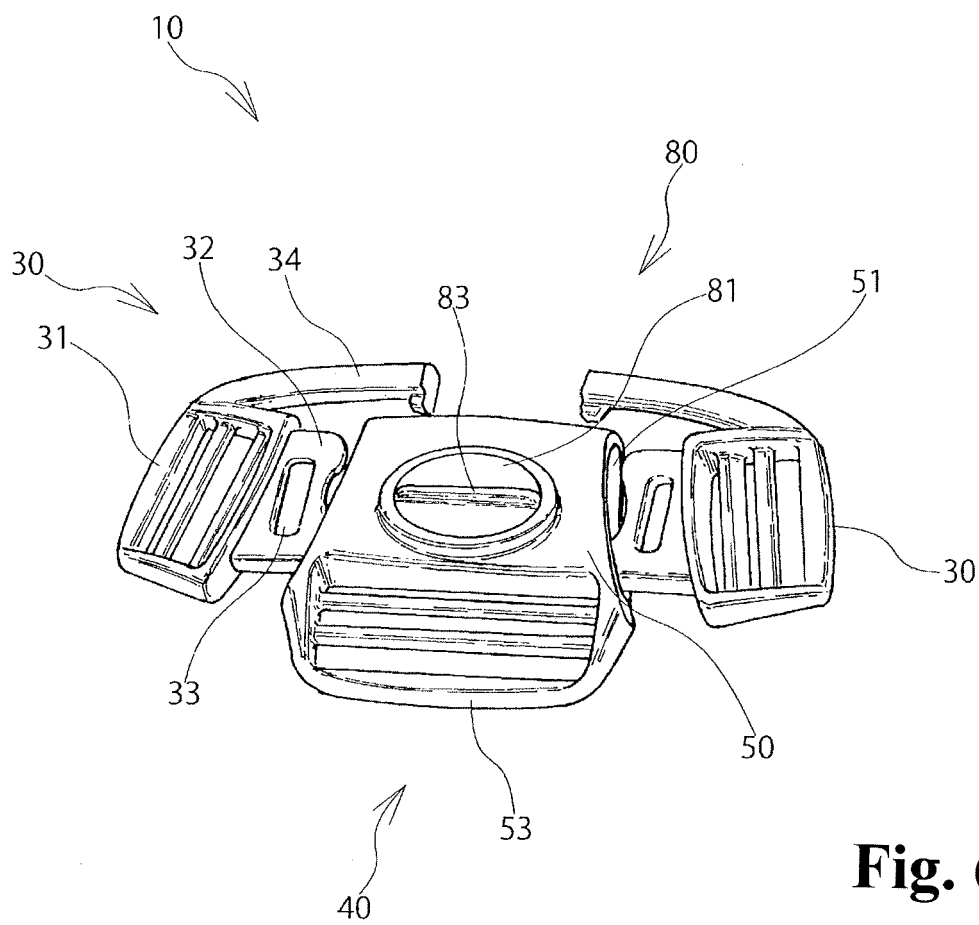
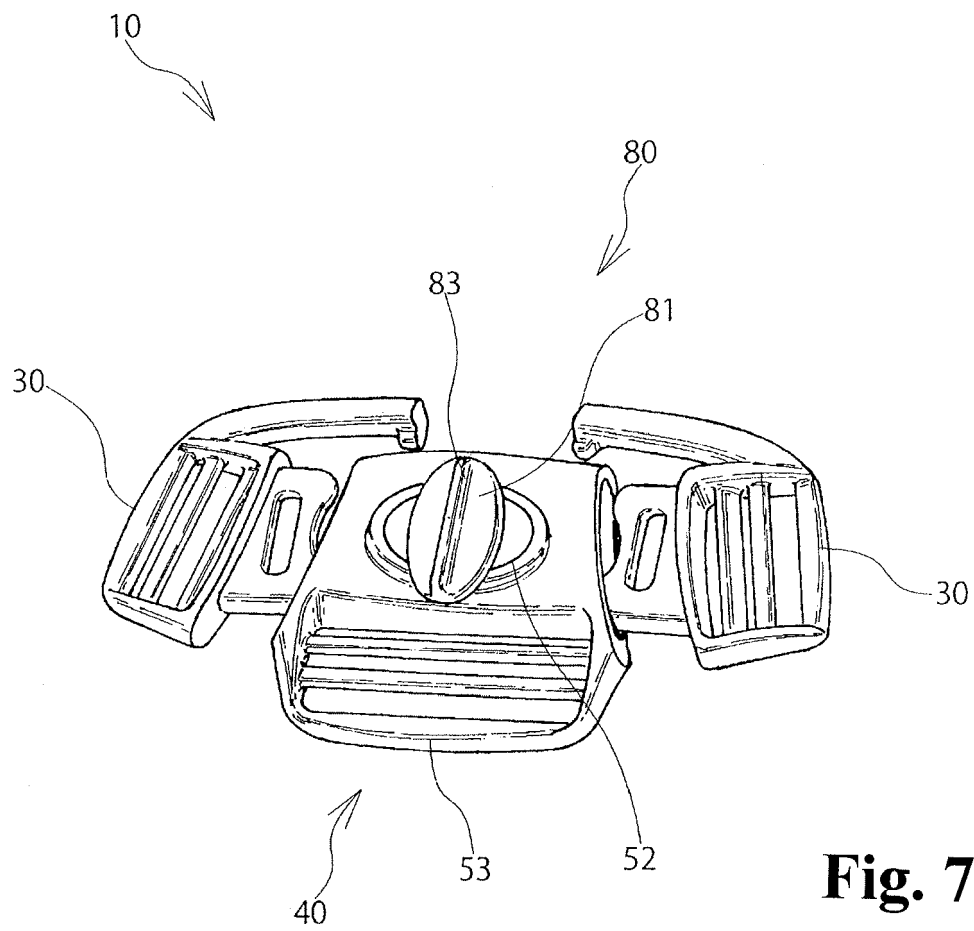


Fig. 6



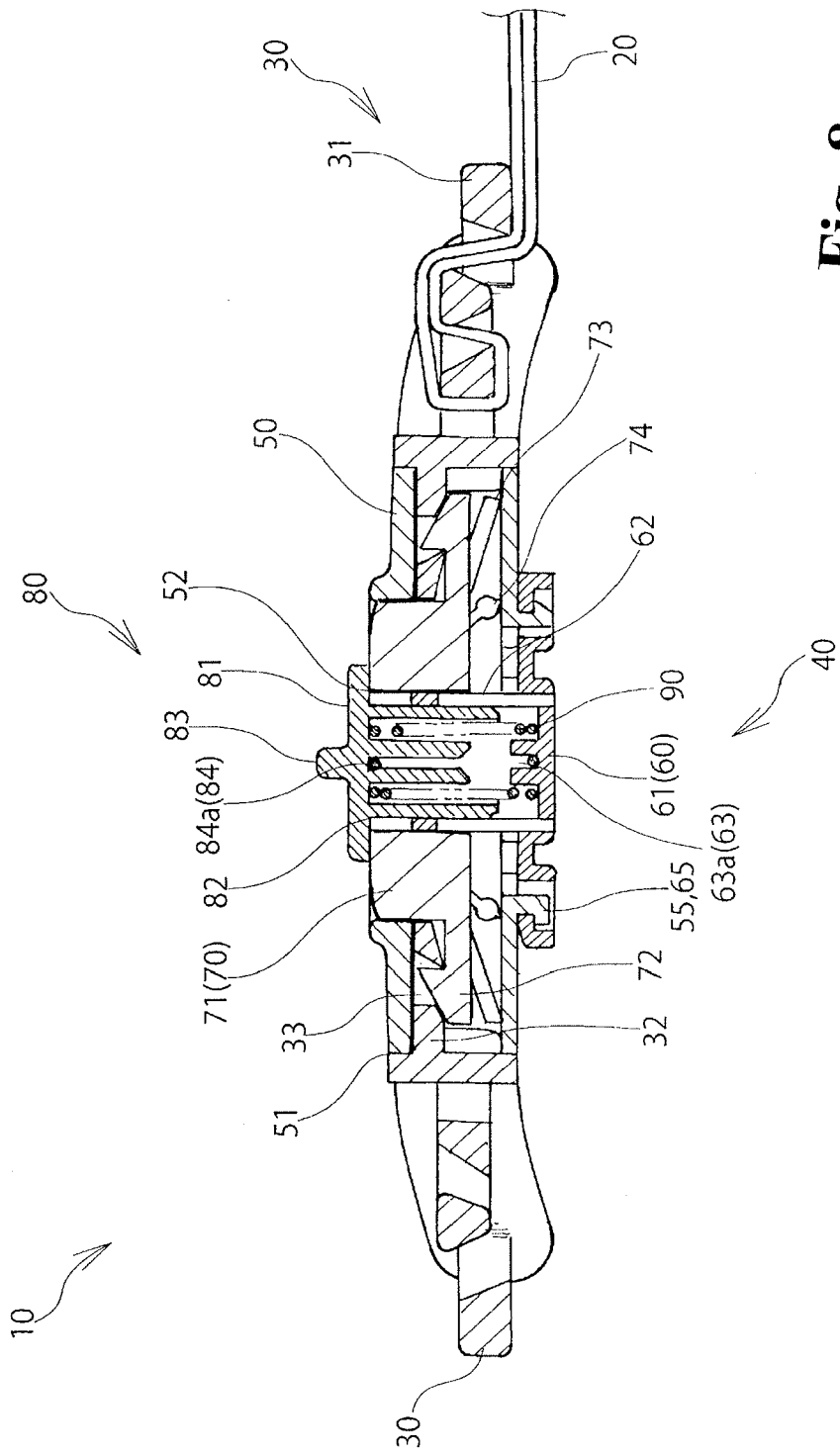


Fig. 8

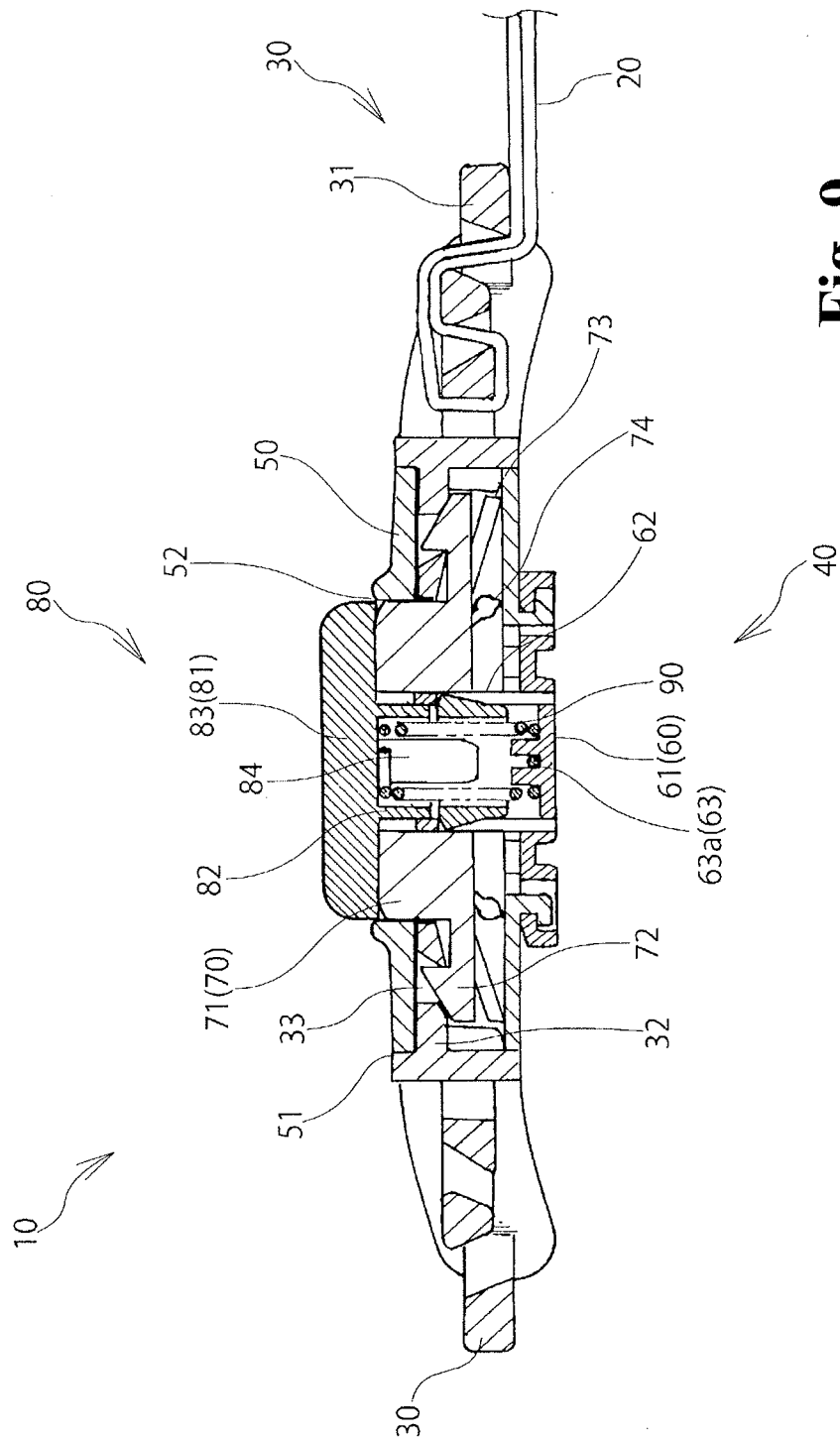


Fig. 9

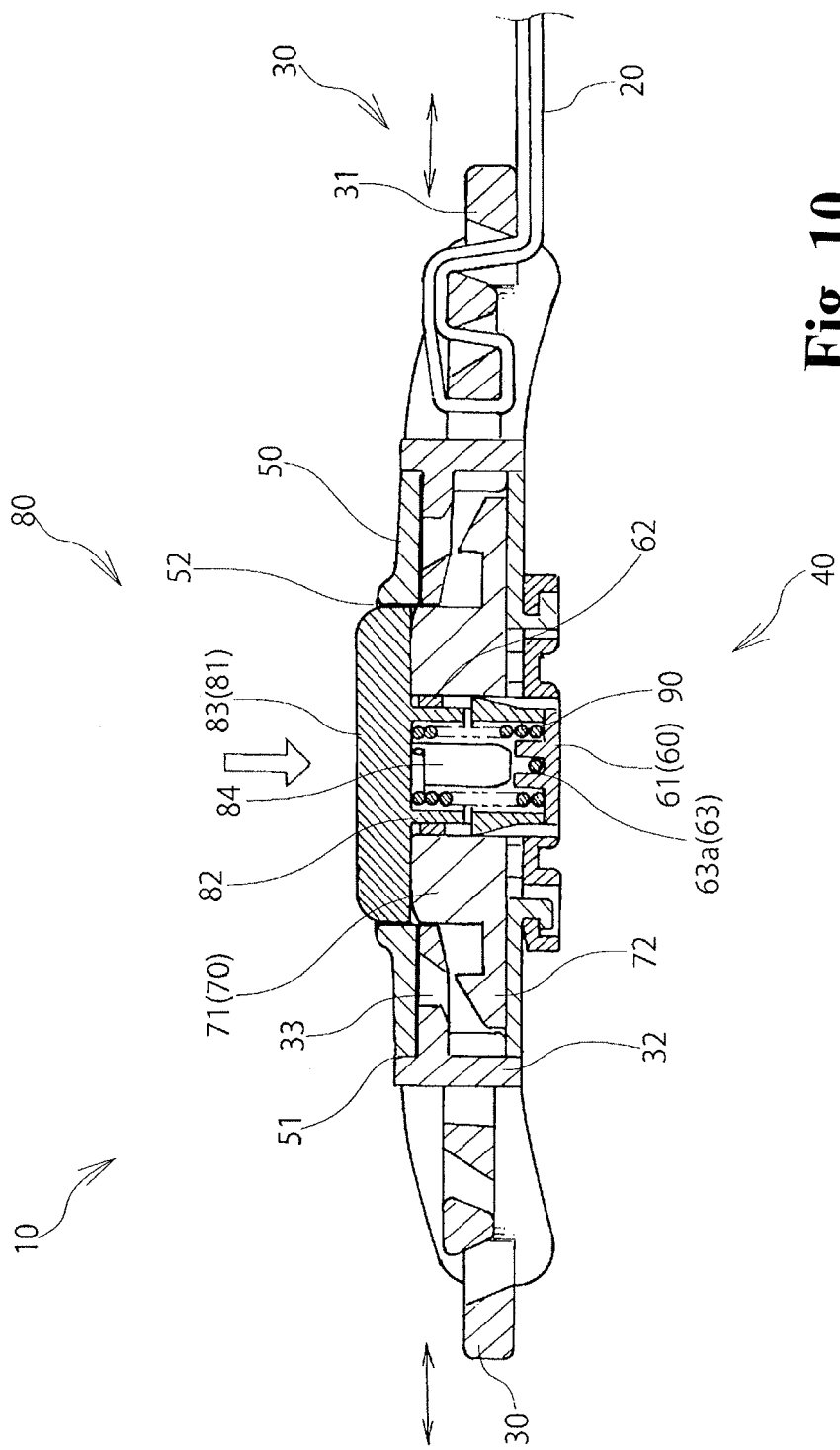


Fig. 10

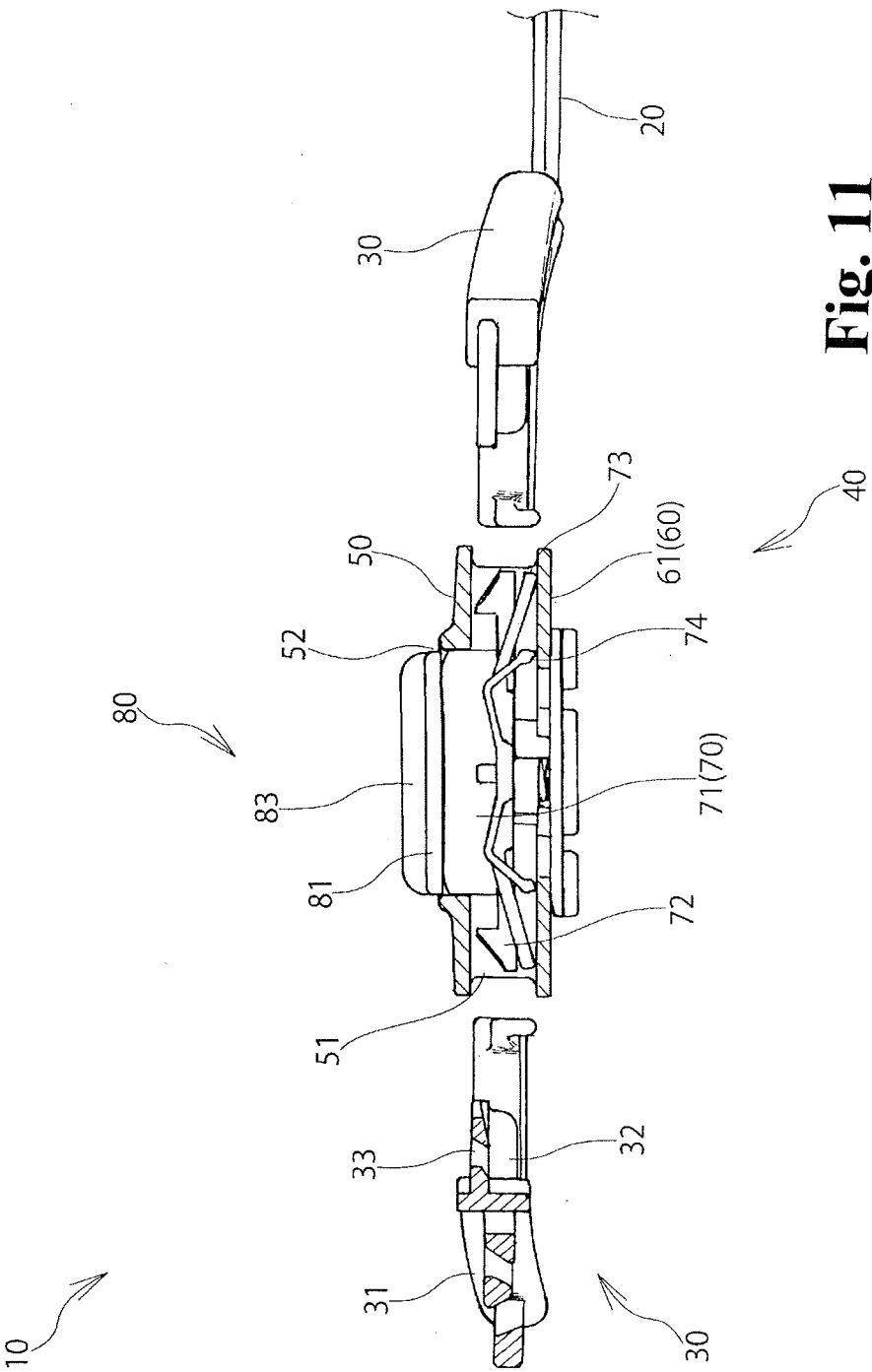


Fig. 11

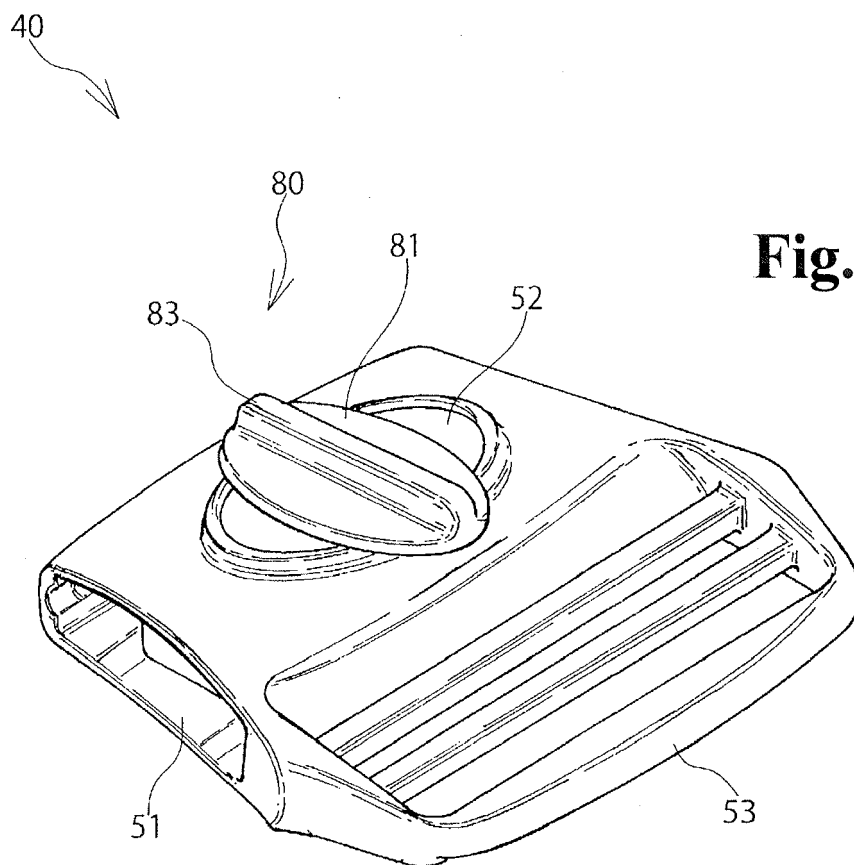


Fig. 12

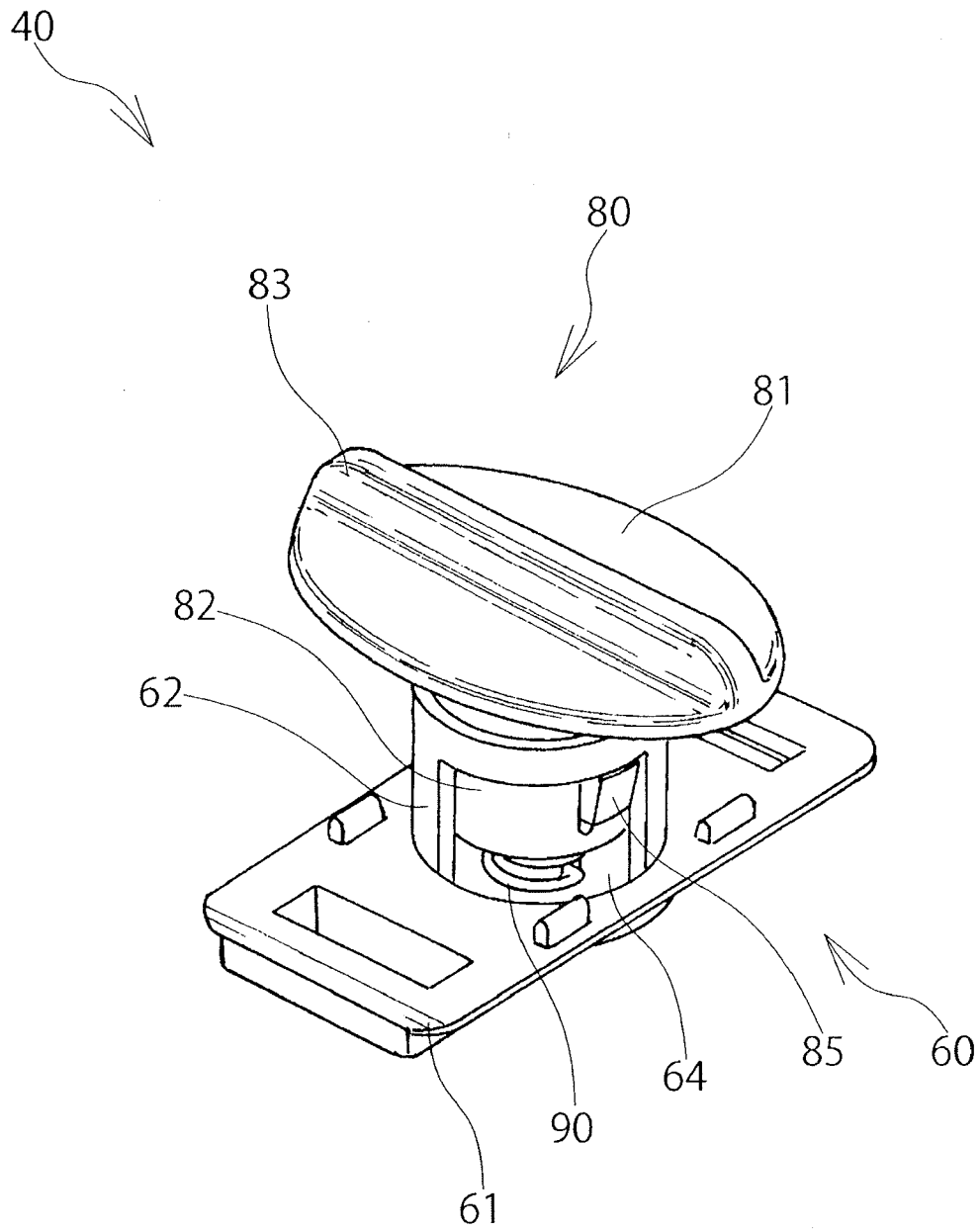


Fig. 13

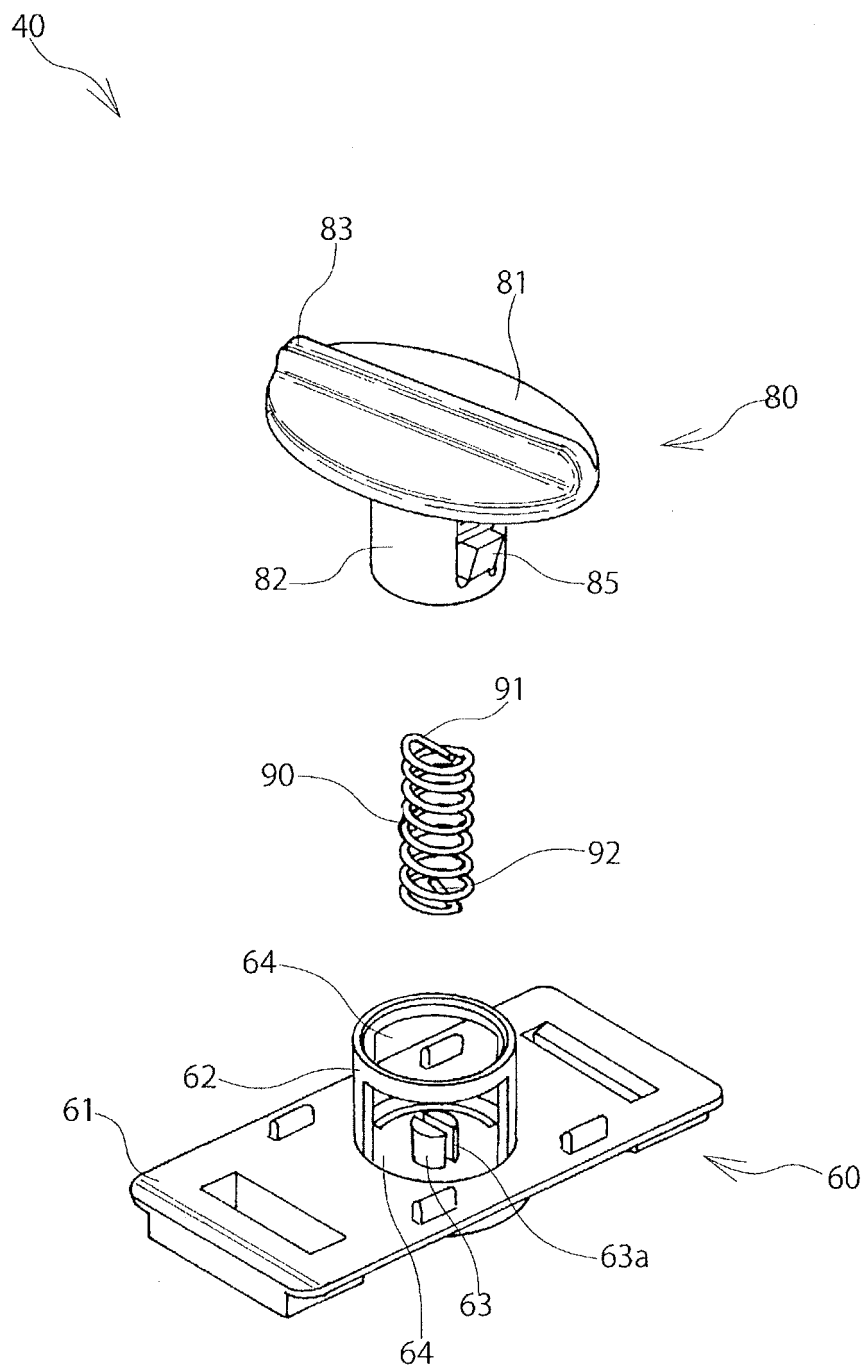


Fig. 14

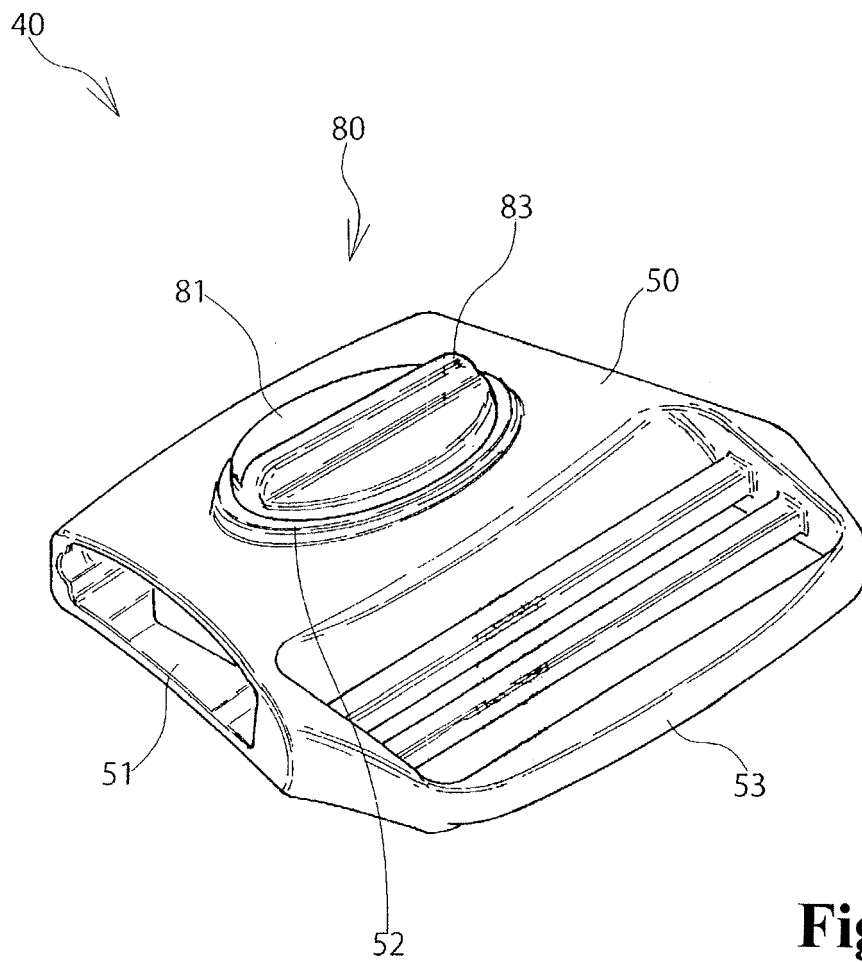


Fig. 15

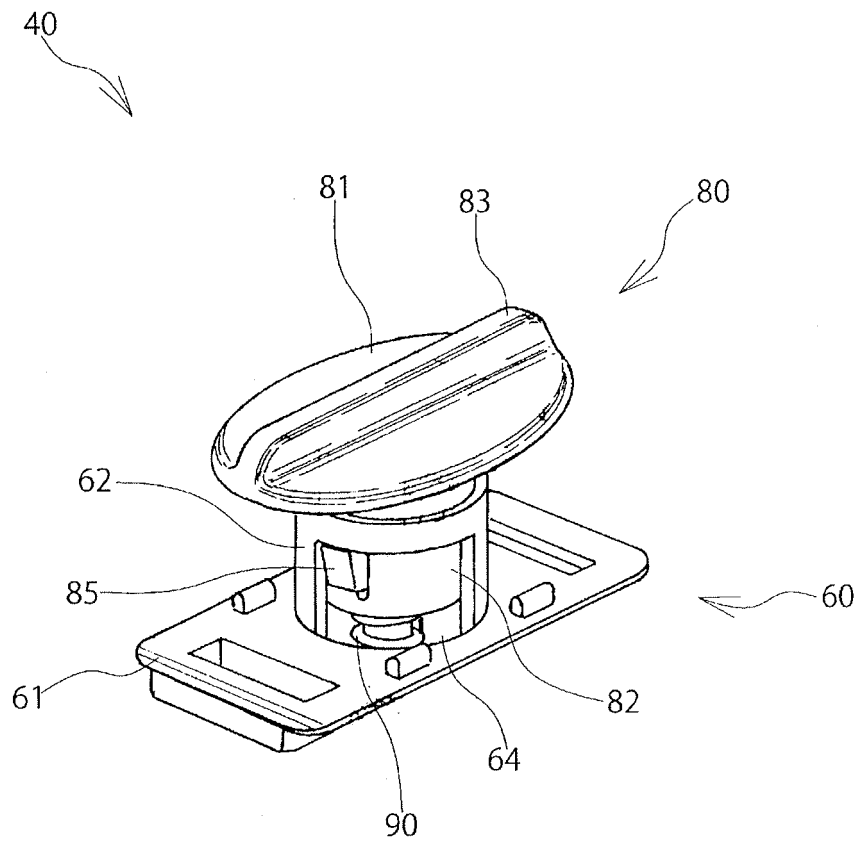
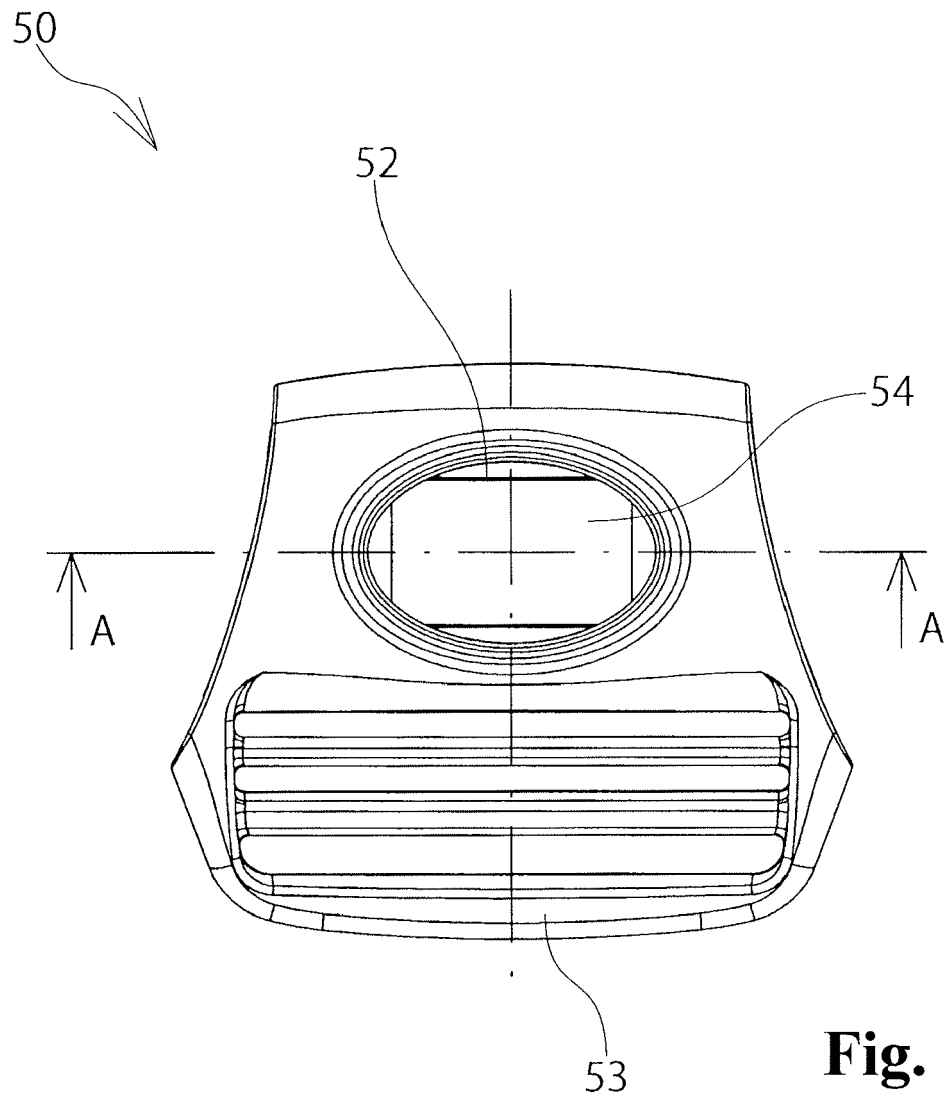


Fig. 16



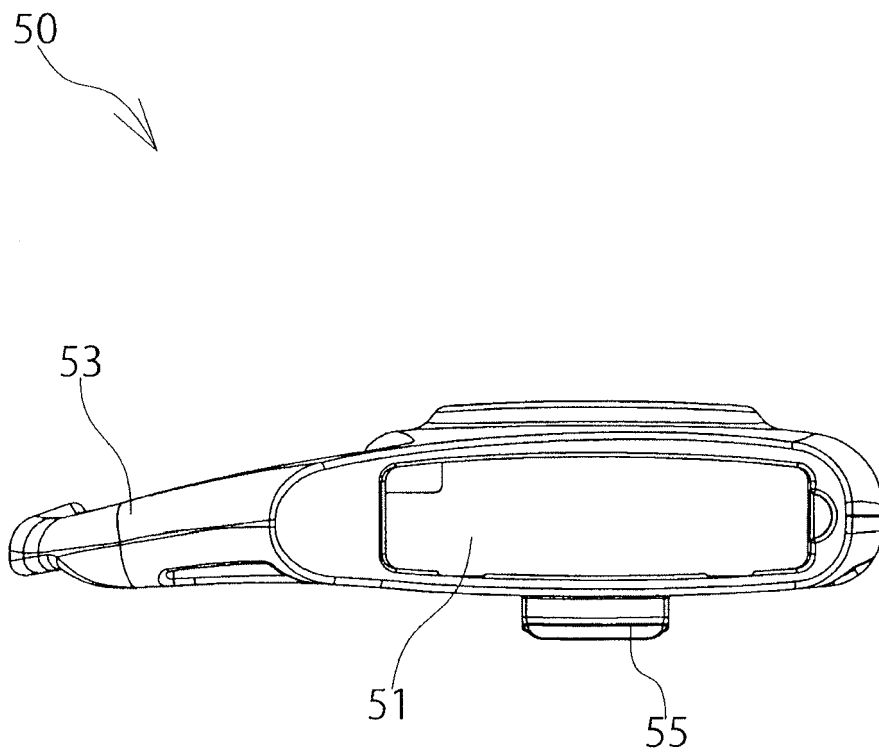


Fig. 18

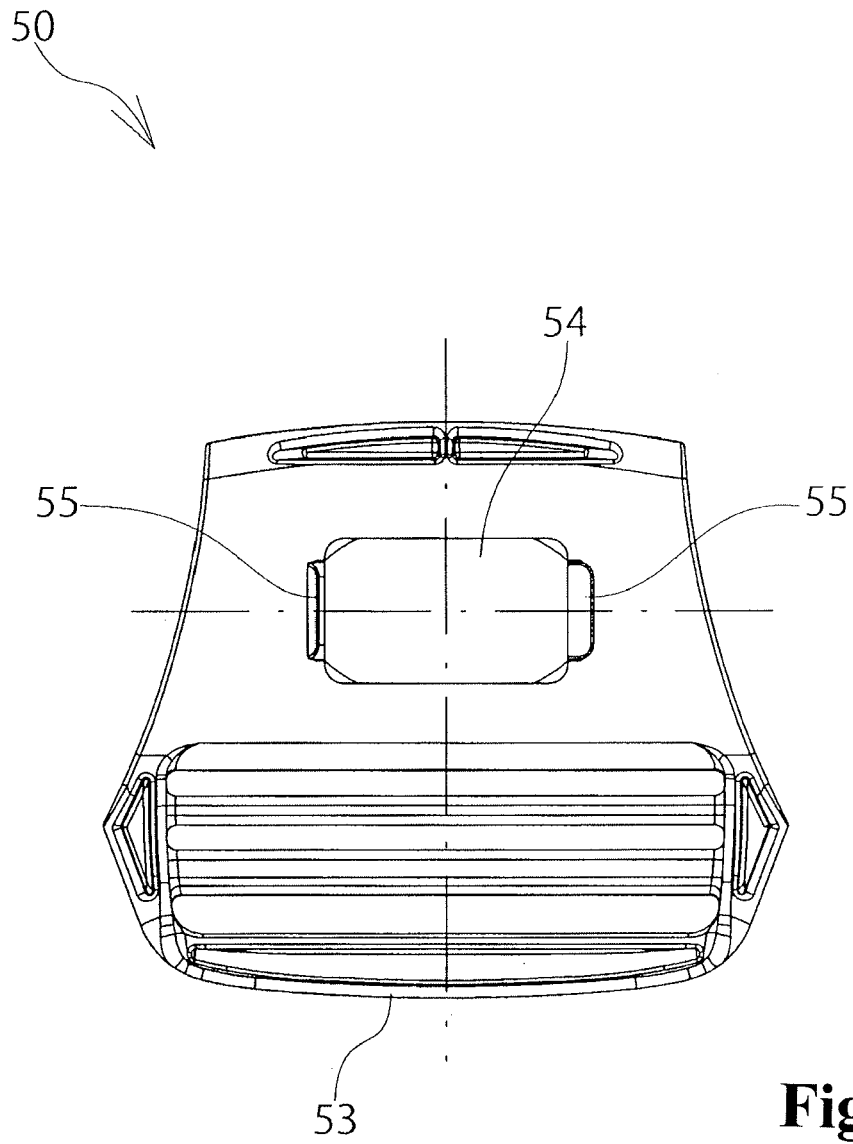


Fig. 19

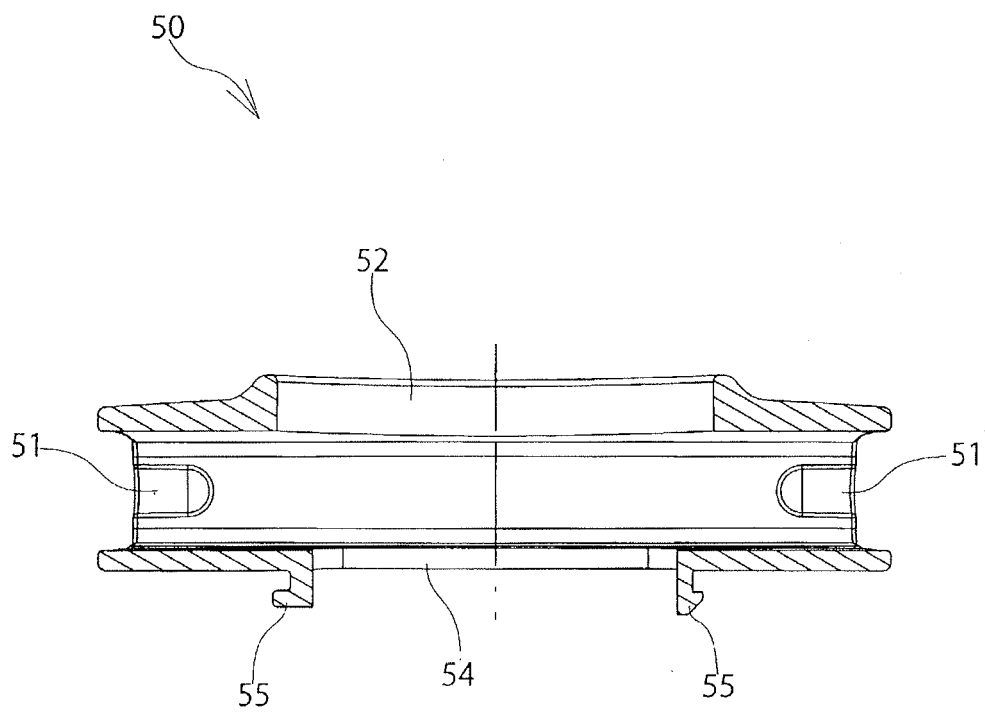


Fig. 20

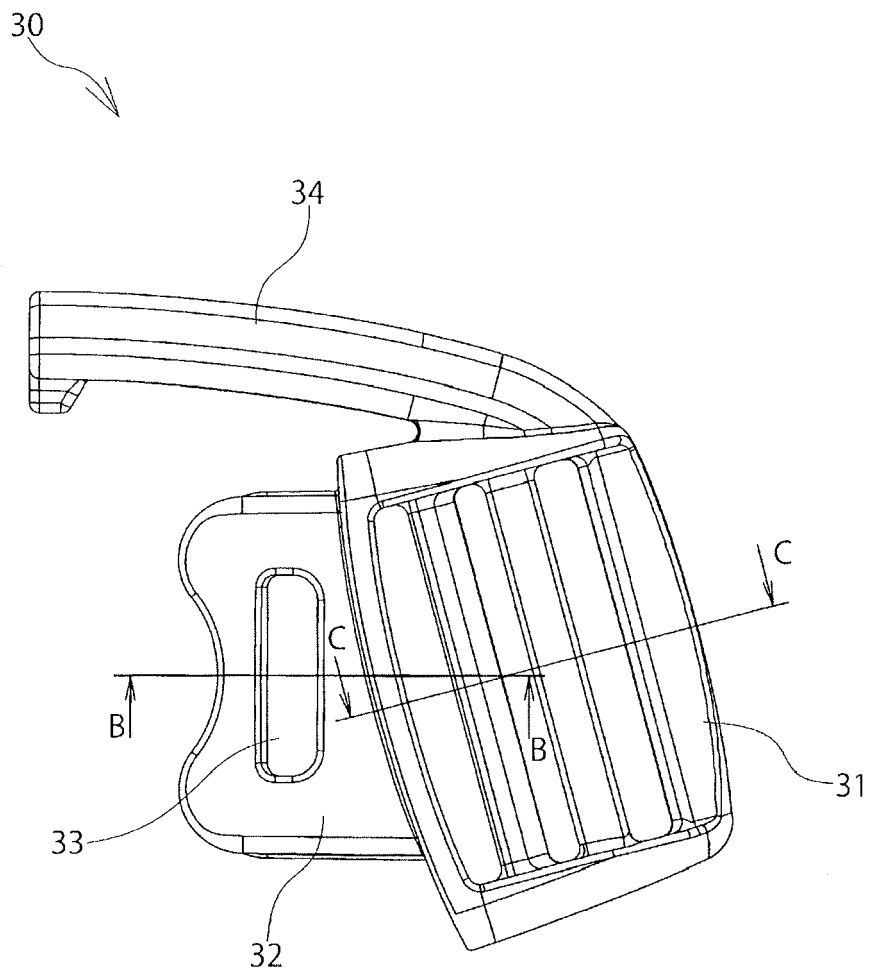


Fig. 21

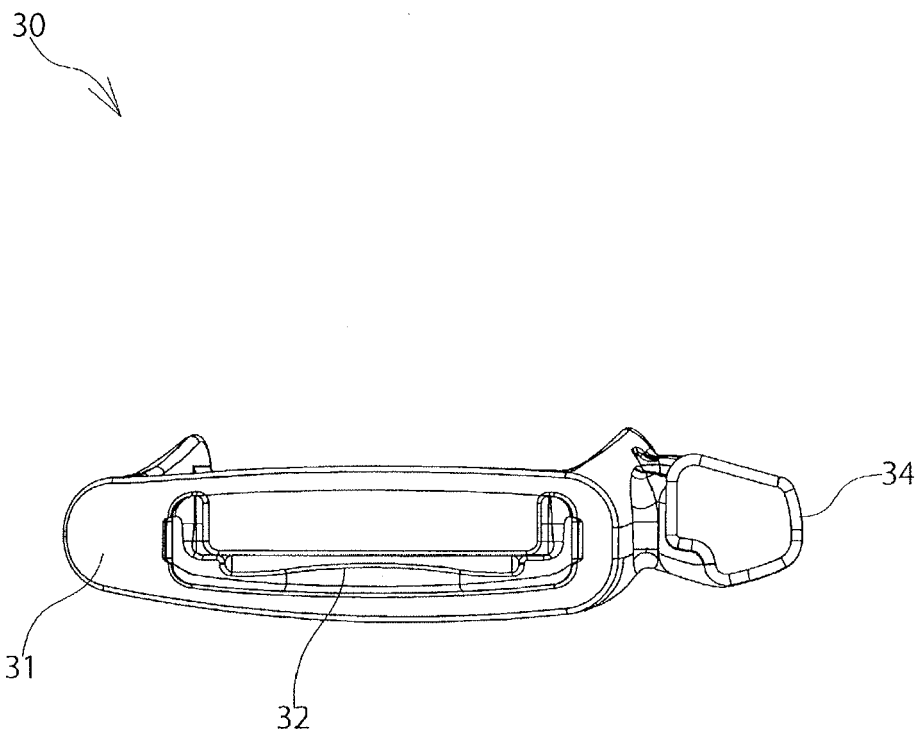


Fig. 22

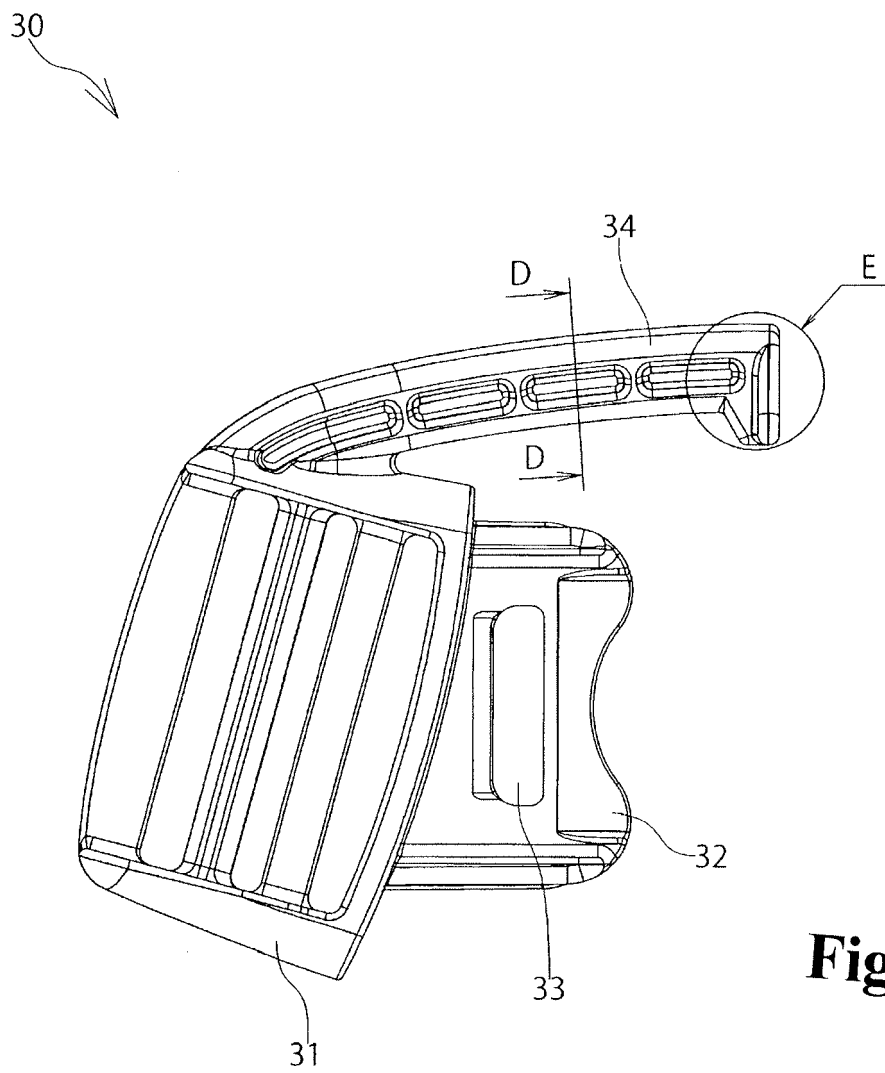


Fig. 23

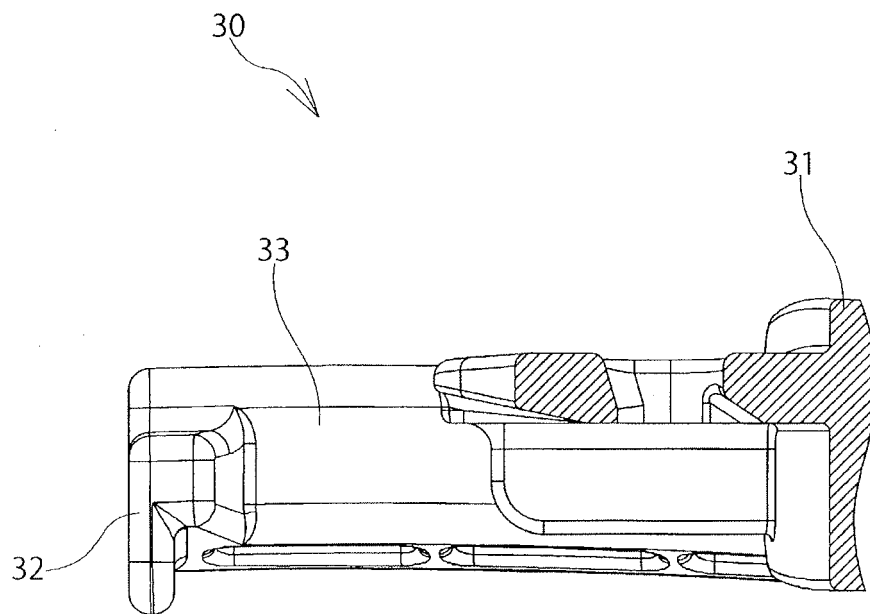


Fig. 24

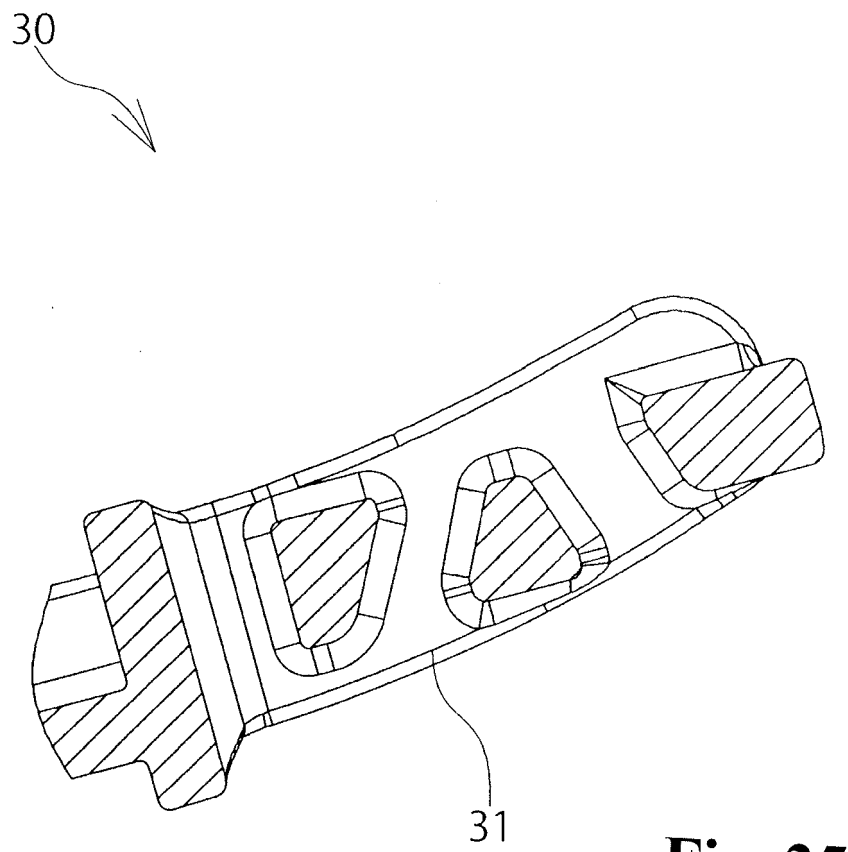


Fig. 25

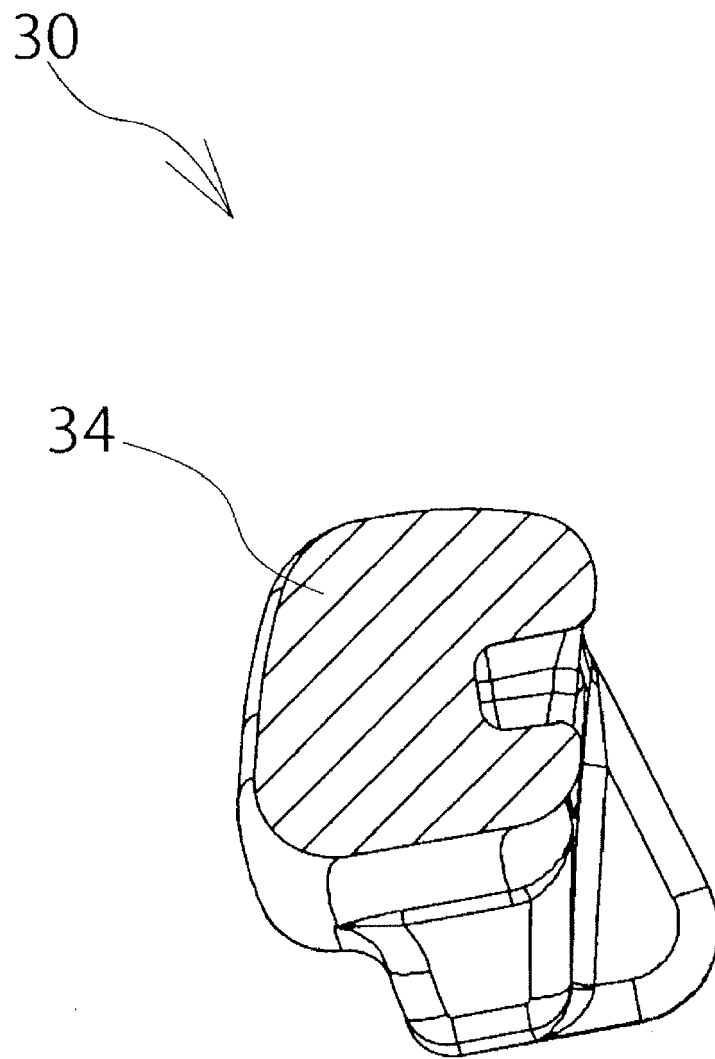


Fig. 26

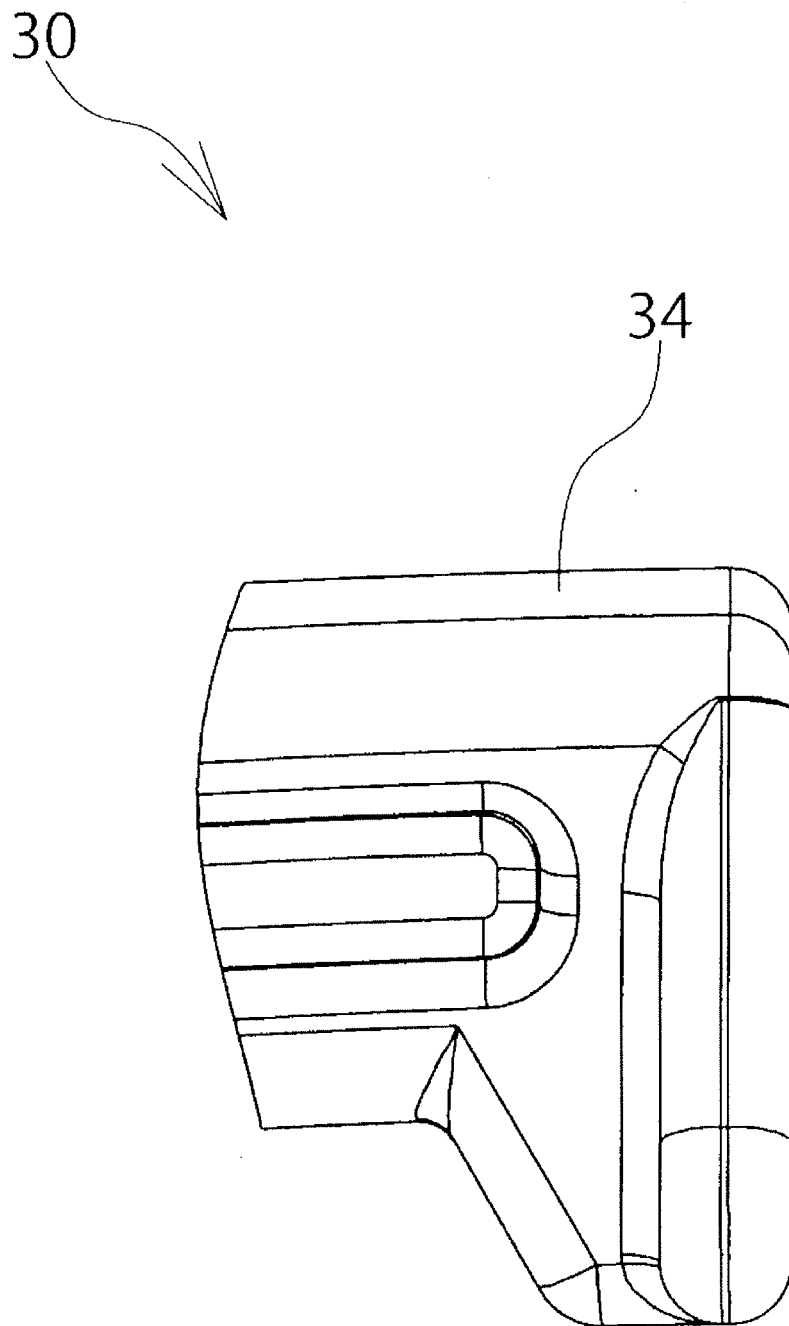


Fig. 27

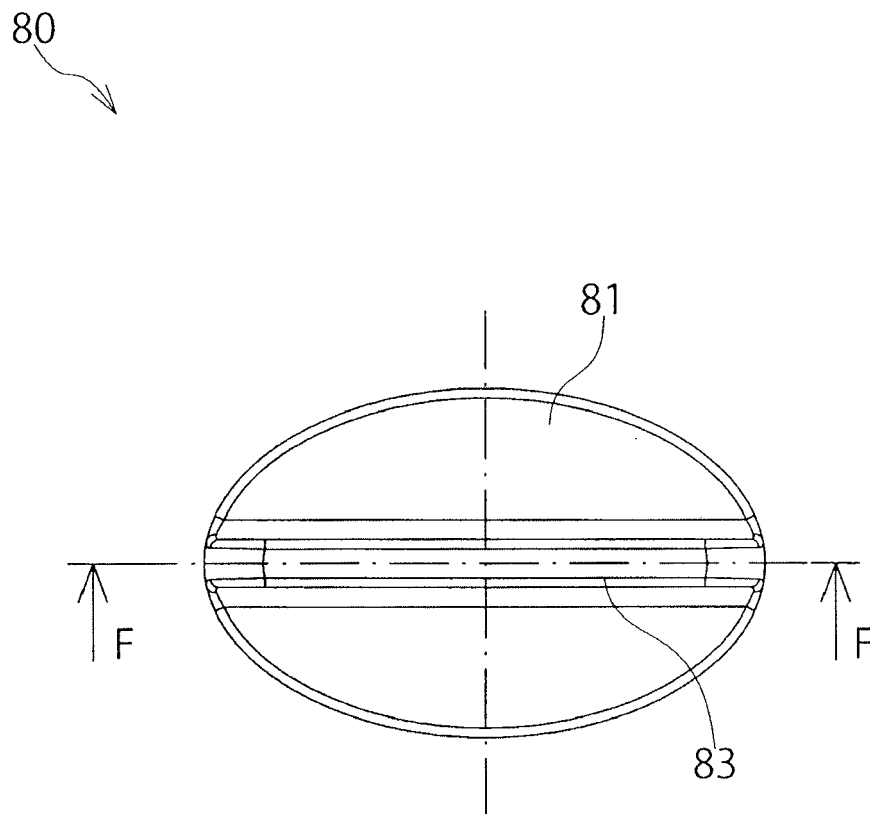


Fig. 28

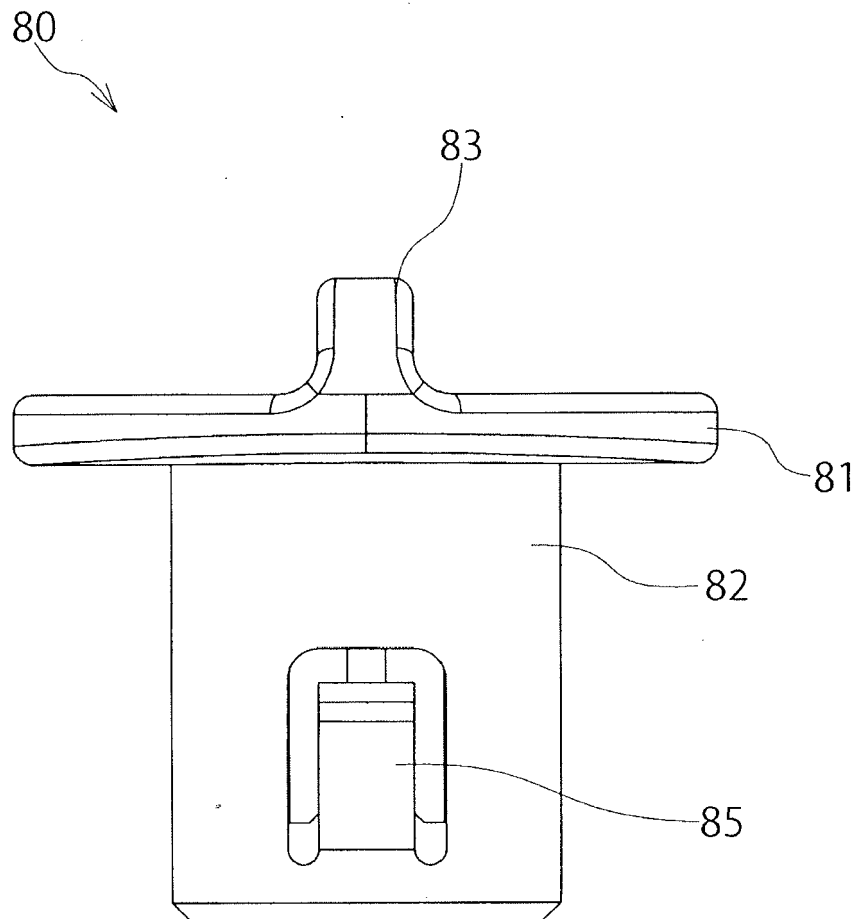


Fig. 29

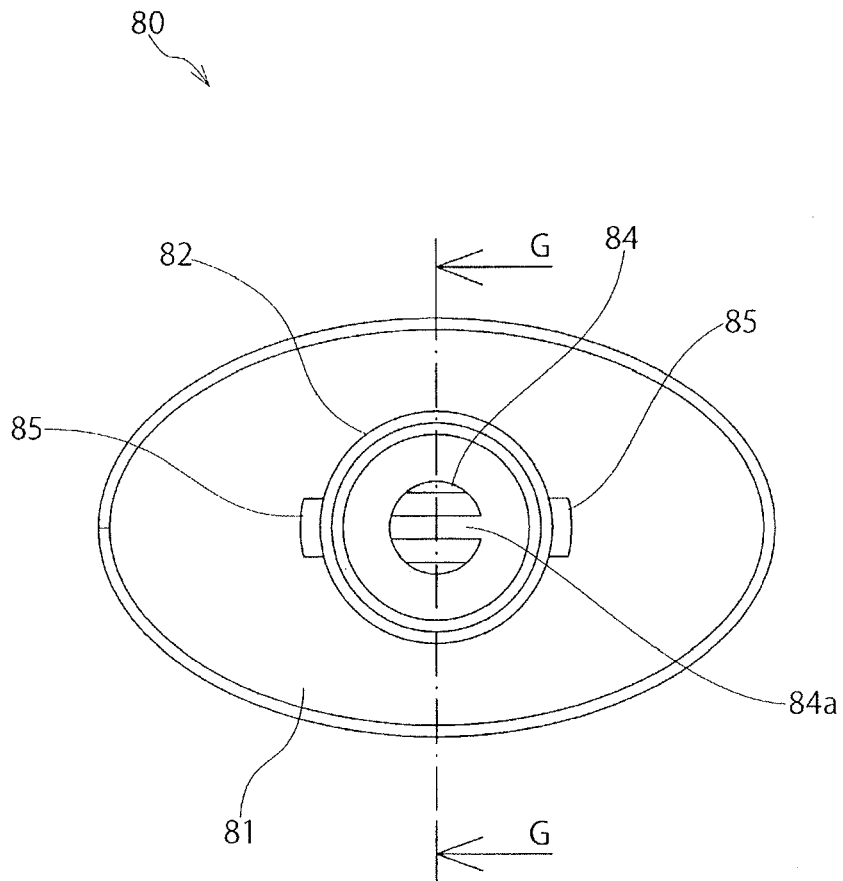


Fig. 30

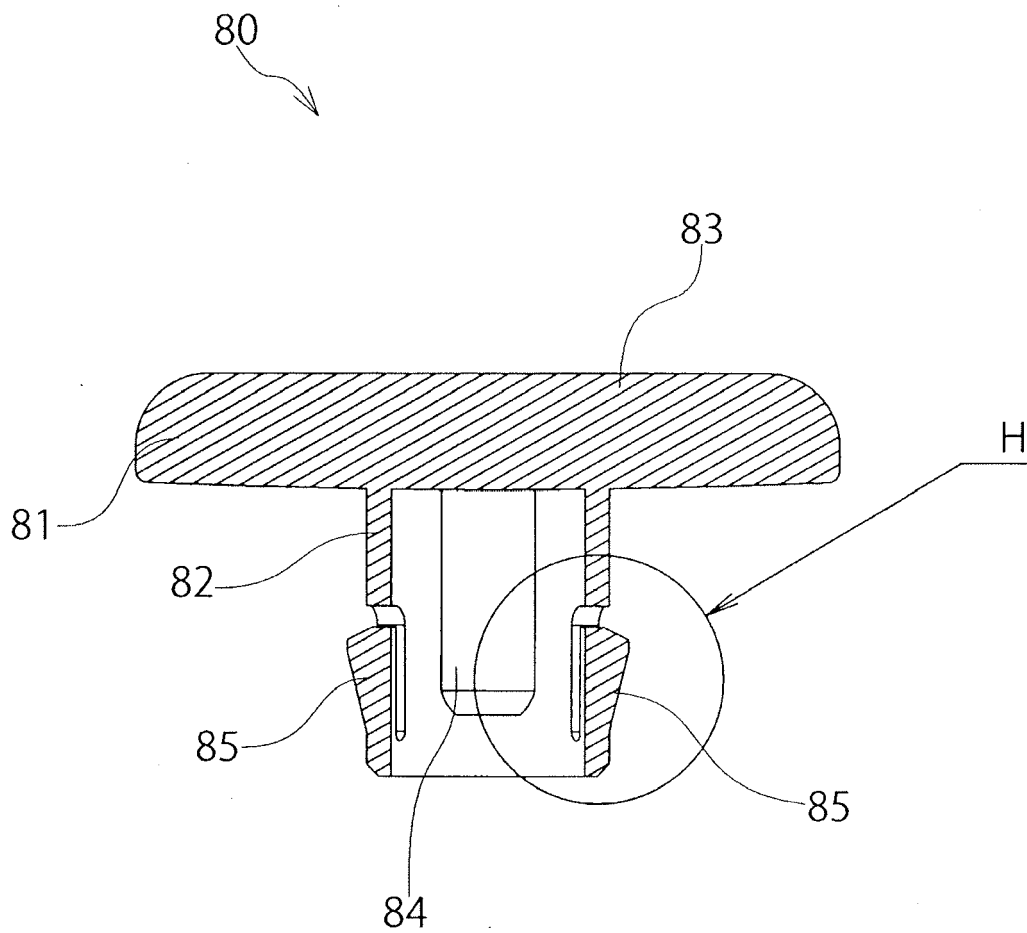


Fig. 31

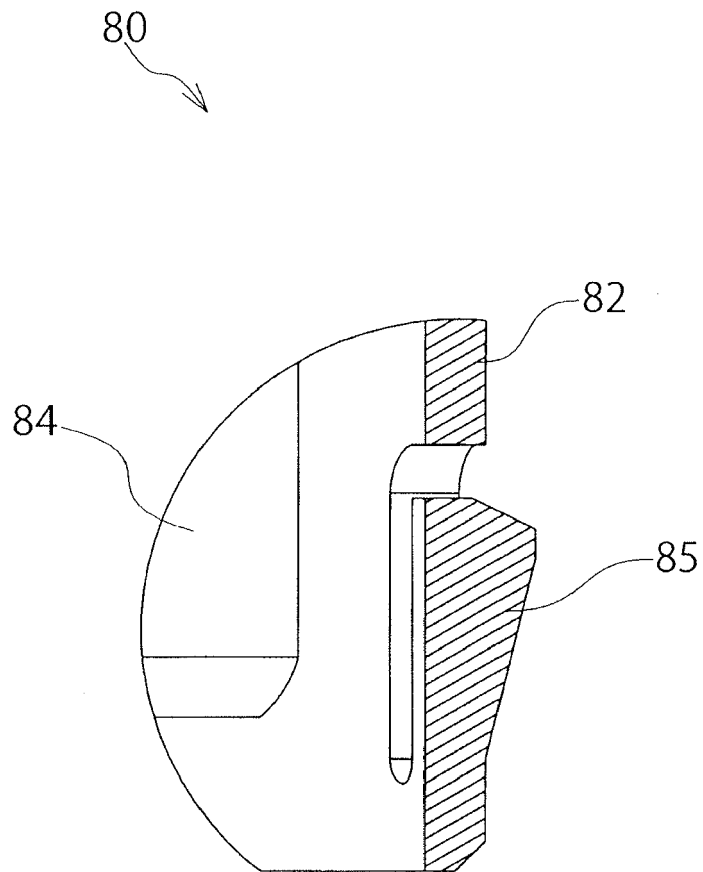
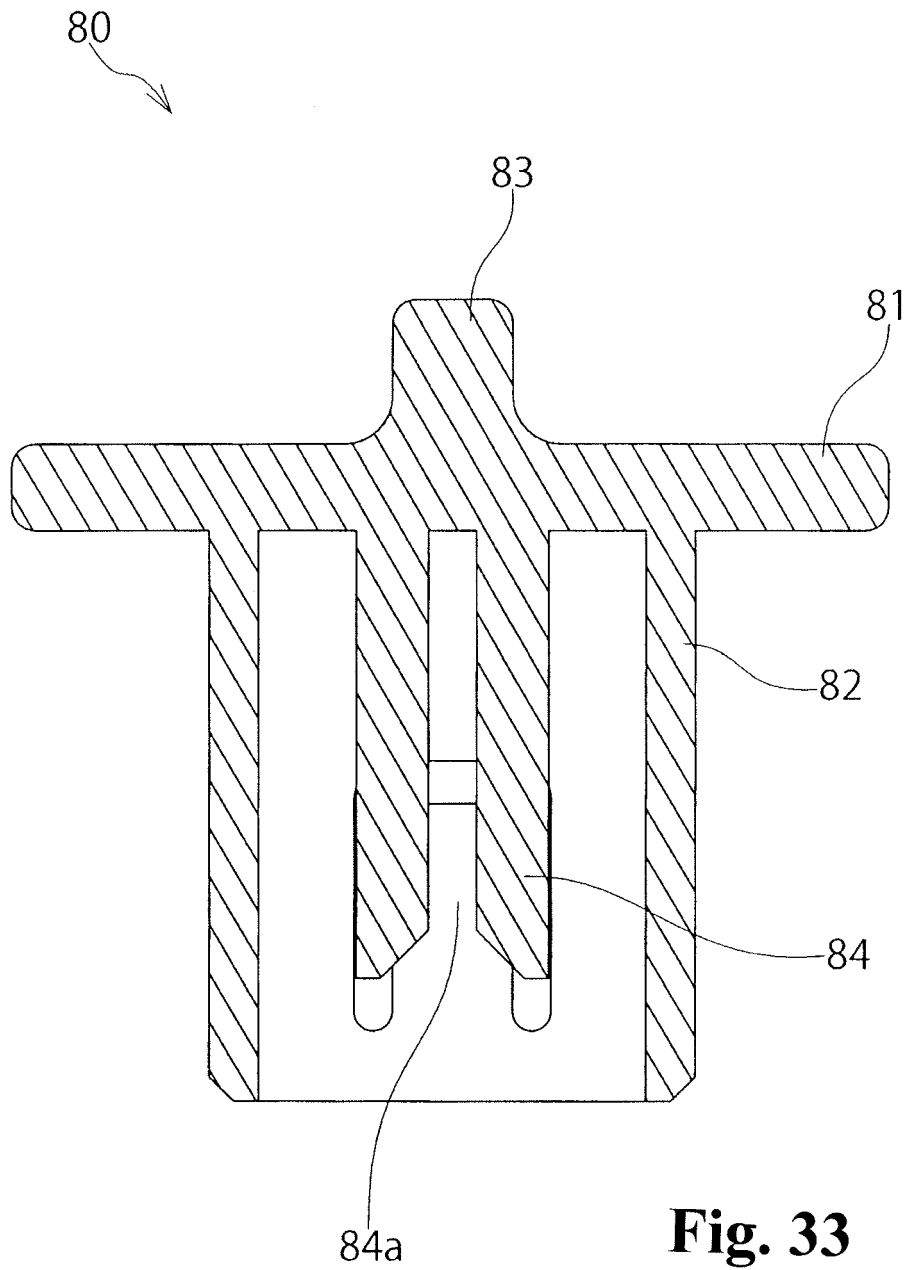


Fig. 32



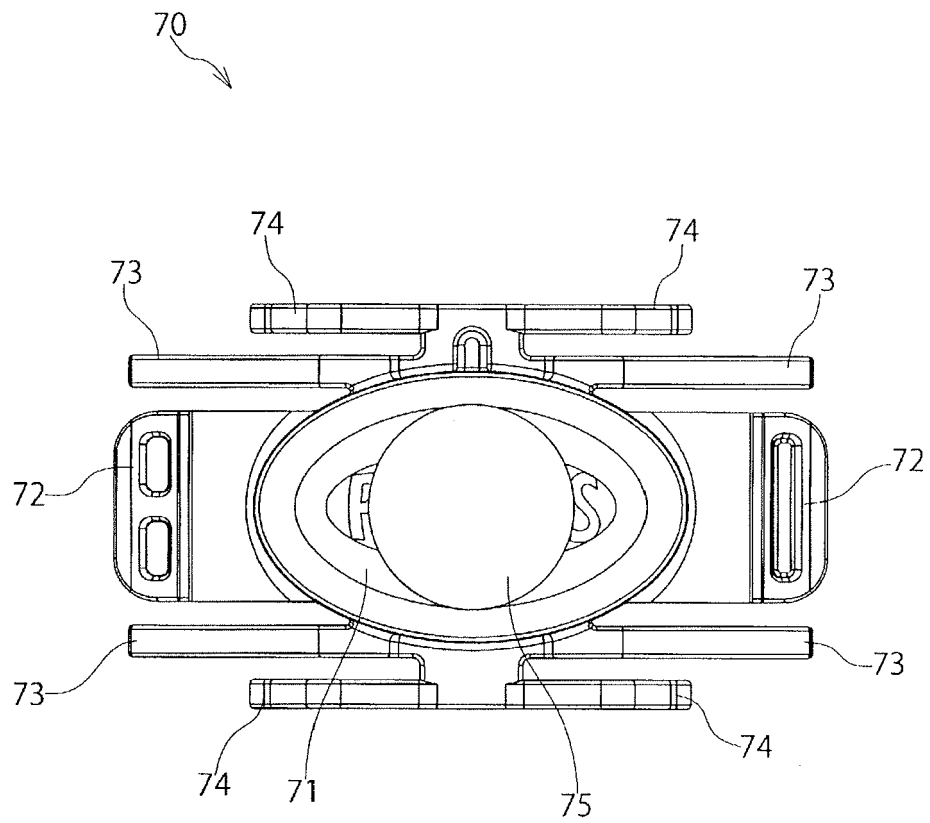


Fig. 34

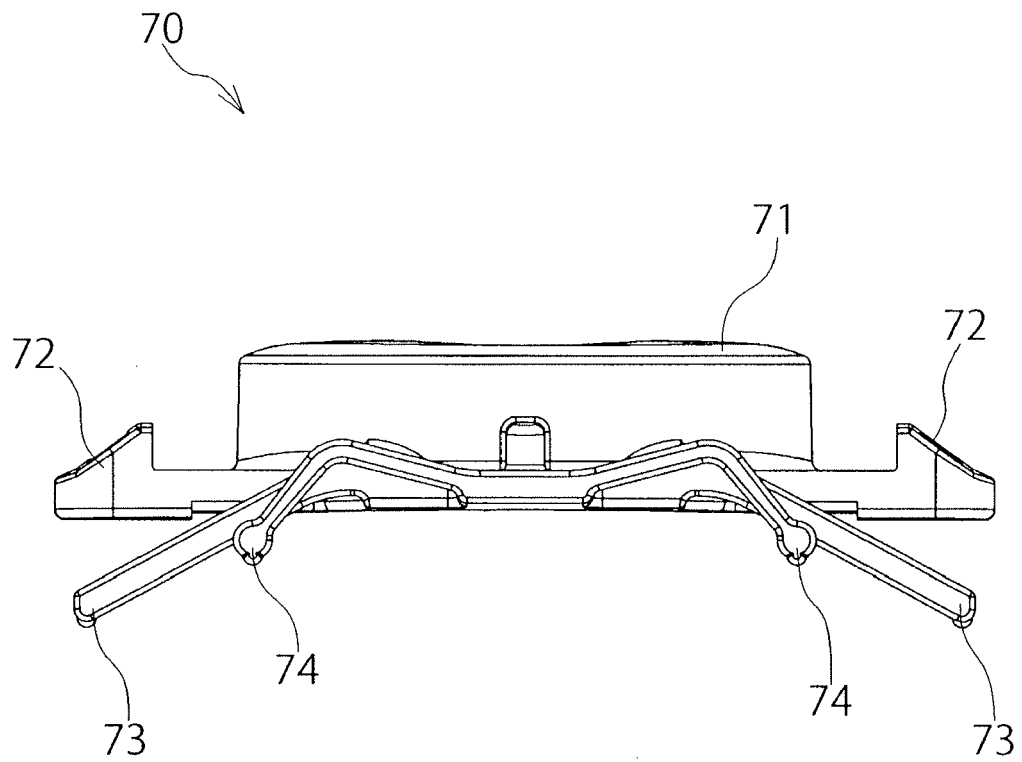


Fig. 35

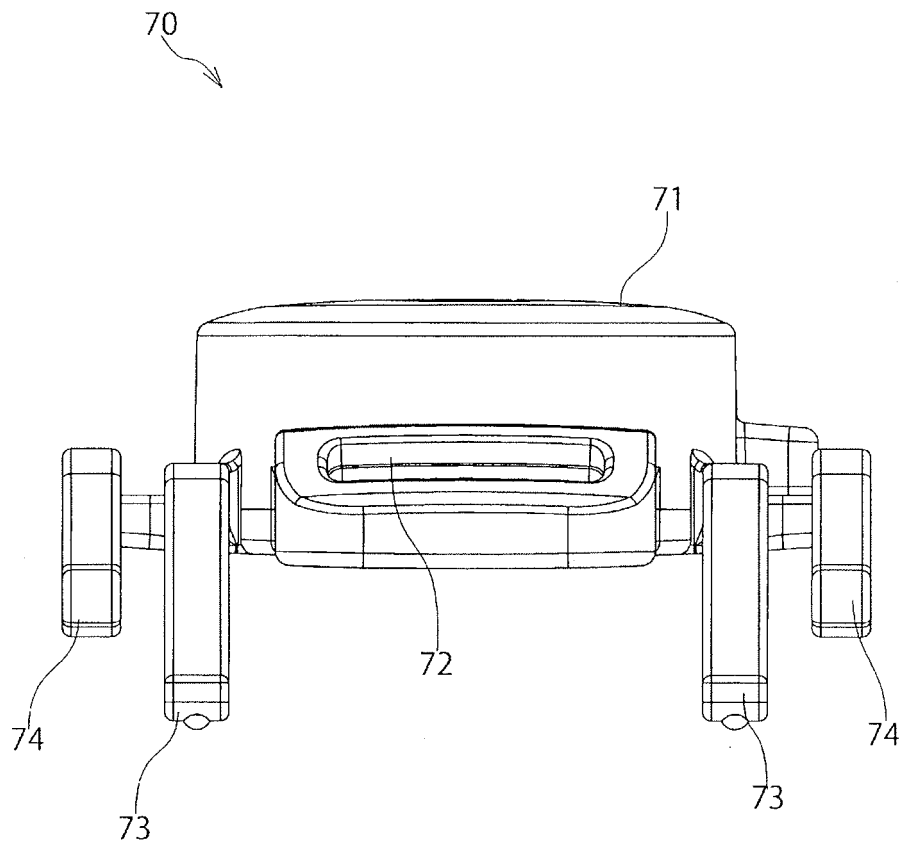


Fig. 36

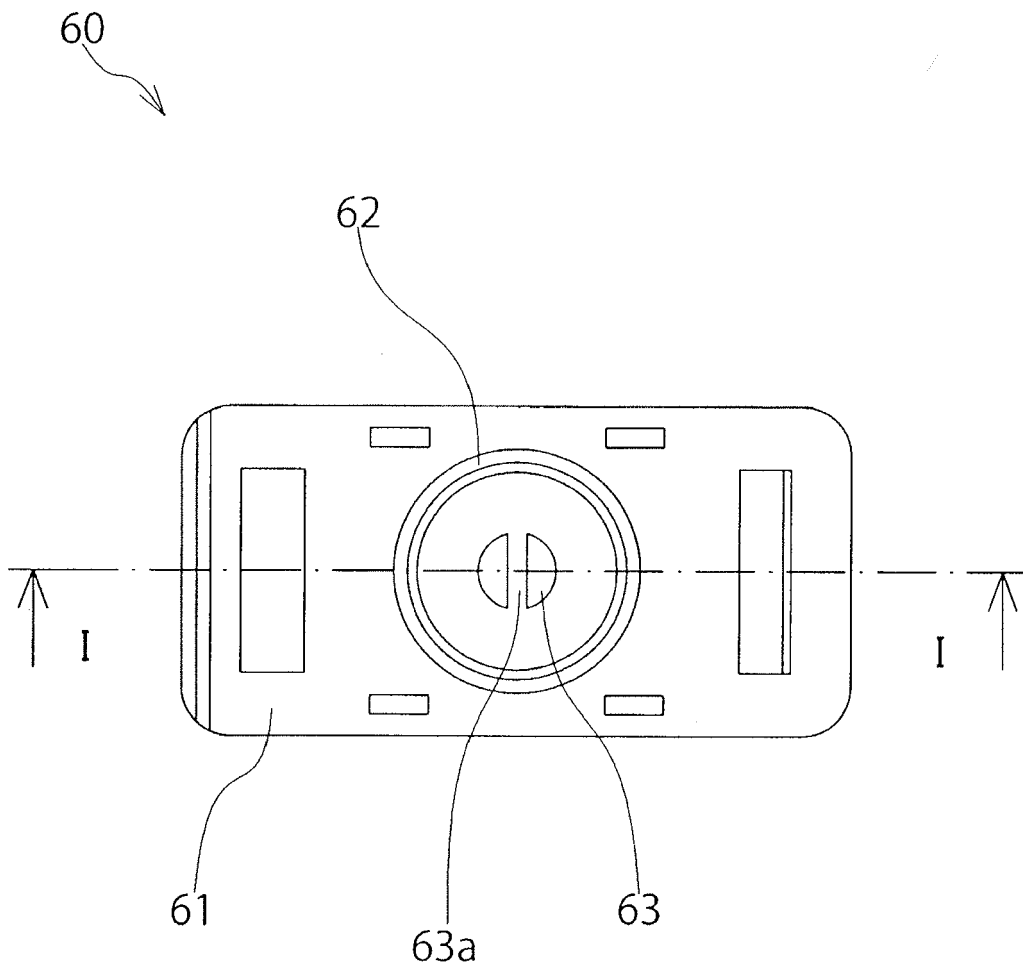


Fig. 37

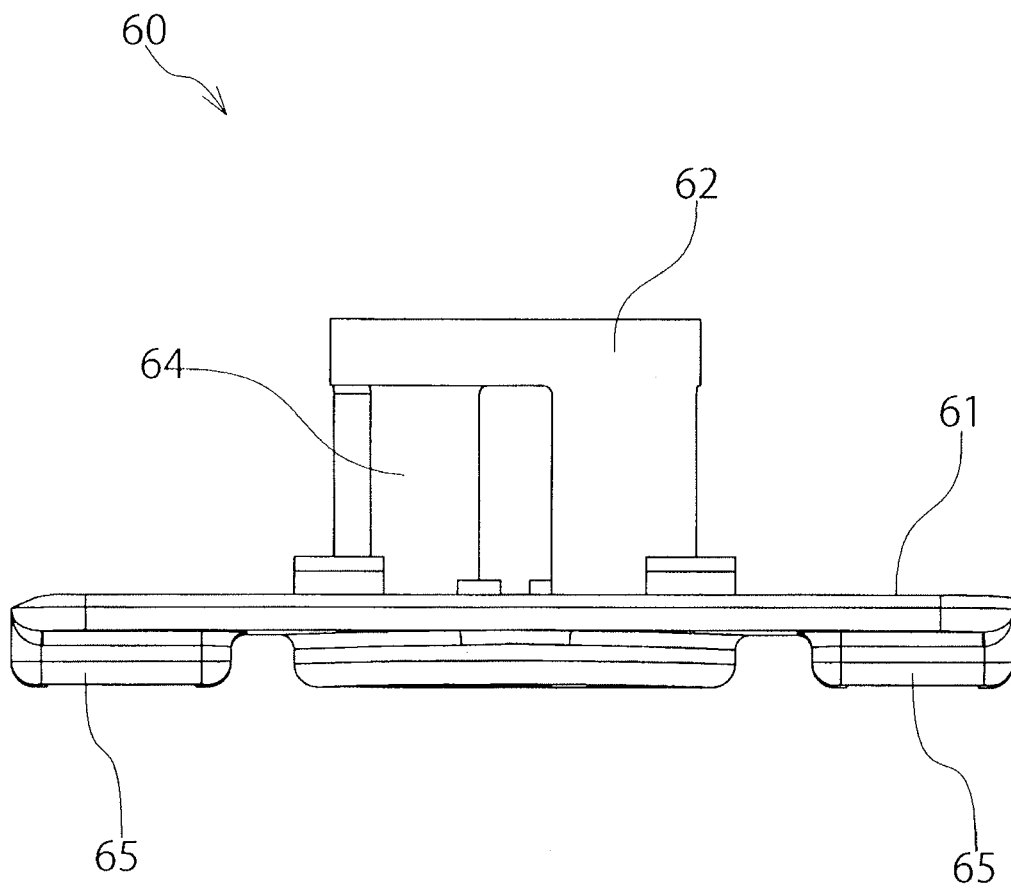


Fig. 38

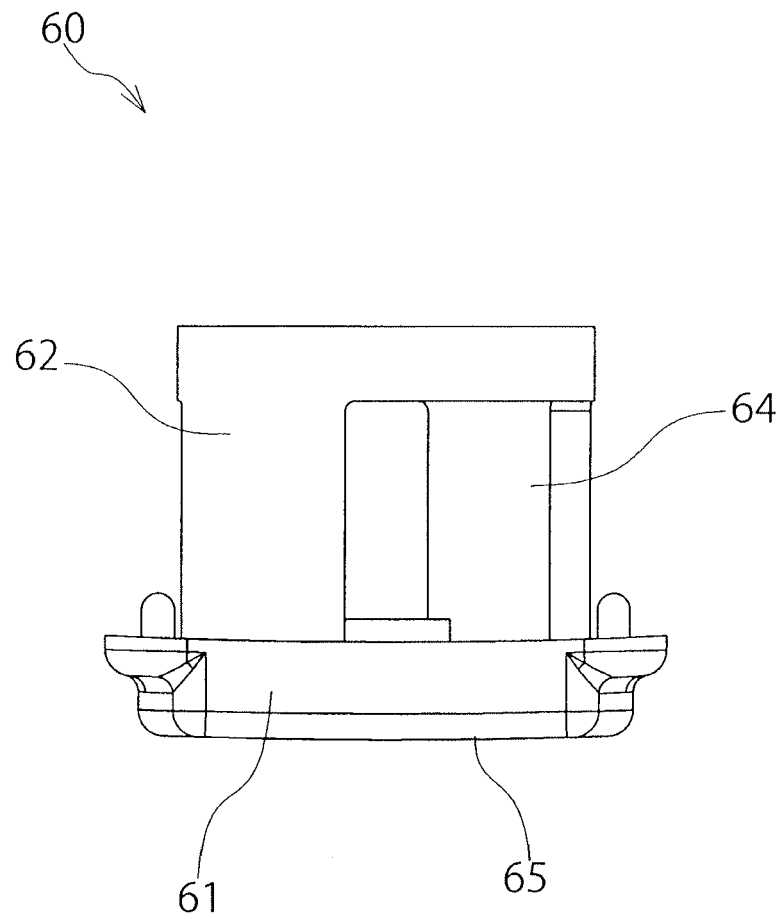


Fig. 39

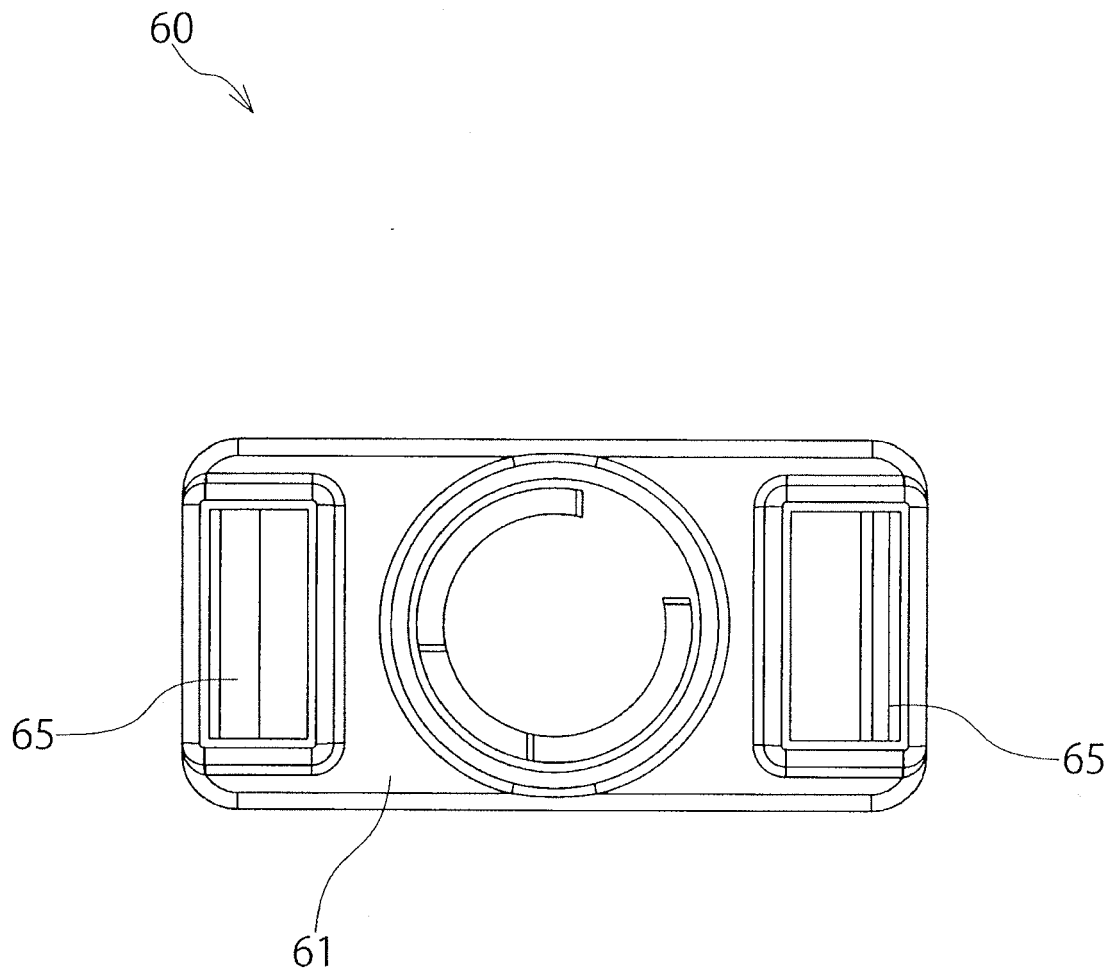


Fig. 40

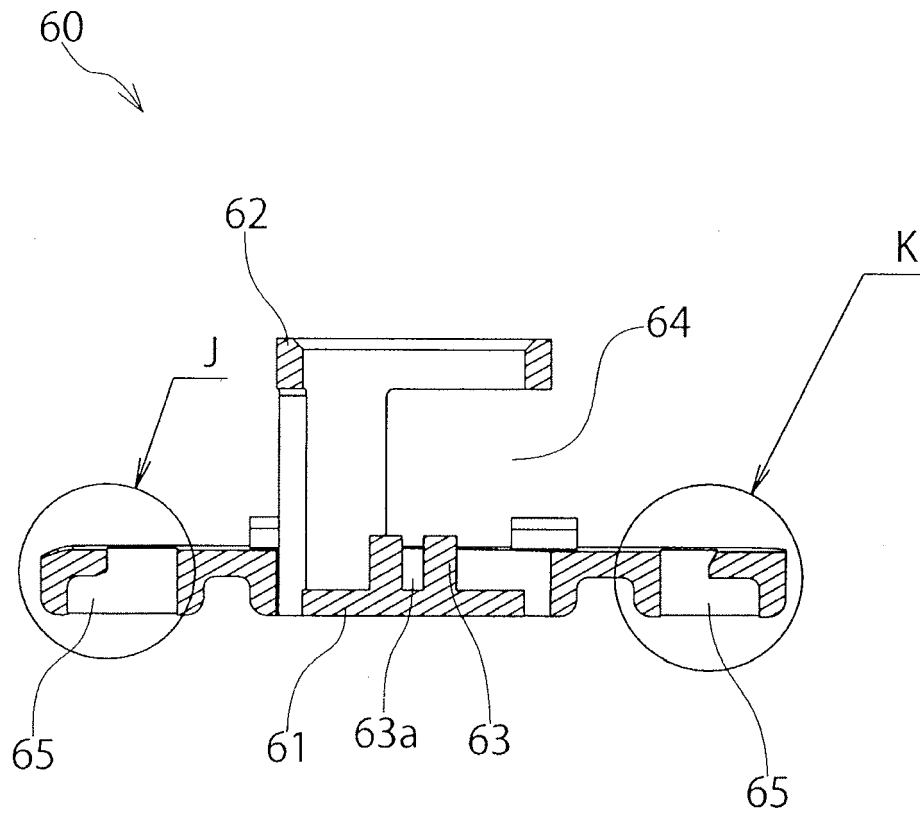


Fig. 41

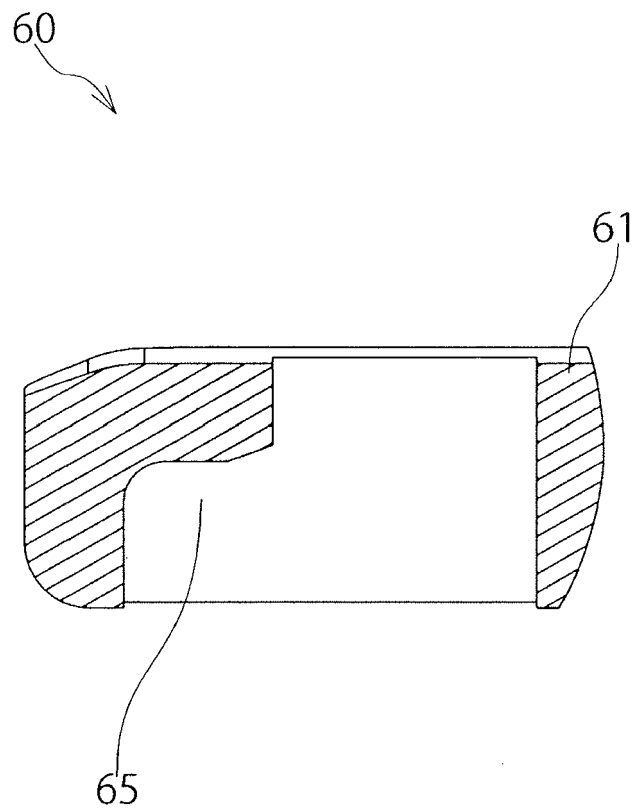


Fig. 42

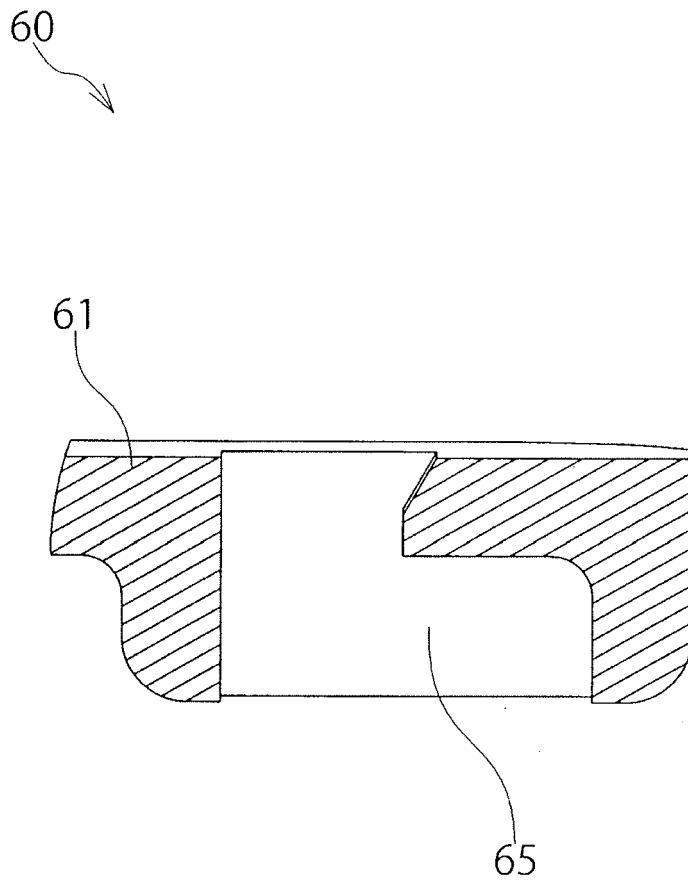


Fig. 43

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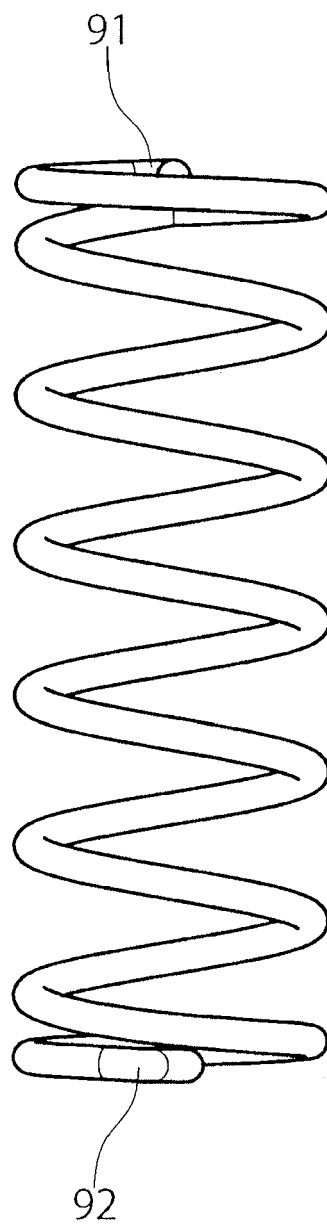


Fig. 44

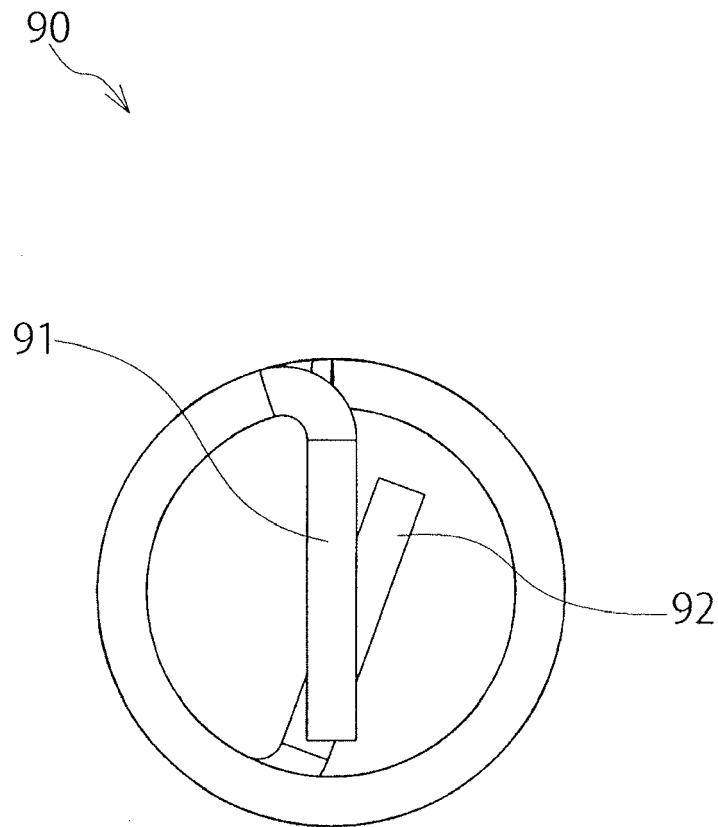


Fig. 45



EUROPEAN SEARCH REPORT

Application Number
EP 12 17 8782

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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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A	FR 2 328 418 A1 (CORRIDORI CLAUDIO [IT]) 20 May 1977 (1977-05-20) * page 3; figure 5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A44B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		5 March 2013	Fonseca Fernandez, H
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05-03-2013

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