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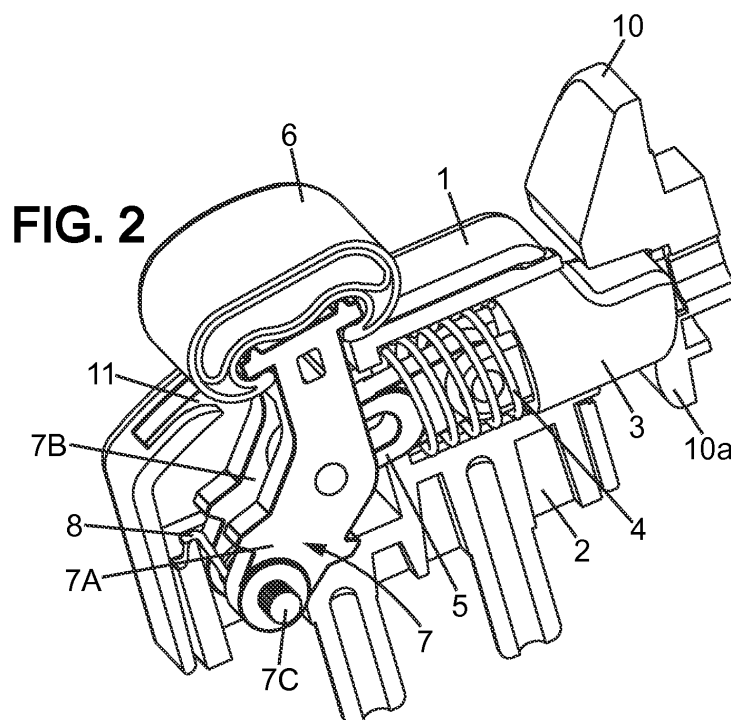
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(54) **Lock for inclined roof window**

(57) A lock for inclined roof window, comprising a locking member (10), a base (2), a retractable bolt (3) arranged inside said base, a spring (4) acting on said bolt, a rocker arm (7), a connecting rod (5) having a front end and a back end, said front end being connected with the back end of said bolt (3) and being able to pivotally

move in relation with said bolt, said back end being connected with the middle part of said rocker arm (7) and being adapted to move in relation with said rocker arm in a fixed stroke while not driving said rocker arm, and a reset member (8), which generates a force to make said rocker arm move in the direction towards the locking member.



Description

Field of invention

[0001] The present invention relates to a lock, in particular, a lock for inclined roof window.

Background of invention

[0002] Inclined roof windows are adapted for inclined roof, which can provide abundance of sunshine for buildings. In order to allow ventilation between inside and outside of the house, most of the inclined roof windows are designed to be opened and closed. And for the opening and closing process, a lock is provided. The use of the lock has a direct impact on the efficiency of the inclined roof window.

[0003] In the prior art, it is known that there are lots of locks for windows, e.g. Chinese patent application for invention No. 200610050768.5, described "a new window lock" (publication No. CN1847594A), which includes a housing, a base member and bolt, a fixed base being arranged on the base member, and a first spring being arranged between the fixed base and the bolt, and a sliding closure which is connected with the bolt being arranged outside of the housing. It is **characterized in that** a buckle mechanism is arranged between the bolt and fixed base. Similarly, Chinese patent application No. 200810060108.4, described "a window lock" (publication No. CN101245680A), wherein the bolt is directly connected with a sliding closure which is adapted for pulling so that the sliding closure moves when the bolt is retreated, therefore, noise generated in the movement has two sources, one is from the bolt, and the other is from the sliding closure.

[0004] Furthermore, Chinese utility model No. ZL200820106956.X, "lock for inclined roof window" (grant publication No. CN201221253Y) discloses a lock which includes a base member, a bolt, a bolt ball, a semicircular connecting rod, a controlling actuation arm, a housing and a return spring, wherein said half covering housing is arranged on the first half of said base member, and two slides are arranged respectively on left and right sides of inner wall of the half covering housing, and the bolt is arranged inside the housing. One end of said bolt which extends over the housing is hinged with the bolt ball, and the other end is hinged with said semicircular connecting rod, and said connecting rod which has a short notch is connected with half covering housing of the base member through a hinge. Said semicircular connecting rod is fixed on the controlling actuation arm which is hinged with the base member, and said return spring is arranged inside the notch which is at the level inside of base member, one end of the return spring is fixed on the base member, and the other end is fixed on the controlling actuation arm. Due to the fact that the bolt slides inside the slide, compared with the lock known from CN1847594A and CN101245680A, the noise is reduced,

however, when the bolt retreats back inside, it also drives the actuation arm, therefore, the actuation arm is bound to make some noise, besides, the actuation arm of the lock is an unconventional member, thus it is not easy to manufacture this member.

Summary of the invention

[0005] In order to solve the technical problem mentioned above this invention provides a lock for inclined roof windows, wherein when its bolt retreats; it will not drive the actuation arm, so that the noise is reduced greatly.

[0006] The technical scheme to solve said technical problem used by this invention is: A lock for inclined roof window, **characterized in that** said lock comprises:

- a strike plate with a locking notch,
- a base member with a holding cavity at its front end,
- a housing, arranged at the outside of said base member, having a guide hole on its upper end,
- a retractable bolt, arranged at the inside of said holding cavity of said base member, which front end is the form of a bevel,
- an elastic means, arranged at the inside of said holding cavity, which front end is against said bolt, and which back end is against an inner-wall of said base member,
- an actuation arm, whose tail is pivotally arranged on said base member, and whose head projects over said guide hole of said housing and is able to move back and forth inside said guide hole,
- a connecting rod, whose front end is connected with the back end of said bolt and said connecting rod is able to pivotally move in relation with said bolt, and whose back end is connected with the middle part of said actuation arm and is adapted to move in relation with said actuation arm in a fixed stroke while not driving said actuation arm, and
- a reset member, which generates a force to make said actuation arm move in the direction towards said locking member.

[0007] Said holding cavity of said base member may have an axial guide groove, and correspondingly, the outer-wall of said bolt has a guide rib along its length direction. Thus, the bolt movement is limited and the bolt cannot spin. Preferably, the cooperative structure of the actuation arm and handle can be designed as follows: the head of said actuation arm has a handle whose lower end has a groove and whose upper end has an elastic filler, and there is a partition between said groove and said elastic filler, while said head of said actuation arm is inserted inside said groove and squeezed by said elastic filler.

[0008] Said reset member may be a reset elastic means which is arranged at the tail of said actuation arm.

[0009] The inlet of said locking notch may have a flange

part which is connected smoothly with the inside of said locking notch.

[0010] Said middle part of said actuation arm may be in the form of a bend.

[0011] The connection between the connecting rod and actuation arm can be designed as follows: the tail part of said connecting rod has a oblong hole or sliding groove in its length direction, and correspondingly, the middle part of said actuation arm has a sliding pin within said oblong hole or sliding groove, when said bolt is completely retreated into said holding cavity of said base member, said connecting rod moves inwardly while not driving said sliding pin, which allows the connecting rod doesn't drive the actuation arm within a certain travel stroke.

[0012] Compared with the prior art, the advantages of this invention are the following: when the bolt retreats, it drives the connecting rod moving inward, while the connecting doesn't drive the sliding pin, therefore, the actuation arm stays still, which limits the noise source. Besides, the bolt moves within a certain travel stroke and inside the holding cavity of the base member, which reduces the noise during the use. The whole structure is coordinated and can be operated smoothly. Moreover, parts can be found easily which reduces the cost.

Brief description of the drawings

[0013]

Figure 1 shows a perspective view of a lock according to one embodiment of the invention, when it is in its locking position.

Figure 2 shows the lock of Figure 1 in perspective view, without its the housing.

Figure 3 shows a front view of the lock of Figure 2.

Figure 4 shows a base member belonging to the lock of Figure 1.

Figure 5 shows a bolt belonging to the lock of Figure 1.

Figure 6 shows an actuation arm belonging to the lock of Figure 1.

Figure 7 shows a connecting rod belonging to the lock of Figure 1.

Figure 8 shows the schematic diagram of the lock when the embodiment is in its unlocking position.

Detailed description of the invention

[0014] One embodiment of the invention will be further described with reference the figures.

[0015] As shown in figure 1 and 2, the lock according to the invention is adapted for a centre-pivoted window on and inclined roof window, and it includes a strike plate 10, a base member 2, a housing 1, a bolt 3, an elastic means 4, an actuation arm 7, an connecting rod 5 and reset elastic means 8.

[0016] The strike plate 10 is arranged on the exterior

window frame, which has a locking notch 10b, and the inside of the said notch 10b is in the form of a bevel, and at the level of the inlet of said locking notch 10b, there is a flange part 10a whose lower end is also in the form of a bevel, so that the bolt 3 can enter into the locking notch 10b, and which is connected smoothly with the inside of said locking notch 10b.

[0017] The base member 2 is arranged on the inner window frame, and the front end of the base member 2 has a holding cavity 22 (see figure 4), housing 1 is arranged on the outside of the base member 2, the upper end has a guide groove 11, the bolt 3 is retractable in the holding cavity 22 of the base member, and the front end of the bolt is in the form of bevel.

[0018] Elastic means 4 is arranged inside of the holding cavity 22, whose front end is against with the bolt 3, and whose back end is against with the inner wall of the base member 2, and it acts on the bolt 3, biasing the bolt 3 outwardly from the holding cavity 22.

[0019] With reference to figure 6, the middle part of the actuation arm 7 forms a bend, between a tail part and a head part ; the tail part is pivotally arranged on the base member 2, and the head part extents over the guide groove 11 and can move inside said guide groove 11. The head part of the actuation arm 7 has a handle 6 whose lower end has a groove 63 and whose upper end has a elastic filler 61, and there is a partition 62 between said groove 63 and said elastic filler 61, while said head of said actuation arm 7 is inserted inside said groove 63 and squeezed by said elastic filler 61. The reset elastic means 8 is used as the reset member of the actuation arm 7, which is arranged at the trail end of the actuation arm 7, and which can generate a force making the actuation arm 7 to move towards the strike plate 10.

[0020] With reference to figure 7, the front end of the connecting rod 5 is hinged with the back end of the bolt 3, and the back end of the connecting rod 5 is connected with the middle part of the actuation arm 7, which doesn't drive the actuation arm 7 within a certain travel stroke. The tail of said connecting rod 5 has an oblong hole 51 in its length direction, and correspondingly, the middle part of said actuation arm 7 has a sliding pin 71 within said oblong hole 51, when said bolt 3 is completely retreated into said holding cavity 22, said connecting rod moves inwardly while not driving said sliding pin 71.

[0021] As shown in figure 4 and 5, in order to prevent the rolling of the bolt 3, the inner wall of said holding cavity 22 has an axial guide groove 21, and correspondingly, the outer wall of said bolt 3 has a guide rib along its length direction. Thus, the movement of the bolt 3 is limited and it cannot spin.

[0022] When a user wants to open the window, he pulls the handle 6. As shown in figure 8, when pulling the handle 6 in direction OD, the actuation arm 7 turns, overcoming the elastic force of the elastic means 4 and reset elastic means 8, and the connecting rod 5 makes the bolt 3 retreat back into the base member by transferring the circular movement of the actuation arm 7 to the straight

movement of the bolt 3, so that the bolt 3 leaves the locking notch 10b of the strike plate 10 and ends the unlocking movement. The inner window frame of the centre-pivoted window can then be pivoted.

[0023] On the contrary, for closing the window, the user may push the handle 6 in the direction opposite the direction OD. Pushing the handle 6 brings the upwards movement of the inner window frame of the centre-pivoted window. Due to the pivoting movement, the bolt 3 and the bevel of the lower part of the flange part 10a of the strike plate collide with each other, which generates the lateral force that overcomes the elastic force of the spring and pushes the bolt 3 towards inside of the holding cavity (by camming effect), the bolt 3 drives the connecting rod 5 to move inwards. Since the back part of the connecting rod 5 has a oblong hole 51, when the connecting rod 5 moves inwards, it doesn't drive any pivoting of actuation arm 7. After the bolt 3 passes the flange part 10a, the bolt 3 is moved outwardly to the locking position under action of the spring 4, thus, the bolt 3 and the strike plate 10 are locked with each other, so that the inner and exterior window frames of the centre-pivoted window are being locked.

[0024] From the above description, one understands that the following features of the invention are of importance:

a. A lock comprising:

- a strike plate (10) ;
- a bolt (3) mounted in a base member (2) and adapted to be displaced in translation relative to said base member (2) between a locking position in which it lockingly engages with said strike plate (10) and an unlocking position in which it retracts into said base member without locking engagement with the strike plate; and
- an actuation arm (7) adapted to swivel relative to the base member (2) and linked to the bolt (3) through a connecting rod (5), whereby swivelling said actuation arm in an opening direction (OD) drives said bolt towards its unlocking position ;

characterized in that it further comprises locking elastic means (4) adapted to push said bolt (3) towards its locking position, and that said connecting rod (5) comprises a free travel stroke portion adapted so that said actuation arm (7) is not driven by said bolt (3) when said strike plate (10) displaces the bolt (3) along a predetermined free travel stroke against the action of said elastic means (4);

b. Said free travel stroke portion comprises an oblong hole (51) which extends longitudinally through said connecting rod (5), said oblong hole (51) being traversed by a sliding pin (71) which is secured to said actuation arm (7) and is arranged to slide along the longitudinal direction of said oblong hole;

c. Said sliding pin (71) is secured to a middle part of said actuation arm (7), and a front end of said connecting rod (5) is mounted to pivot about a crank pin (35) secured to a back end of said bolt (3);

d. The lock further comprises reset elastic means (8) adapted to push said actuation arm (7) so as to swivel in a direction opposite said opening direction (OD);

e. Said bolt (3) is mounted to slide inside a holding cavity (22) which is provided in said base member (2) and extends axially in the direction of translation of the bolt.

f. The lock further comprises anti-rotation means (21, 31) provided in said bolt (3) and in said holding cavity (22) and adapted to prevent said bolt (3) from turning inside said holding cavity (22);

g. Said anti-rotation means comprise a guide groove (21) which extends axially in said holding cavity (22) and a corresponding guide rib (31) protruding on an outer surface of said bolt (3);

h. Said locking elastic means (4) are formed by a helical spring which is arranged in the inside of said holding cavity (22) in compression between said bolt (3) and an annular shoulder (23) formed by an inner wall of said base member (2);

i. Said actuation arm (7) comprises a head (73) on which a handle (6) is secured, said handle (6) comprising a groove section (63) and a filler section (64) separated from said groove section (63) by a flexible partition wall (62), said head (73) being inserted inside said groove section (63), an elastic filler being inserted inside said filler section (64) so as to push away said partition wall (62) and to squeeze said head (73);

j. The lock further comprises a housing (1) which covers said base member (2) and has an opening (11) traversed by said actuation arm (7);

k. Said middle part of said actuation arm (7) is bent;

l. Said actuation arm (7) is substantially formed by a U-shaped arm having two parallel legs (7A, 7B), and wherein said reset elastic means are formed by a torsion spring (8) which is arranged substantially between said legs (7A, 7B) in a base section (72) of said actuation arm (7);

m. A front end of said bolt (3) is in the form of a bevel, and said strike plate (10) comprises a locking notch (10b) to receive said bolt (3);

n. A window is equipped with at least one lock ac-

cording to any one of the preceding claims;

o. A window is equipped with two locks and comprises a pivoting sash on the top of which the base members (2) of said locks are secured, further comprising an exterior window frame on which the strike plates (10) of said locks are secured, and wherein a single handle (6) having the form of a bar is secured to the actuation arms (7) of said locks.

Claims

1. A lock for inclined roof window, comprising:

- a locking member (10) with a locking notch (10b),
- a base (2) with a holding cavity (22) at its front end,
- a housing (1), arranged at the outside of said base, having a guide hole (11) on its upper end,
- a retractable bolt (3), arranged inside said holding cavity of said base, said retractable bolt having a front end in the form of a bevel,
- a spring (4), arranged at the inside of said holding cavity, which front end is against said bolt (3), and which back end is against an inner-wall of said base,
- a rocker arm (7), whose tail is pivotally arranged on said base (2), and whose head projects over said guide hole (11) of said housing and is able to move back and forth inside said guide hole,
- a connecting rod (5) having a front end and a back end, said front end being connected with the back end of said bolt (3) and being able to pivotally move in relation with said bolt, said back end being connected with the middle part of said rocker arm (7) and being adapted to move in relation with said rocker arm in a fixed stroke while not driving said rocker arm, and
- a reset member (8), which generates a force to make said rocker arm move in the direction towards said locking member.

2. A lock for inclined roof window according to claim 1, **characterized in that** said holding cavity (22) of said base has an axial guide groove (21), and correspondingly, the outer-wall of said bolt has a guide rib (31) in its length direction.

3. A lock for inclined roof window according to claim 1 or claim 2, **characterized in that** said head of said rocker arm has a handle (6) whose lower end has a groove and whose upper end has a elastic filler, and there is a partition between said groove and said elastic filler, while said head of said rocker arm is inserted inside said groove and squeezed by said elastic filler.

4. A lock for inclined roof window according to anyone of the preceding claims, **characterized in that** said reset member (8) is a torsion spring which is arranged at the tail of said rocker arm.

5. A lock for inclined roof window according to anyone of the preceding claims, **characterized in that** the inlet of said locking notch (10b) has a flange part (10a) which is connected smoothly with the inside of said locking notch.

6. A lock for inclined roof window according to anyone of the preceding claims, **characterized in that** said middle part of said rocker arm (7) is in the form of a bend.

7. A lock for inclined roof window according to any of claims 1 to 6, **characterized in that** the tail of said connecting rod has a sliding opening or sliding groove (51) in its length direction, and correspondingly, the middle part of said rocker arm has a projecting pin (71) within said sliding opening or sliding groove, when said bolt is completely retreated into said holding cavity of said base, said connecting rod moves inwardly while not driving said projecting pin.

FIG. 1

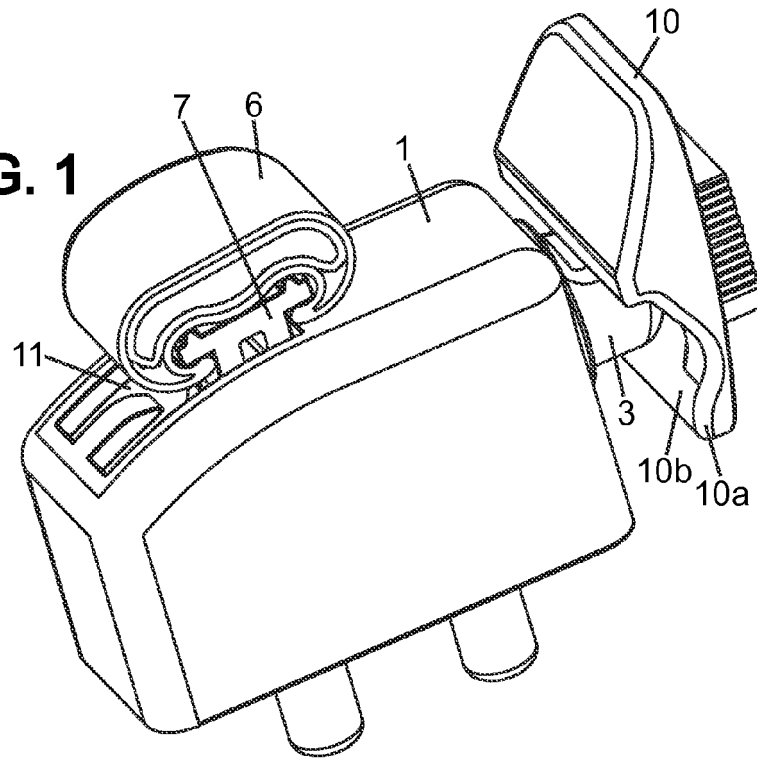
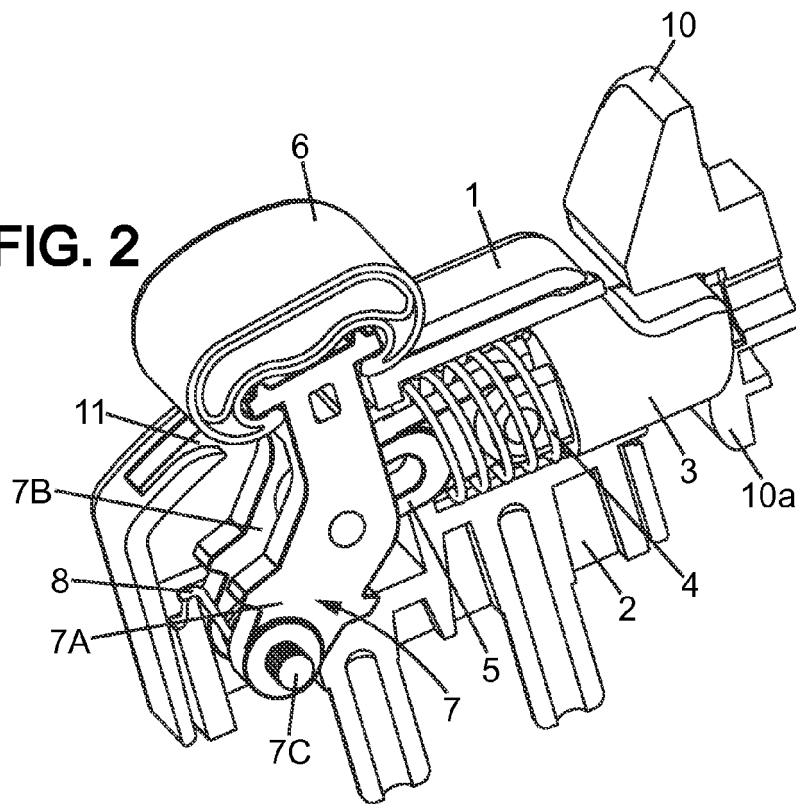
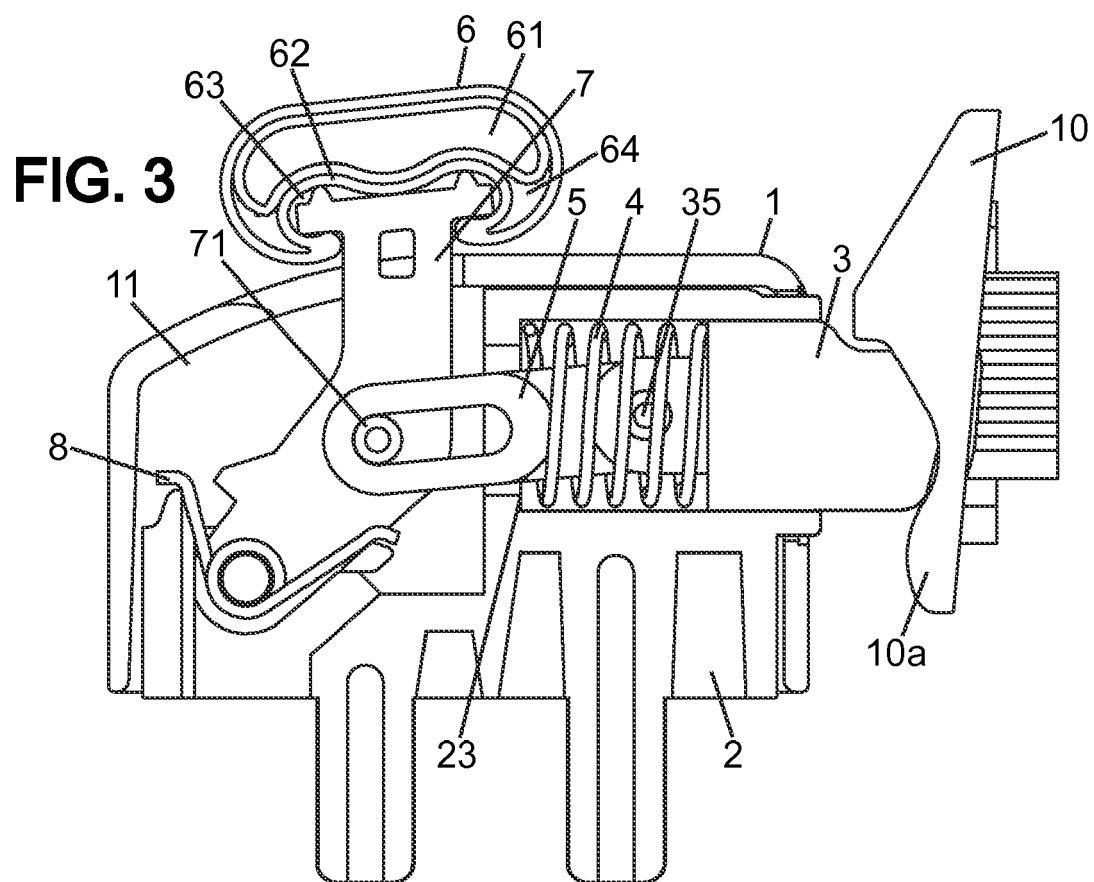


FIG. 2





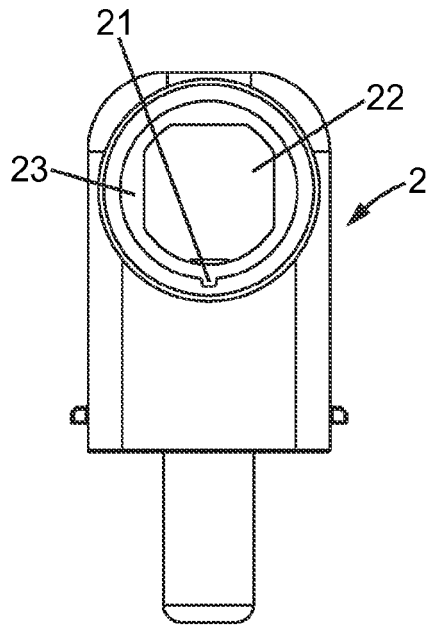


FIG. 4

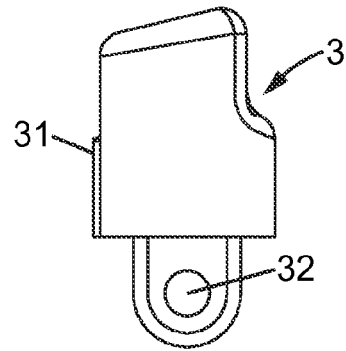


FIG. 5

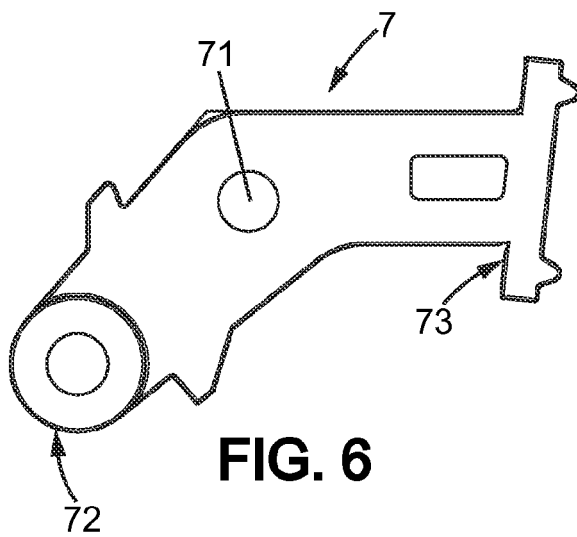


FIG. 6

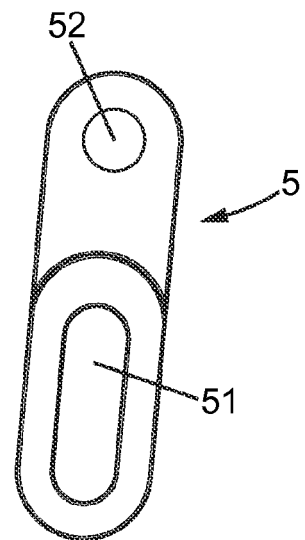
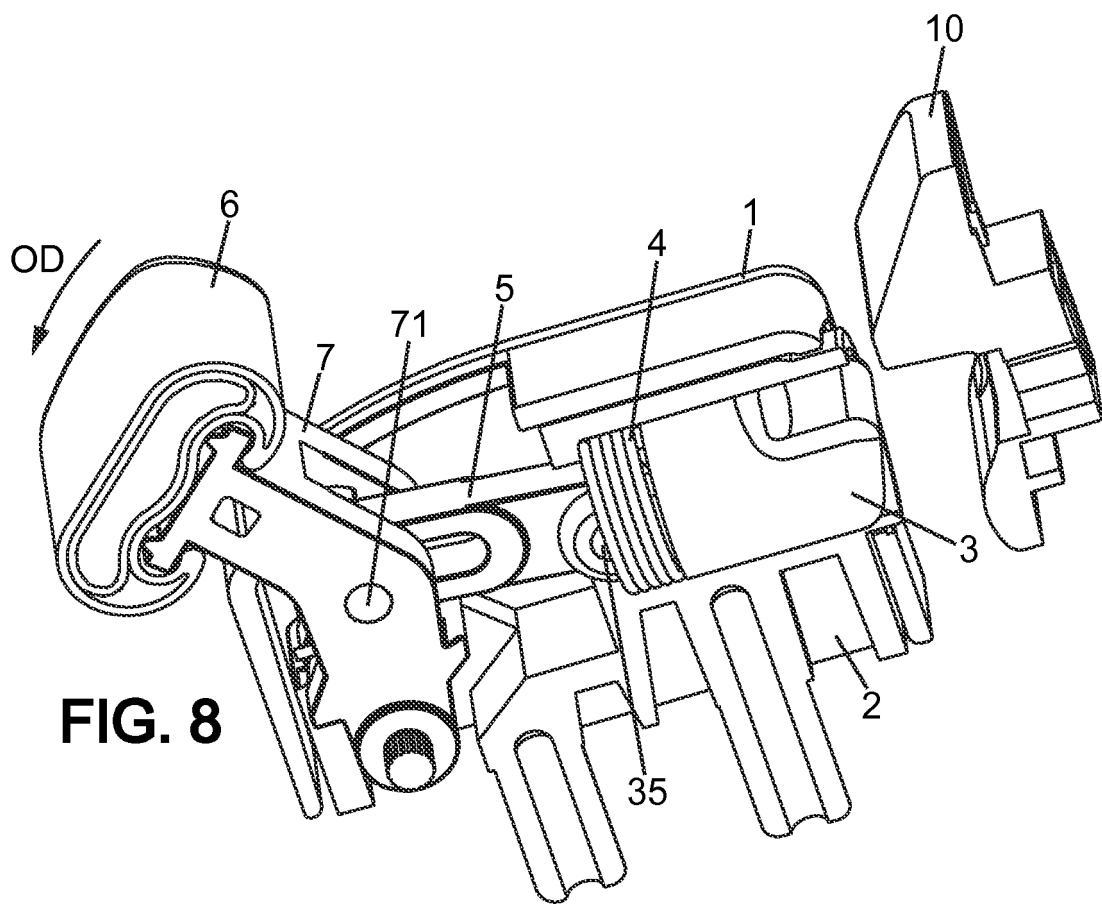


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 200610050768 [0003]
- CN 1847594 A [0003] [0004]
- CN 200810060108 [0003]
- CN 101245680 A [0003] [0004]
- CN 201221253 Y [0004]