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(71) Applicant: **Kabushiki Kaisha Honda Lock**
Miyazaki-shi, Miyazaki 880-0293 (JP)

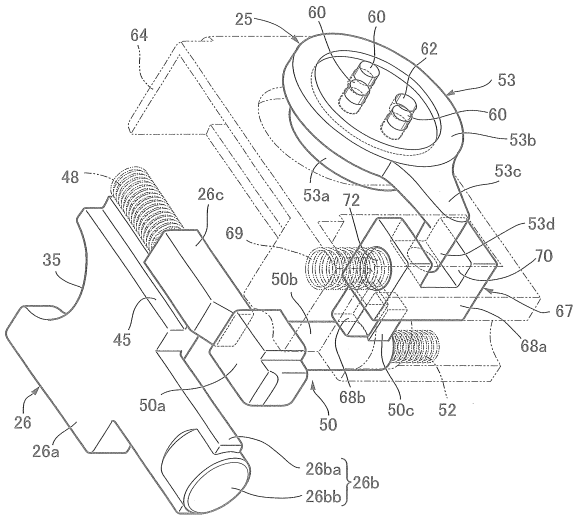
(72) Inventors:
- **TANAKA, Akimitsu**
  Miyazaki-shi
  Miyazaki 880-0293 (JP)
- **NIWAT, Samrerng**
  Chonburi 20000 (TH)

(74) Representative: **Weickmann & Weickmann PartmbB**
Postfach 860 820
81635 München (DE)

(54) PROTECTIVE DEVICE FOR CYLINDER LOCK

(57) A protective device for a cylinder lock is provided in which a shutter plate supported on a casing so as to be capable of opening and closing a mechanical key insertion hole is capable of moving to an open position when a magnet lock is unlocked by a magnet key, wherein a restricting member (50) is disposed in the casing so as to be capable of moving between a restriction position in which the shutter plate (26) urged to an open position side is restricted to the closed position and a restriction release position, a slide member (64) that is slidably housed in the casing not only enables an insertion operation of the magnet key to an unlocked position but can also be moved from the unlocked position to a pushed-in position, and restriction release means (67) is provided between the slide member (64) and the restricting member (50) and moves the restricting member (50) to the restriction release position in response to the slide member (64) being pushed in to the pushed-in position in a state in which the magnet lock (25) is unlocked. This enables a shutter plate to be moved from a closed position to an open position by operation of a magnet key in one direction.

FIG.8



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Description

TECHNICAL FIELD

[0001] The present invention relates to a protective device for a cylinder lock, the protective device including a casing having a mechanical key insertion hole for a mechanical key to be inserted into a cylinder lock, a shutter plate supported on the casing so as to be capable of moving between a closed position in which the mechanical key insertion hole is closed and an open position in which the mechanical key insertion hole is opened, and a magnet lock disposed in the casing while having a movable member capable of operating accompanying unlocking by a magnet key, the shutter plate being capable of moving to the open position when the magnet lock is unlocked.

BACKGROUND ART

[0002] Such a protective device for a cylinder lock is known from for example Patent Document 1.

RELATED ART DOCUMENTS

PATENT DOCUMENTS

[0003] Patent Document 1: Japanese Patent Publication No. 3914043

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004] However, in the arrangement disclosed in Patent Document 1, the shutter plate is moved from the closed position to the open position by pivoting the magnet key in a state in which the magnet key is fitted into the magnet lock and it is unlocked; when the shutter plate is opened an operation of fitting the magnet key into the magnet lock and a subsequent operation of pivoting are required, which is complicated, and there is a demand for a smoother operation.

[0005] The present invention has been accomplished in light of such circumstances, and it is an object thereof to provide a protective device for a cylinder lock that enables a shutter plate to be moved from a closed position to an open position by operation of a magnet key in one direction.

MEANS FOR SOLVING THE PROBLEMS

[0006] In order to attain the above object according to a first aspect of the present invention, there is provided a protective device for a cylinder lock, the protective device comprising a casing having a mechanical key insertion hole for a mechanical key to be inserted into a cylinder lock, a shutter plate supported on the casing so as to be capable of moving between a closed position in which the mechanical key insertion hole is closed and an open position in which the mechanical key insertion hole is opened, and a magnet lock disposed in the casing while having a movable member capable of operating accompanying unlocking by a magnet key, the shutter plate being capable of moving to the open position when the magnet lock is unlocked, characterized in that the device comprises an urging member urging the shutter plate to the open position side, a restricting member disposed in the casing so as to be capable of moving between a restriction position in which the shutter plate is restricted to the closed position and a restriction release position in which movement of the shutter plate from the closed position to the open position is allowed, a slide member that is slidably housed in the casing so as to move together with the magnet key in response to the magnet key being inserted into the casing and that not only enables an insertion operation of the magnet key to an unlocked position in which the magnet lock is unlocked but can also be moved from the unlocked position to a pushed-in position by further pushing in the magnet key, and restriction release means that is provided between the slide member and the restricting member so as to move the restricting member to the restriction release position in response to the magnet key being pushed in to the pushed-in position together with the slide member in a state in which the magnet lock is unlocked so that the movable member can be operated.

[0007] Further, according to a second aspect of the present invention, in addition to the first aspect, the restriction release means comprises a movable engagement member that is engaged with the movable member and is retained by the slide member while movement is restricted by the movable member in a locked state of the magnet lock, and a spring member provided between the slide member and the movable engagement member so as to exert a resilient force for pushing the movable engagement member toward a side on which the movable engagement member drives the movable member in response to movement of the slide member to the pushed-in position side, and the movable engagement member is engaged with the restricting member so as to move the restricting member from the restriction position to the restriction release position by movement of the movable engagement member to the side on which the movable engagement member drives the movable member.

EFFECTS OF THE INVENTION

[0008] In accordance with the first aspect of the present invention, when the magnet key is pushed further in to the pushed-in position after the magnet lock has been unlocked by inserting the magnet key into the casing and moving the slide member to the unlocked position together with the magnet key, the restriction release means moves the restricting member, which restricts movement

to the open position of the shutter plate urged to the open position side by the urging member, to the restriction release position, and the shutter plate thereby moves to the open position; when the shutter plate is to be moved from the closed position to the open position, the magnet key may simply be pushed in one direction, and it is possible to move the shutter plate to the open position by a smooth operation.

[0009] Furthermore, in accordance with the second aspect of the present invention, since the pressing force acting on the movable member of the magnet lock accompanying the slide member moving together with the magnet key acts from the slide member via the spring member and the movable engagement member, even if the slide member is pushed by an unauthorized member other than a legitimate magnet key, the pressing force from the slide member is absorbed by the spring member, only the spring load of the spring member acts on the movable member, which is in the non-operated state due to the magnet lock being in the locked state, and an excessive load is not applied to the magnet lock.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

[FIG. 1] FIG. 1 is a perspective view of a protective device for a cylinder lock. (first embodiment)
[FIG. 2] FIG. 2 is a perspective view of a mechanical key and a magnet key. (first embodiment)
[FIG. 3] FIG. 3 is an exploded perspective view of the protective device. (first embodiment)
[FIG. 4] FIG. 4 is a front view of the protective device in a state in which a cover member is omitted. (first embodiment)
[FIG. 5] FIG. 5 is a perspective view when the cover member is viewed from the reverse side. (first embodiment)
[FIG. 6] FIG. 6 is a view of a body from the direction of arrow 6 in FIG. 4. (first embodiment)
[FIG. 7] FIG. 7 is a perspective view of a slide member. (first embodiment)
[FIG. 8] FIG. 8 is a perspective view showing the state of restriction release means when a magnet lock is in a locked state. (first embodiment)
[FIG. 9] FIG. 9 is a perspective view showing the state of the restriction release means when the magnet lock is unlocked and the magnet key is pushed in from an unlocked position to a pushed-in position. (first embodiment)

EXPLANATION OF REFERENCE NUMERALS AND SYMBOLS

[0011]

11 Cylinder lock
13 Protective device
14 Mechanical key
16 Magnet key
24 Casing
25 Magnet lock
26 Shutter plate
27 Mechanical key insertion hole
48 First coil spring, which is an urging member
50 Restricting member
53 Rotor, which is a movable member
64 Slide member
67 Restriction release means
68 Movable engagement member
69 Fifth coil spring, which is a spring member

MODE FOR CARRYING OUT THE INVENTION

[0012] An embodiment of the present invention is explained below by reference to the attached FIG. 1 to FIG. 9.

FIRST EMBODIMENT

[0013] First, in FIG. 1, a protective device 13 is mounted on a cylinder body 12 of a cylinder lock 11 used in a vehicle such as for example a two-wheeled motor vehicle so that it can carry out switching of the switching mode of an ignition switch and switching of steering between a locked state and an unlocked state.

[0014] In FIG. 2, a mechanical key 14 for unlocking the cylinder lock 11 is supported on one end part of a linearly extending portable case 15 having a rectangular cross-sectional shape so as to switch between a state in which it is housed in the portable case 15 and a state in which it projects from the portable case 15 as shown in FIG. 2, and a magnet key 16 is provided on the other end part of the portable case 15.

[0015] Formed on a side face of said other end part of the portable case 15 are a square-shaped recess 17, a circular projection 18 disposed in a central part of the recess 17, and four housing recesses 19 disposed on the periphery of the circular projection 18 within the recess 17. In a state in which a magnet 20 is housed in each of three housing recesses 19 selected from the four housing recesses 19, a lid member 22 having in a central part a circular hole 21 into which the circular projection 18 is fitted is fitted into and adhered to the recess 17, thus forming the magnet key 16. Moreover, the magnet 20 is housed in the housing recess 19 so that either one of the N pole and the S pole faces the outer end side of the housing recess 19.

[0016] Referring in addition to FIG. 3 and FIG. 4, the protective device 13 includes a casing 24 covering one end part of the cylinder body 12, a magnet lock 25 disposed in the casing 24, and a shutter plate 26 housed within the casing 24.

[0017] The casing 24, which has a mechanical key insertion hole 27 for the mechanical key 14 to be inserted into the cylinder lock 11, is formed from a body 28 to

which the cylinder body 12 is joined and a cover member 29 secured to the body 28 so as to cover the body 28 from the side opposite to the cylinder body 12. Supported on this casing 24 is a shutter plate 26 capable of moving in a shutter plate movement direction 30 shown by the arrow in FIG. 4 between a closed position in which the mechanical key insertion hole 27 is closed (position shown in FIG. 4) and an open position in which the mechanical key insertion hole 27 is opened, this shutter plate 26 being disposed between the body 28 and the cover member 29.

[0018] Referring in addition to FIG. 5, the cover member 29 covers the body 28 so that part of the body 28 on the side opposite to the cylinder lock 11 is fitted thereinto, and is formed into a substantially rectangular bowl shape that is long in a direction orthogonal to the shutter plate movement direction 30.

[0019] Formed integrally with the peripheral edge of the cover member 29 in an intermediate part in the longitudinal direction of the cover member 29 are first and second boss portions 29a and 29b opposing each other in the shutter plate movement direction 30, and formed integrally with one of four corners of the cover member 29 is a third boss portion 29c. On the other hand, integrally formed with the outer periphery of the body 28 are first to third support portions 28a, 28b, and 28c against which the first to third boss portions 29a, 29b, and 29c abut, the cover member 29 being secured to the body 28 by screwing into the first to third boss portions 29a to 29c a screw member 31 (see FIG. 3) inserted through the first to third support portions 28a to 28c from the cylinder lock 11 side.

[0020] A sliding contact support face 32 is formed on an area, surrounded by the first to third support portions 28a to 28c, of a face of the body 28 opposing the reverse face of the cover member 29, the shutter plate 26 being in sliding contact with the sliding contact support face 32. The mechanical key insertion hole 27 is formed from a circular internal hole 33 provided in the body 28 so as to open on the sliding contact support face 32 so as to communicate with the interior of the cylinder lock 11, and a circular external hole 34 provided in the cover member 29 so as to correspond to the internal hole 33, the shutter plate 26 closing the mechanical key insertion hole 27 by being present between the internal hole 33 and the external hole 34.

[0021] The shutter plate 26 is formed so as to have a flat plate-shaped lid portion 26a that is in sliding contact with the sliding contact support face 32, an operating portion 26b that is connectedly provided integrally with the lid portion 26a so as to extend along the shutter plate movement direction 30, and a spring receiving portion 26c that extends in the shutter plate movement direction 30 and is connectedly provided integrally with the lid portion 26a so as to be positioned in a virtual plane PL passing through central axes of the first and second support portions 28a and 28b.

[0022] Formed in one end part, along the shutter plate movement direction 30, of the lid portion 26a is a cutout 35 formed into a semicircular shape corresponding to substantially half of the periphery of the internal hole 33 and the external hole 34. Due to the cutout 35 being formed it is possible to ensure a guide length on opposite sides of the lid portion 26a by a first guide projecting portion 43a and a retaining projection 46, which are described later, while shortening the amount of movement of the shutter plate 26 from the closed position to the open position.

[0023] Furthermore, the operating portion 26b is continuous as a unit with the lid portion 26a via an end part on the side opposite to a portion where the cutout 35 is formed, and is formed so as to have a flat plate portion 26ba that is flush with the lid portion 26a and a short columnar portion 26bb formed integrally with the center of the extremity of the flat plate portion 26ba.

[0024] Provided integrally with the peripheral edge of the cover member 29 at a place corresponding to the operating portion 26b is a projecting portion 29d having a semicircular cross section protruding to the body 28 side so as to form an operating recess 36 on an outer face side of the cover member 29. A through hole 37 that is formed so as to have a shape corresponding to cross-sectional shape of the operating portion 26b so that the extremity of the operating portion 26b faces the through hole 37 in a state in which the shutter plate 26 is at the closed position is provided in the cover member 29 so as to correspond to the operating recess 36, and when the shutter plate 26 moves to the open position the extremity of the operating portion 26b projects into the operating recess 36.

[0025] The spring receiving portion 26c is connectedly provided integrally with a side part, on the virtual plane PL side, of the lid portion 26a, one end of the spring receiving portion 26c is disposed at a position corresponding to an intermediate part of the lid portion 26a along the shutter plate movement direction 30, and the other end of the spring receiving portion 26c is disposed so as to correspond to an intermediate position of the operating portion 26b along the shutter plate movement direction 30.

[0026] A bottomed slide support hole 38 opening so as to oppose the reverse face of the cover member 29 is provided in the body 28 in a portion on the side opposite to the sliding contact support face 32 with respect to the virtual plane PL so as to have a substantially rectangular cross-sectional shape with a direction along the shutter plate movement direction 30 as the longitudinal direction, and a substantially rectangular insertion hole 39 corresponding to the slide support hole 38 is provided in the cover member 29.

[0027] Referring to FIG. 3, a lid member 40 closing the insertion hole 39 is pivotably supported on the reverse face of the cover member 29 via a support shaft 41, this lid member 40 being urged to the closed side by a spring 42.

[0028] A rib 43 is projectingly provided integrally with

the reverse face of the cover member 29 while being disposed so as to surround the external hole 34 and the insertion hole 39 apart from a portion corresponding to the projecting portion 29d, the rib 43 abutting against an outer peripheral part of a face of the body 28 opposing the reverse face of the cover member 29.

[0029] The first guide projecting portion 43a, which extends along the shutter plate movement direction 30 while forming part of the rib 43, is in sliding contact with a side face, on the side opposite to the spring receiving portion 26c, of the lid portion 26a of the shutter plate 26, and a second guide projection 44 projectingly provided on the reverse face of the cover member 29 so as to extend lengthwise along the shutter plate movement direction 30 is in sliding contact with an outside face of the spring receiving portion 26c of the shutter plate 26. Furthermore, a groove 45 opening so as to oppose the reverse face of the cover member 29 is formed in a lateral end part, on the spring receiving portion 26c side, of the lid portion 26a in the shutter plate 26 so as to extend along the shutter plate movement direction 30, and the retaining projection 46, which is fitted into the groove 45, is projectingly provided integrally with the reverse face of the cover member 29 so as to extend lengthwise along the shutter plate movement direction 30. That is, movement of the shutter plate 26 along the shutter plate movement direction 30 is guided by the first guide projecting portion 43a, the second guide projection 44, and the retaining projection 46.

[0030] Moreover, a supporting projecting portion 28d is projectingly provided integrally with a portion positioned outside the slide support hole 38 on a face, opposing the reverse face of the cover member 29, of the body 28, the supporting projecting portion 28d abutting against the reverse face of the cover member 29 inside the rib 43 on the reverse face of the cover member 29.

[0031] A spring receiving seat 47 opposing said one end of the spring receiving portion 26c of the shutter plate 26 is provided on the cover member 29 so as to be disposed between the second guide projection 44 and the retaining projection 46, and a first coil spring 48, which is the urging member urging the shutter plate 26 to the open position side, is provided in a compressed state between the spring receiving seat 47 and said one end of the spring receiving portion 26c.

[0032] In a state in which the shutter plate 26 is at the closed position, movement of the shutter plate 26 to the open position side is restricted by a restricting member 50 abutting against said other end of the spring receiving portion 26c of the shutter plate 26. This restricting member 50 is disposed on the body 28 of the casing 24 while being capable of moving between a restriction position in which it abuts against said other end of the spring receiving portion 26c of the shutter plate 26 in the closed position so as to restrict the shutter plate 26 to the closed position and a restriction release position in which abutment against said other end of the spring receiving portion 26c is released so as to allow movement of the shutter plate 26 from the closed position to the open position.

[0033] The restricting member 50 is formed so as to integrally have an abutment portion 50a that can abut against said other end of the spring receiving portion 26c, a rod-shaped portion 50b that has one end part connected to the abutment portion 50a and extends in parallel to a direction in which the slide support hole 38 extends, and a latching portion 50c that is connected to the other end part of the rod-shaped portion 50b at right angles. A bottomed restricting member fitting hole 51 is provided in the body 28 so as to open on the sliding contact support face 32 and also open on a side face, on the shutter plate 26 side, of the slide support hole 38, the restricting member fitting hole 51 having the restricting member 50 movably fitted thereinto so that the latching portion 50c projects on the slide support hole 38 side. A second coil spring 52 housed in the restricting member fitting hole 51 is provided in a compressed state between the blocked end of the restricting member fitting hole 51 and the rod-shaped portion 50b of the restricting member 50 so as to exert a spring force urging the restricting member 50 to the restriction position side.

[0034] Sliding of the shutter plate 26 from the closed position to the open position is enabled by unlocking the magnet lock 25 disposed on the body 28 of the casing 24 by the magnet key 16, and this magnet lock 25 includes a rotor 53 as a movable member pivotably supported by the body 28 of the casing 24.

[0035] The rotor 53 is formed from a non-magnetic material so as to integrally have a circular plate-shaped portion 53a, a collar portion 53b protruding radially outward from the open end of the plate-shaped portion 53a, a link arm portion 53c extending outward from one location in the peripheral direction of the collar portion 53b, and an engagement projection portion 53d projecting toward the same side as the plate-shaped portion 53a from the outer end of the link arm portion 53c.

[0036] In FIG. 6, provided in the body 28 of the casing 24 are a fitting recess 54, a circular fitting hole 55, and an elongated hole 56, the fitting recess 54 having the collar portion 53b and the link arm portion 53c of the rotor 53 pivotably fitted thereinto, the fitting hole 55 having the plate-shaped portion 53a of the rotor 53 pivotably fitted thereinto while having its outer end opening in the fitting recess 54 and having its inner end opening on a side face, on the side opposite to the shutter plate 26, of the slide support hole 38, and the elongated hole 56 having its outer end opening in the fitting recess 54 so that the engagement projection portion 53d is inserted thereinto and having its inner end opening on a side face, on the side opposite to the shutter plate 26, of the slide support hole 38. The elongated hole 56 is formed into an arc shape with the pivot axis of the rotor 53 as a center so as to allow pivoting of the rotor 53 within the fitting recess 54 and the fitting hole 55.

[0037] The fitting recess 54 is closed by a lid member 57 that integrally has a supporting projecting portion 57a fitted into the plate-shaped portion 53a of the rotor 53

and supporting pivoting of the rotor 53, and that is secured to the body 28 by three screw members 58, an O ring 59 being disposed between a base part of the supporting projecting portion 57a and the rotor 53.

[0038] A plurality of, for example three, pins 60, which are magnets, are slidably fitted to the extremity of the supporting projecting portion 57a so as to be capable of moving between a position in which they engage with three of four latching recesses 62 provided in a blocked end inner face of the plate-shaped portion 53a of the rotor 53 and a position in which engagement is released, each pin 60 being resiliently urged toward the side on which it engages with the rotor 53 by third coil springs 61 individually corresponding thereto.

[0039] The three pins 60 are fitted into the latching recesses 62 so as to be disposed at positions corresponding to the three magnets 20 of the magnet key 16 when the magnet key 16 opposes a blocked end outer face of the plate-shaped portion 53a of the rotor 53. Moreover, the pins 60 are disposed so that the same pole as the pole of the magnet lock 25 side of the magnet 20 of the magnet key 16 is disposed on the inner end side of the latching recess 62, and when a legitimate magnet key 16 is disposed at a position opposing the blocked end outer face of the plate-shaped portion 53a of the rotor 53 the pin 60 can move to the side that releases engagement with the rotor 53 against the resilient urging force of the third coil spring 61, thereby allowing pivoting of the rotor 53.

[0040] Referring in addition to FIG. 7, a slide member 64 is slidably housed in the slide support hole 38 of the body 28 of the casing 24, the slide member 64 moving together with the magnet key 16 in response to the magnet key 16 being inserted into the casing 24.

[0041] This slide member 64 is formed so as to integrally have a first side wall portion 64a that is in sliding contact with a side face, on the shutter plate 26 side, of the slide support hole 38, a second side wall portion 64b opposing the first side wall portion 64a so as to be in sliding contact with a side face, on the side opposite to the shutter plate 26, of the slide support hole 38, a first linking wall portion 64c linking the first and second side wall portions 64a and 64b on one end side in the longitudinal direction of the cross-sectional shape of the slide support hole 38, a second linking wall portion 64d, corresponding to the first linking wall portion 64c, linking the first and second side wall portions 64a and 64b on the other end side in the longitudinal direction of the cross-sectional shape of the slide support hole 38, and an end wall portion 64e linking the first side wall portion 64a, the second side wall 64b, the first linking wall portion 64c, and the second linking wall portion 64d on an inner end side of the slide support hole 38. Formed in the slide member 64 is a bottomed magnet key insertion hole 65 having a substantially rectangular cross-sectional shape, the magnet key 16 that opens the lid member 40 and is inserted together with the portable case 15 via the insertion hole 39 of the cover member 29 being inserted into the magnet key insertion hole 65.

[0042] The extremity of the portable case 15, which is inserted into the magnet key insertion hole 65 together with the magnet key 16, abuts against the end wall portion 64e, and pushing in the magnet key 16 together with the portable case 15 makes the slide member 64 slide within the slide support hole 38. Moreover, a fourth coil spring 66 is provided in a compressed state between each of the first and second linking wall portions 64c and 64d of the slide member 64 and the blocked end of the slide support hole 38, and the slide member 64 is spring-biased to the side on which it approaches the cover member 29.

[0043] A window 67 is formed in the second side wall portion 64b of the slide member 64 in a long elliptical shape along the extending direction of the slide support hole 38, the magnet key 16 inserted into the magnet key insertion hole 65 facing the magnet lock 25 side via the window 67. The slide member 64 moves together with the magnet key 16 in response to insertion of the magnet key 16 so as to make the magnet key 16 oppose the blocked end outer face of the rotor 53 of the magnet lock 25, thus not only enabling the magnet key 16 to be inserted into an unlocked position in which the magnet lock 25 is unlocked but also enabling the magnet key 16 to be pushed in from the unlocked position to thus move to a pushed-in position.

[0044] In FIG. 8, provided between the slide member 64 and the restricting member 50 is restriction release means 67 that moves the restricting member 50 to the restriction release position in response to the magnet key 16 being pushed in to the pushed-in position together with the slide member 64 in a state in which the magnet lock 25 is unlocked and pivoting of the rotor 53 is enabled.

[0045] The restriction release means 67 includes a movable engagement member 68 that is retained on the slide member 64 while being engaged with the engagement projection portion 53d of the rotor 53 so that its movement is restricted by the rotor 53 in a state in which the magnet lock 25 is in a locked state, and a fifth coil spring 69 as a spring member provided between the slide member 64 and the movable engagement member 68 so as to exert a resilient force that pushes the movable engagement member 68 to the side that pivots the rotor 53 in response to the slide member 64 moving to the pushed-in position side.

[0046] The movable engagement member 68 is formed so as to integrally have a movable engagement member main portion 68a that has a substantially C-shaped form opening on the link arm portion 53c side of the rotor 53 while having a latching groove 70 with which the engagement projection portion 53d engages, and an engagement projection portion 68b that projects from the movable engagement member main portion 68a so as to engage the latching portion 50c of the restricting member 50 from the abutment portion 50a side. A circular receiving recess 72 is formed in the movable engagement member main portion 68a, the receiving recess 72

receiving an end part, on the movable engagement member 68 side, of the fifth coil spring 69. On the other hand, provided in the second linking wall portion 64d of the slide member 64 is a housing hole 71 into which the latching portion 50c of the restricting member 50 and the engagement projection portion 53d of the rotor 53 project from opposite sides, the housing hole 71 opening toward a side face, on the shutter plate 26 side, of the slide support hole 38 and a side face, on the side opposite to the shutter plate 26, thereof and being closed at opposite ends in the extending direction of the slide support hole 38. The movable engagement member 68 is housed within the housing hole 71.

[0047] Furthermore, the fifth coil spring 69, which exerts a spring force urging the movable engagement member 68 in the same direction as the pushing-in direction within the slide support hole 38 of the slide member 64, is housed in the housing hole 71 while being provided in a compressed state between the slide member 64 and the movable engagement member 68.

[0048] When inserting and pushing the legitimate magnet key 16 into the slide member 64, the magnet lock 25 is unlocked at the unlocked position to thus allow pivoting of the rotor 53, when further pushing the magnet key 16 and the slide member 64 from the unlocked position together with the portable case 15, the pressing force due to movement of the slide member 64 is transmitted to the link arm portion 53c of the rotor 53 via the fifth coil spring 69 and the movable engagement member 68, as shown in FIG. 9 the movable engagement member 68 moves and the rotor 53 pivots, the restricting member 50 having the movable engagement member 68 engaged therewith is forcibly driven to the restriction release position, and the shutter plate 26 for which restriction by the restricting member 50 has been released is moved to the open position by the urging force of the first coil spring 48.

[0049] In a state in which the shutter plate 26 is at the open position, the extremity of the operating portion 26b of the shutter plate 26 projects into the operating recess 36 of the cover member 29 of the casing 24. Therefore, when pushing in the operating portion 26b of the shutter plate 26 in the open position in a state in which the magnet key 16 is disengaged from the casing 24, the shutter plate 26 returns to the closed position against the spring force of the first coil spring 48, the restricting member 50 returns to the restriction position by virtue of the spring force of the second coil spring 52, and the magnet lock 25 attains a locked state due to the rotor 53 pivoting to the original position.

[0050] The operation of this embodiment is now explained; since the protective device 13, which opens and closes by the shutter plate 26 the mechanical key insertion hole 27 provided in the casing 24 for the mechanical key 14 to be inserted into the cylinder lock 11, includes the first coil spring 48, which urges the shutter plate 26 to the open position side, the restricting member 50, which is disposed on the casing 24 so as to be capable of moving between the restriction position in which the shutter plate 26 is restricted to the closed position and the restriction release position in which movement of the shutter plate 26 from the closed position to the open position is allowed, the slide member 64, which is slidably housed in the casing 24 so as to move together with the magnet key 16 in response to the magnet key 16 being inserted into the casing 24 and enables not only insertion of the magnet key 16 to the unlocked position in which the magnet lock 25 is unlocked but also movement to the pushed-in position by further pushing the magnet key 16 from the unlocked position, and the restriction release means 67, which is provided between the slide member 64 and the restricting member 50 so as to move the restricting member 50 to the restriction release position in response to the magnet key 16 being pushed in to the pushed-in position together with the slide member 64 in a state in which the magnet lock 25 is unlocked to thus enable pivoting of the rotor 53 of the magnet lock 25, it is possible to operate the shutter plate 26 to the open position with a smooth operation merely by pushing the magnet key 16 in one direction when moving the shutter plate 26 from the closed position to the open position.

[0051] Moreover, since the restriction release means 67 includes the movable engagement member 68, which is engaged with the rotor 53 and retained by the slide member 64 while movement is restricted by the rotor 53 when the magnet lock 25 is in the locked state, and the fifth coil spring 69, which is provided between the slide member 64 and the movable engagement member 68 so as to exert a resilient force pushing the movable engagement member 68 to the side on which it pivots the rotor 53 in response to movement of the slide member 64 to the pushed-in position side, and the movable engagement member 68 is engaged with the restricting member 50 so as to move the restricting member 50 from the restriction position to the restriction release position as a result of movement of the movable engagement member 68 to the side on which it pivots the rotor 53, the pressing force acting on the rotor 53 of the magnet lock 25 accompanying the slide member 64 moving together with the magnet key 16 acts from the slide member 64 via the fifth coil spring 69 and the movable engagement member 68, and even if the slide member 64 is pushed by an unauthorized member other than a legitimate magnet key 16, since the pressing force from the slide member 64 is absorbed by the fifth coil spring 69, only the spring load of the fifth coil spring 69 acts on the rotor 53, which is in the non-operated state due to the magnet lock 25 being in the locked state, and an excessive load is not applied to the magnet lock 25.

[0052] An embodiment of the present invention is explained above, but the present invention is not limited to the above embodiment and may be modified in a variety of ways as long as the modifications do not depart from the spirit and scope thereof.

Claims

1. A protective device for a cylinder lock, the protective device comprising a casing (24) having a mechanical key insertion hole (27) for a mechanical key (14) to be inserted into a cylinder lock (11), a shutter plate (26) supported on the casing (24) so as to be capable of moving between a closed position in which the mechanical key insertion hole (27) is closed and an open position in which the mechanical key insertion hole (27) is opened, and a magnet lock (25) disposed in the casing (24) while having a movable member (53) capable of operating accompanying unlocking by a magnet key (16), the shutter plate (26) being capable of moving to the open position when the magnet lock (25) is unlocked, **characterized in that** the device comprises an urging member (48) urging the shutter plate (26) to the open position side, a restricting member (50) disposed in the casing (24) so as to be capable of moving between a restriction position in which the shutter plate (26) is restricted to the closed position and a restriction release position in which movement of the shutter plate (26) from the closed position to the open position is allowed, a slide member (64) that is slidably housed in the casing (24) so as to move together with the magnet key (16) in response to the magnet key (16) being inserted into the casing (24) and that not only enables an insertion operation of the magnet key (16) to an unlocked position in which the magnet lock (25) is unlocked but can also be moved from the unlocked position to a pushed-in position by further pushing in the magnet key (16), and restriction release means (67) that is provided between the slide member (64) and the restricting member (50) so as to move the restricting member (50) to the restriction release position in response to the magnet key (16) being pushed in to the pushed-in position together with the slide member (64) in a state in which the magnet lock (25) is unlocked so that the movable member (53) can be operated.

2. The protective device for a cylinder lock according to Claim 1, wherein the restriction release means (67) comprises a movable engagement member (68) that is engaged with the movable member (53) and is retained by the slide member (64) while movement is restricted by the movable member (53) in a locked state of the magnet lock (25), and a spring member (69) provided between the slide member (64) and the movable engagement member (68) so as to exert a resilient force for pushing the movable engagement member (68) toward a side on which the movable engagement member (68) drives the movable member (53) in response to movement of the slide member (64) to the pushed-in position side, and the movable engagement member (68) is engaged with the restricting member (50) so as to move the restricting member (50) from the restriction position to the restriction release position by movement of the movable engagement member (68) to the side on which the movable engagement member (68) drives the movable member (53).

FIG.1

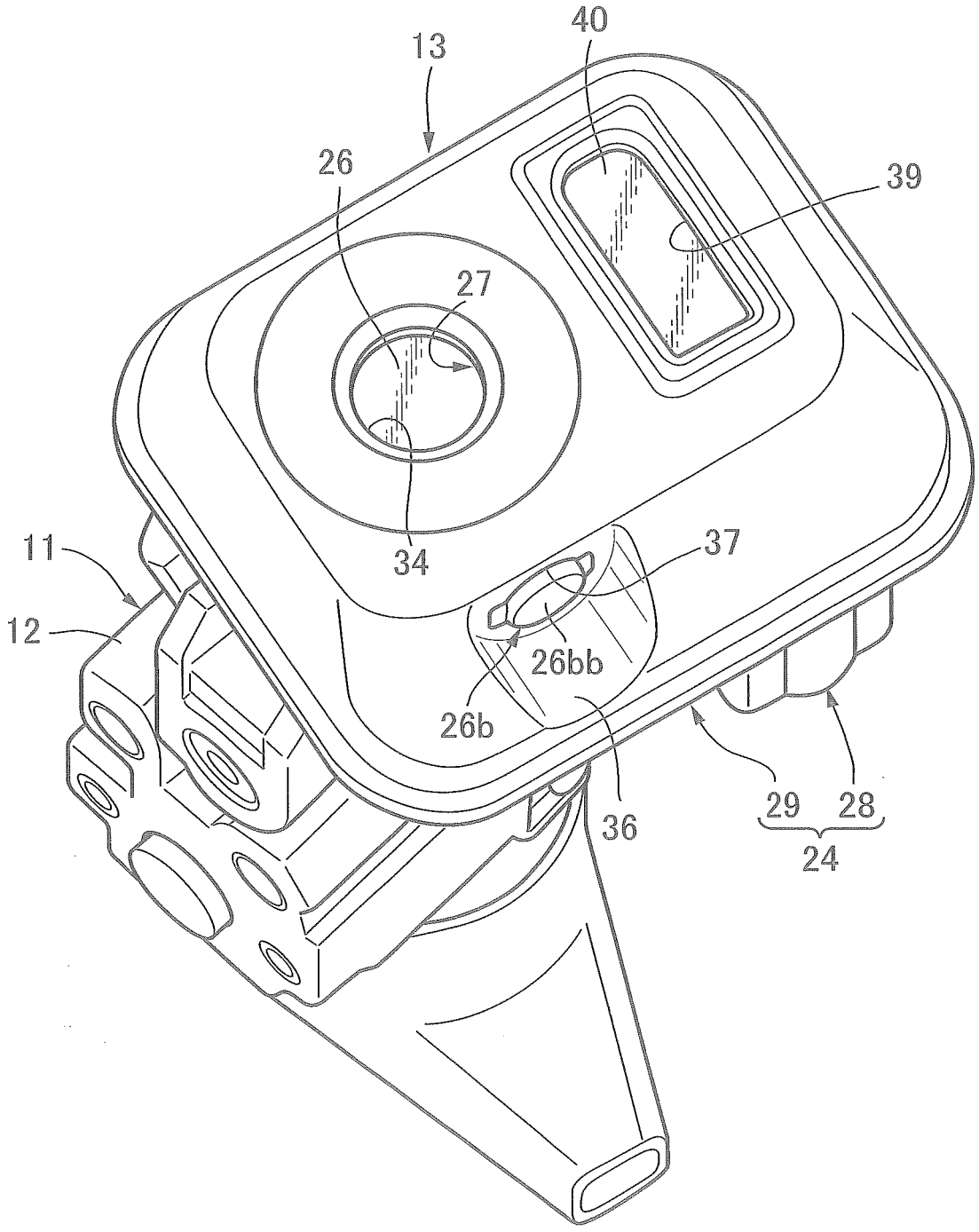

FIG.2

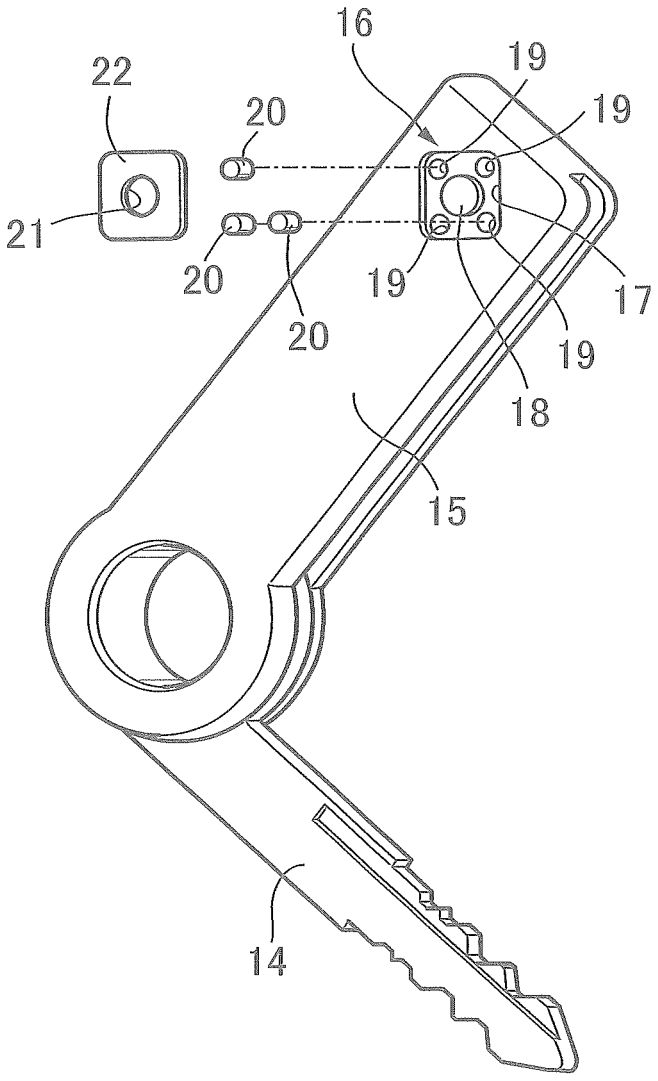

FIG.3

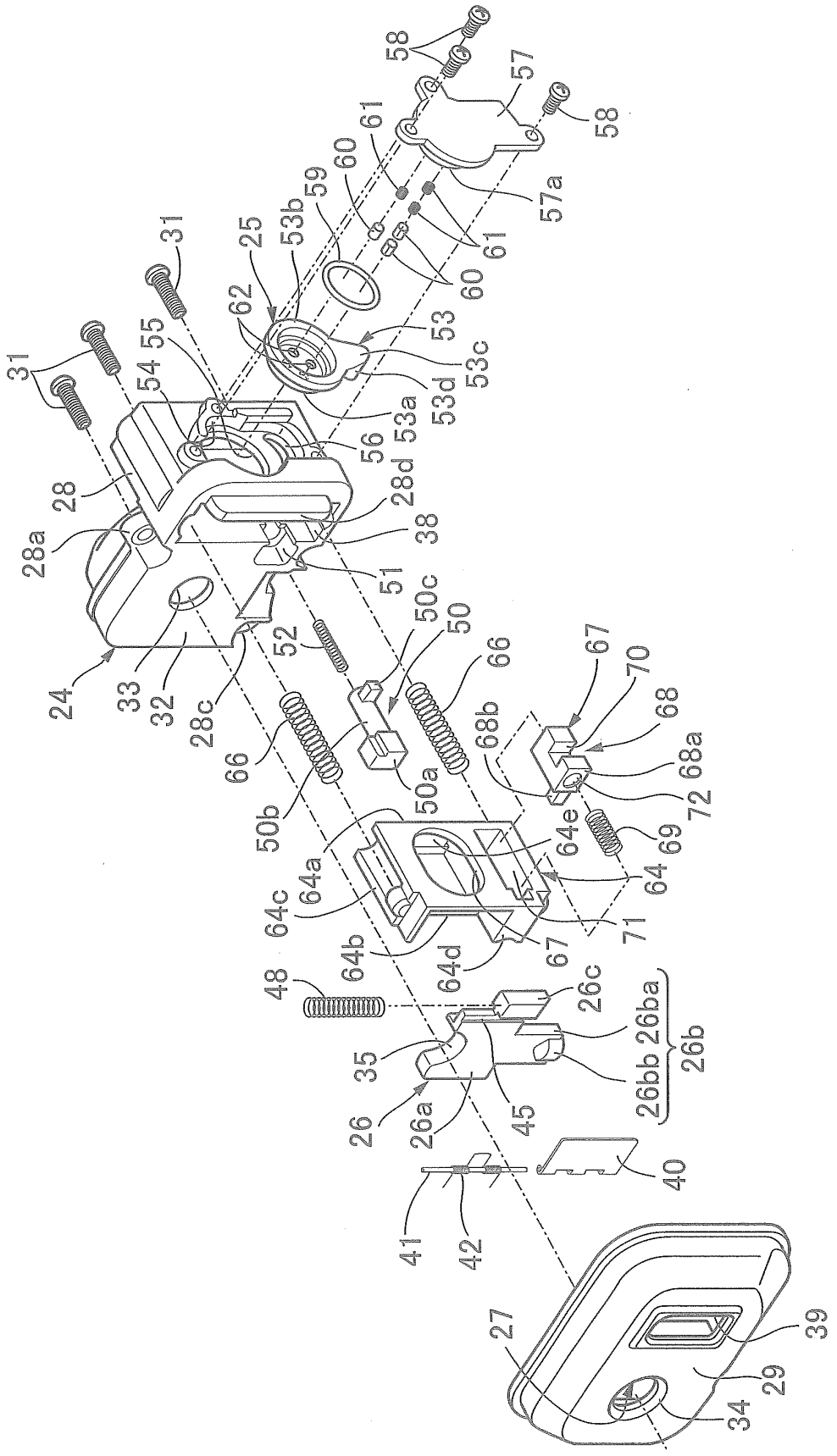
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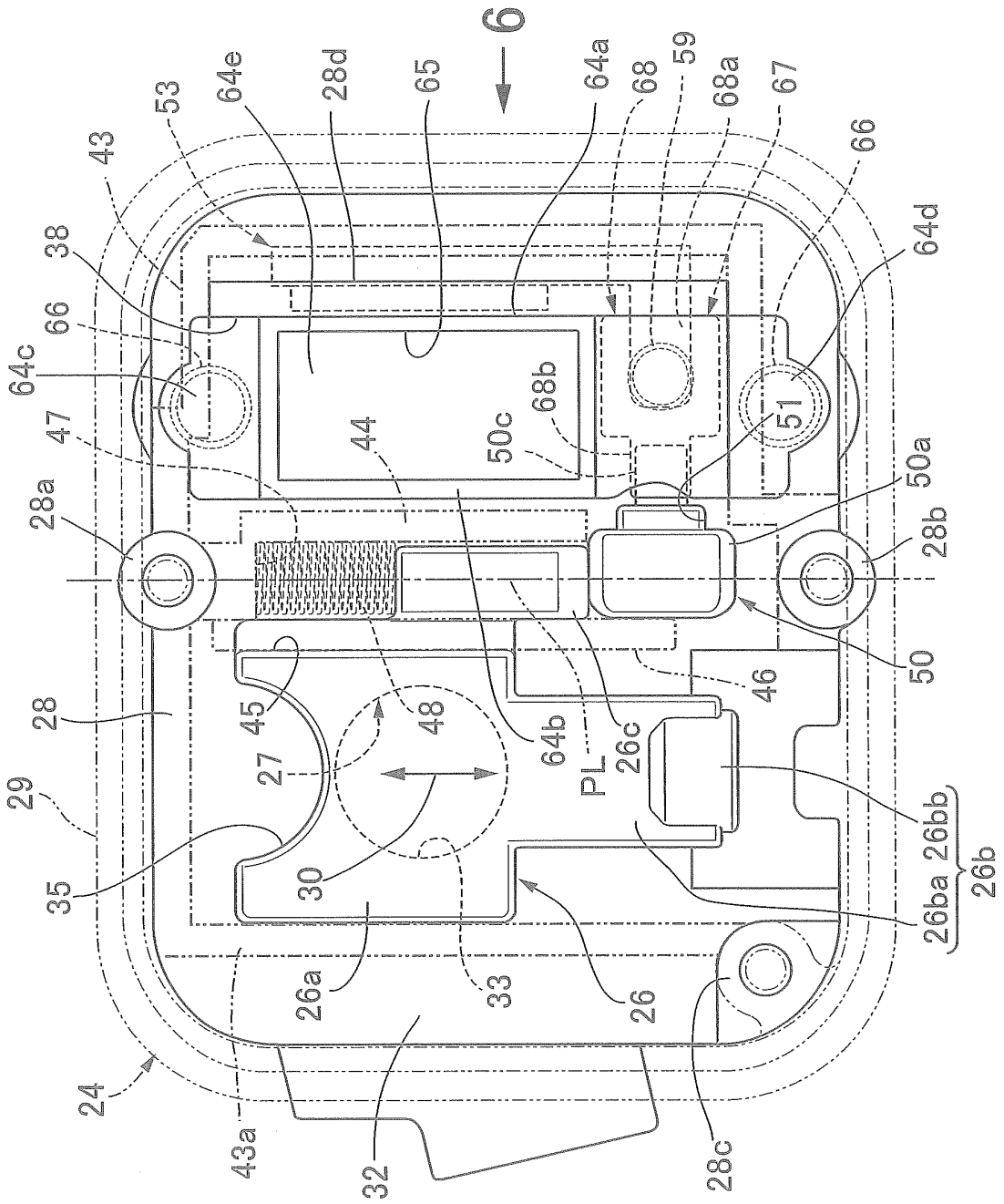
FIG.4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50c
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28a
28b
50
46
28
45
48
64b
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26a
33
26
24
43a
32
28c

FIG.5

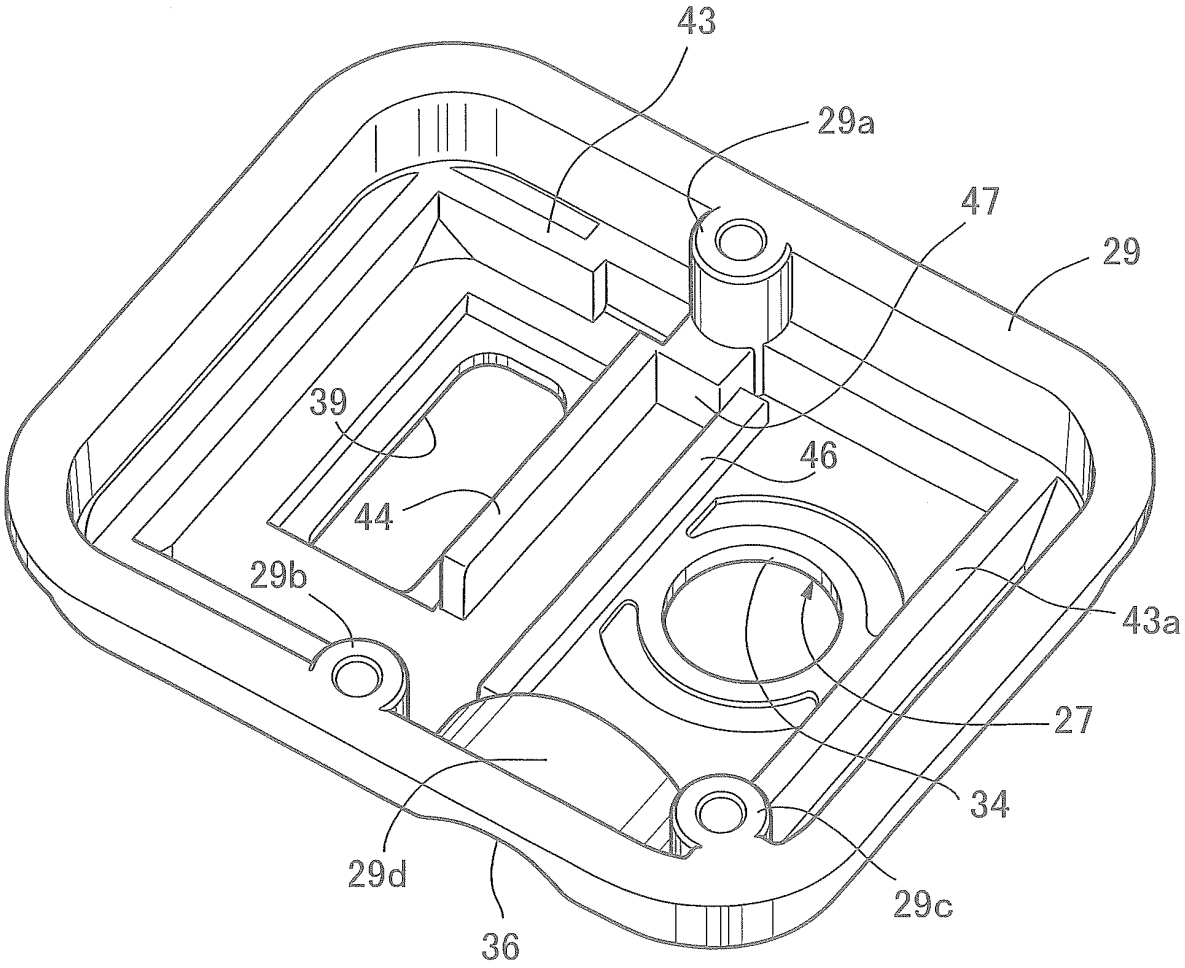

FIG.6

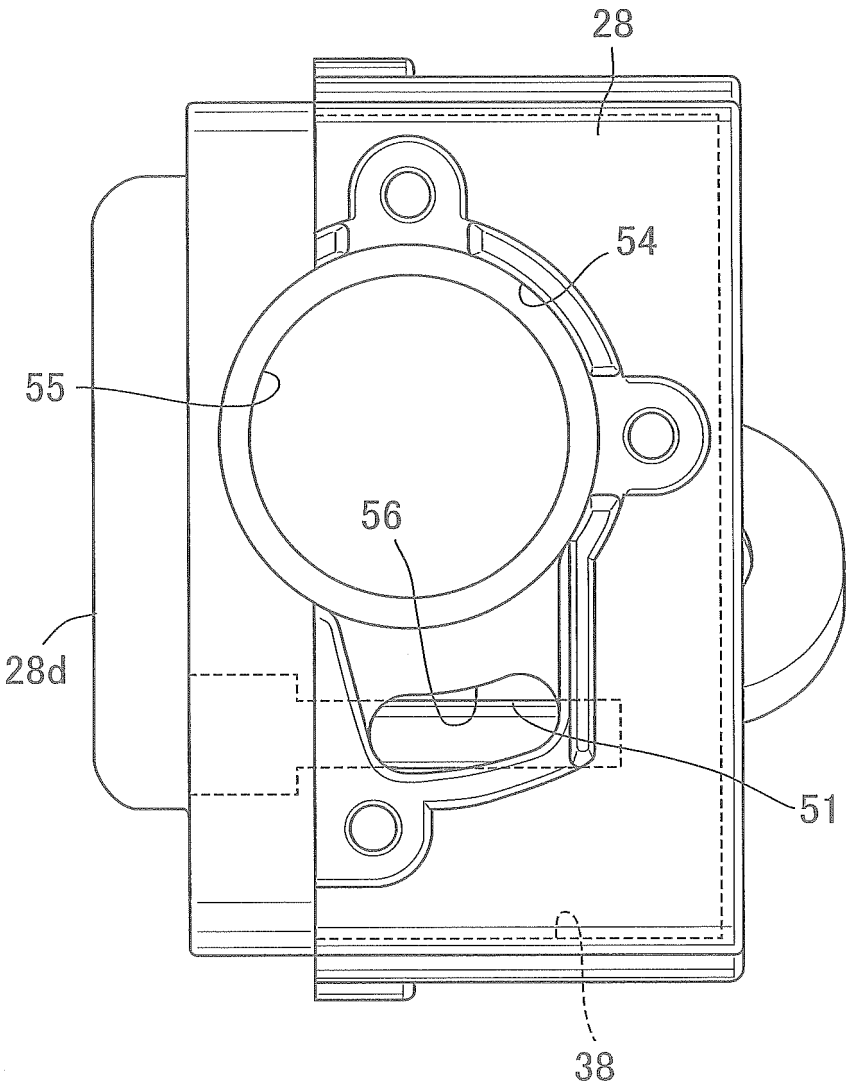

FIG.7

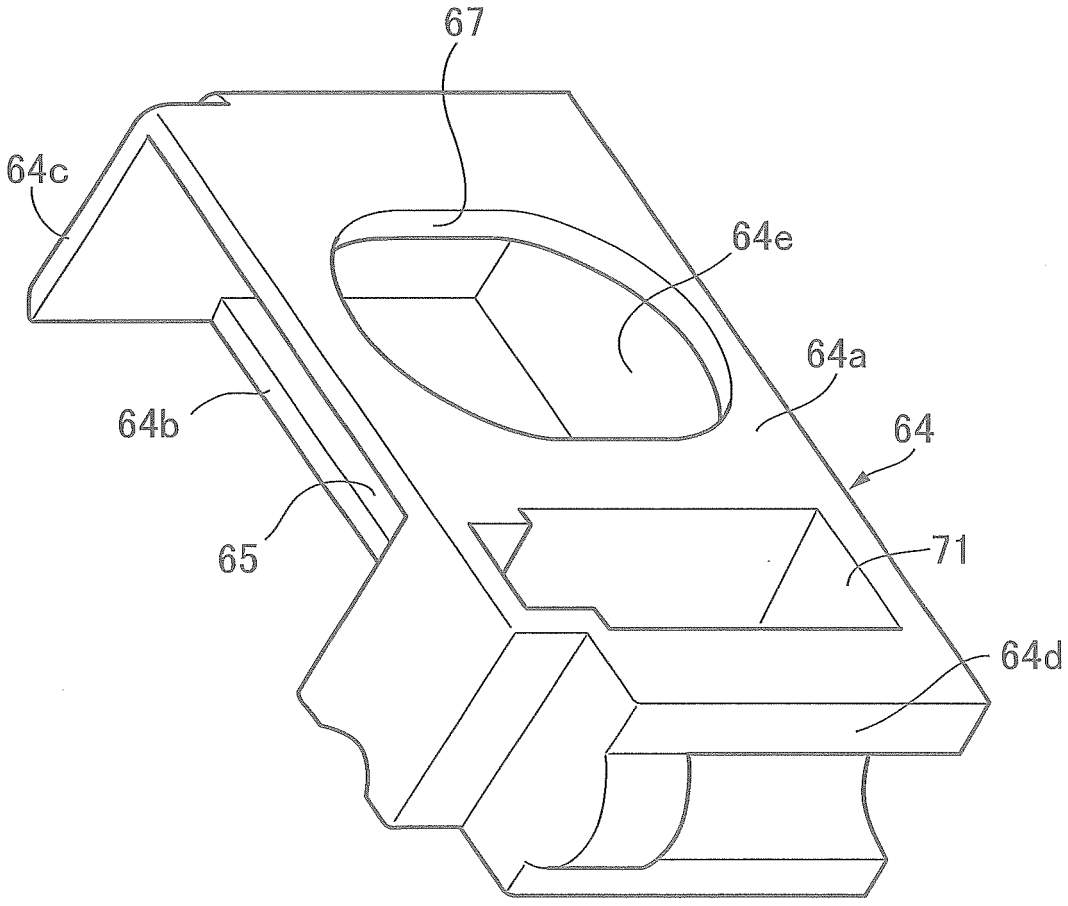

FIG.8

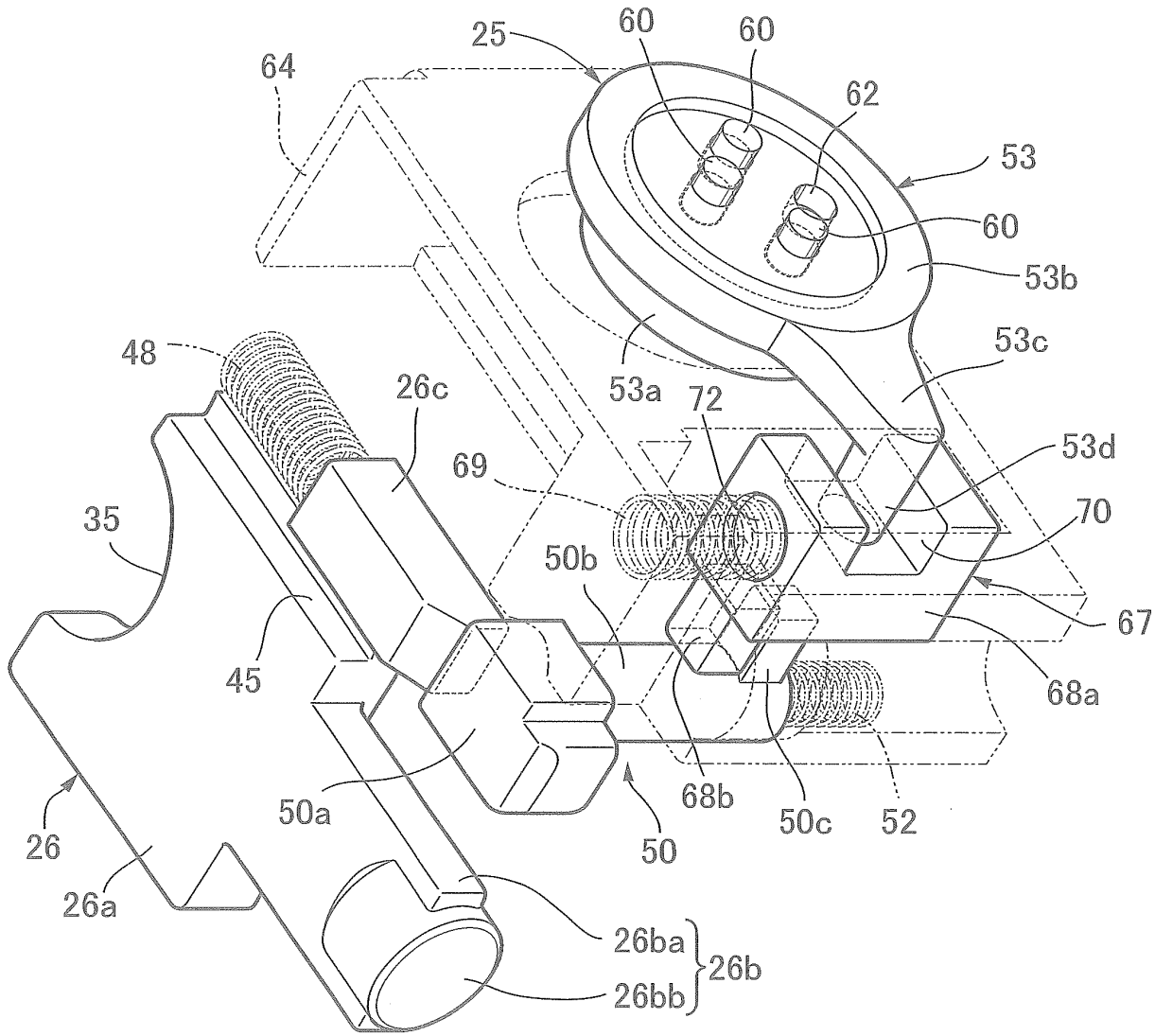
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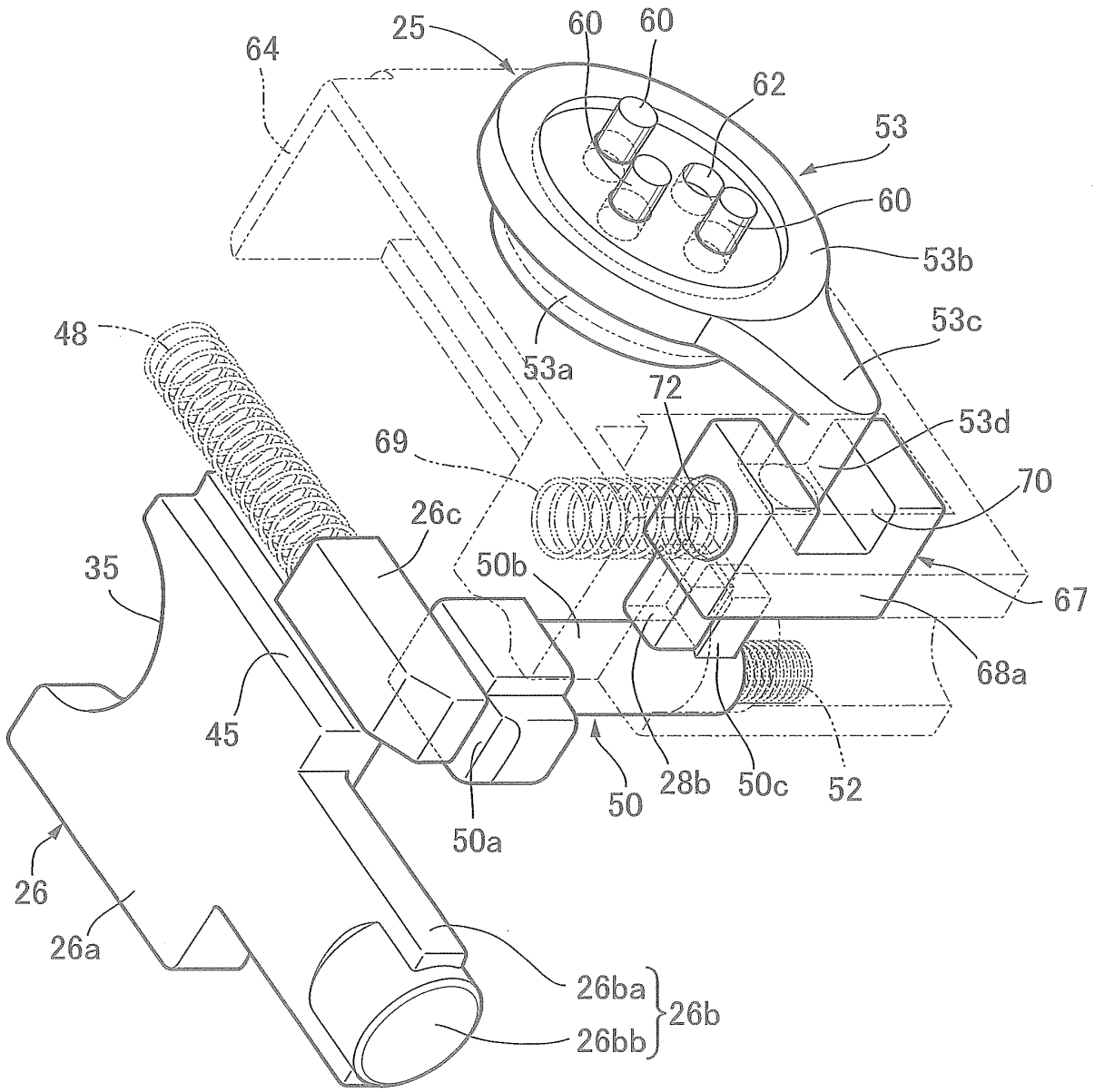
FIG.9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26ba
26b
26bb

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/065719

A. CLASSIFICATION OF SUBJECT MATTER
E05B17/18(2006.01)i, *E05B47/00*(2006.01)i, *E05B83/00*(2014.01)i, *E05B19/00*(2006.01)n

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B17/18, E05B47/00, E05B83/00, E05B19/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014
Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2011-032816 A (Honda Lock Mfg. Co., Ltd.), 17 February 2011 (17.02.2011), paragraphs [0012] to [0037]; fig. 1 to 9 & WO 2011/016294 A1 & TW 201116693 A & CN 102472054 A	1-2
A	JP 2012-188810 A (Asahi Denso Co., Ltd.), 04 October 2012 (04.10.2012), paragraphs [0019] to [0045]; fig. 1 to 11 (Family: none)	1-2
A	JP 2010-196283 A (Honda Lock Mfg. Co., Ltd.), 09 September 2010 (09.09.2010), paragraphs [0014] to [0040]; fig. 1 to 6, 10 to 18 & TW 201043767 A	1-2

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 August, 2014 (26.08.14)	09 September, 2014 (09.09.14)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

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Patent documents cited in the description

- JP 3914043 B **[0003]**