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(54) **Antivibration assembly for electric lock**

(57) An antivibration assembly for electric lock, comprising a casing (2) provided with guiding means for a translational motion of a ferromagnetic core (4) that is controlled by an electromagnet (3) and is associated with mechanical closure and opening elements (7); in-

direct contact means being interposed between the core (4) and the casing (2) and being adapted to dampen impulsive translational motions of the core (4) within the casing (2) generated by break-in percussive actions against the casing (2).

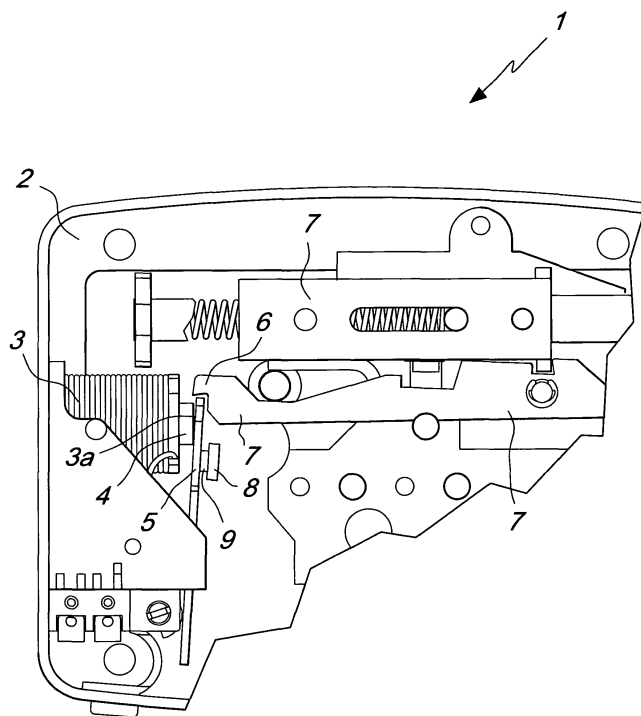


Fig. 1

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Description

[0001] The present invention relates to an antivibration assembly for electric lock.

[0002] There exist electric locks of the type provided with a latch that can slide parallel to itself and is suitable to engage in a recess provided in a fixed wall or in a support rigidly coupled thereto, and electric locks provided with a pawl-type engagement system that is suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall. The second type of electric lock is disclosed in Italian Patent Application BO2001A000033 in the name of CISA S.p.A.

[0003] In any case, electric locks, including electric selvages, are all characterized by the presence of an outer casing, which contains an opening and closure mechanism connected to a ferromagnetic core controlled by an electromagnet powered by the opening enabling circuit. When the button for opening the electric lock (which can be installed in any point electrically connected to said lock) is operated, the electromagnet receives power and acts on the ferromagnetic core, moving it along its own axis; this translational motion is also transferred to the element of the opening mechanism that is rigidly coupled to the core and entails the release of the leaf on which the lock is fitted, allowing to open it.

[0004] The core can thus move with a certain predefined stroke within a guiding path traced by the electromagnet and delimited by the outer casing.

[0005] The ability of the core to move is such that as a consequence of impacts on the leaf and on the outer casing that produce vibrations of the entire lock, the uncontrolled release of the lock may occur, with the consequent possibility to open the leaf.

[0006] The aim of the present invention is to obviate the above-cited drawbacks and to meet the mentioned requirements, by providing an antivibration unit for electric lock that is capable of damping the vibrations of the core, preventing the lock from tripping into the open position as a consequence of an impact on the casing.

[0007] Within this aim, an object of the present invention is to provide an antivibration assembly that is simple, relatively easy to provide in practice, safe in use, effective in operation, and has a relatively low cost.

[0008] This aim and this and other objects that will become better apparent hereinafter are achieved by the present antivibration assembly for electric lock, which comprises a casing that is provided with guiding means for a translational motion of a ferromagnetic core that is controlled by an electromagnet and is associated with mechanical closure and opening elements, characterized in that indirect contact means are interposed between said core and said casing and are suitable to dampen impulsive translational motions of said core within said casing generated by break-in percussive actions against said casing.

[0009] Further characteristics and advantages of the present invention will become better apparent from the

following detailed description of a preferred but not exclusive embodiment of an antivibration assembly for electric lock, according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a truncated sectional plan view of a conventional electric lock provided with a variation of the antivibration assembly according to the invention;

Figure 2 is a partially sectional plan view of an electric lock with a pawl-type engagement system, suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall, provided with a variation of the antivibration assembly according to the invention;

Figure 3 is a partially sectional and truncated plan view of an electric lock with a pawl-type engagement system, suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall, provided with a variation of the antivibration assembly according to the invention;

Figure 4 is a partially sectional and truncated plan view of an electric lock with a pawl-type engagement system, suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall, provided with a variation of the antivibration assembly according to the invention;

Figure 5 is a sectional plan view of an electric lock with a pawl-type engagement system, suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall, provided with a variation of the antivibration assembly according to the invention;

Figure 6 is a partially sectional plan view of the core of the electric lock of Figure 5;

Figure 7 is a partially sectional side view of the core of the electric lock of Figure 5.

[0010] With reference to the figures, the reference numeral 1 generally designates an electric lock of the conventional type, constituted by an outer casing 2, which is rigidly coupled to the leaf, and by a plurality of elements that are internal to said casing. The electromagnet 3, constituted by an electric winding powered by the opening enabling circuit, not shown in the figure, accommodates the core 4 so that it can slide inside it.

[0011] The action applied by the electromagnet 3 to the core 4 is to move it parallel to itself along its own axis; during these translational motions, the core 4 acts on the keeper 5, which is designed to engage an end tooth 6 that belongs to mechanical closure and opening elements 7.

[0012] The stroke of the keeper 5 is comprised between the adjacent surface of the electromagnet 3a and a fixed abutment 8, which is rigidly coupled to the casing 2. A pad 9 is fixed to the fixed abutment 8 (or, as an alternative, on the portion of the keeper 5 that faces the

abutment 8) and is made of a material such as rubber or comprises elastic means (for example a spring) interposed between its surfaces in contact with the abutment 8 and with the keeper 5; said pad is designed to dampen the vibrations produced by uncontrolled translational motions of the core 4, caused for example by percussions for break-in purposes applied to the casing 2. In this case, the core 4 in fact begins to vibrate and, if the frequency of the successive blows on the casing 2 is in step with one of the vibrating motions of the core 4, the core may perform translational motions that may even open the lock 1. The pad 9 prevents the lock 1 from opening in such a situation, damping the vibrations of the keeper 5 and therefore disengaging the core 4 and the mechanical closure and opening elements 7 when the core is not actuated by the electromagnet 3.

[0013] In the case of an electric lock with a pawl-type engagement system suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall, the lock 10 is constituted by a casing 11 rigidly coupled to the leaf suitable to mate with a pin-equipped selvage, not shown in the figure. The electromagnet 12, suitable to produce the translational motion of the core 13 following the opening command (electrical signal), is arranged on the upper or lower face (depending on the type of installation).

[0014] The core 13 supports, on its end that lies furthest from the element 14 for anchoring to the pin-equipped selvage (not shown in the figure), a bottom 15 that faces a fixed abutment 16, which is rigidly coupled to the casing 11. The bottom 15 accommodates the shaft 17 for connection to the mechanical opening and closure elements.

[0015] In a first embodiment shown in Figure 2, the bottom 15 is made of a material such as rubber in order to dampen the vibrations of the core 13 that follow break-in percussions applied to the casing 11 of the lock 10. The same result can be achieved with solutions, not shown in the figure, that provide the abutment 16 by using damping material or any material and by interposing a pad made of a material such as rubber between the bottom 15 and the fixed abutment 16, fixed equally on one component or the other. Another solution may use a spring-loaded abutment instead of the abutment 16.

[0016] A still further solution, according to what is described in Figure 3, consists in providing the bottom 15a with an inclined end surface 20 that tapers toward the fixed abutment 16a, which has a corresponding facing surface 21 that is also equally inclined.

[0017] Impulsive translational motions of the core 13 lead to the impact of the bottom 15a against the abutment 16a: more specifically, the two surfaces 20 and 21 mate, so that translational motions that exceed the translational motion that produces simple contact between the two surfaces are matched by a downward deflection of the path of the core 13 until it stops by friction. This prevents the translational motion of the core 13 from reaching values that induce the opening of the lock

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[0018] The solution described in Figure 4 consists in providing, on the outer casing 11, an inclined slot 30, in which a pin 31, rigidly coupled to the core not shown in the figure, is movably coupled.

[0019] The impulsive translational motions of the core are prevented by the guiding slot 30; the pin 31 in fact cannot perform a translational motion freely, and the core with it, but it can move only along the path allowed to it by the guiding slot 30.

[0020] In the solution of Figure 5, the ferromagnetic core 13a is hollow and its cavity 32 is coaxial to the core. The core 13a can slide within the appropriately provided seat 33 arranged inside the electromagnet 12: a conical element 34a protrudes on the bottom of the seat 33 toward the core and is suitable to mate with the conical cavity 34b provided on the head of the core 13a.

[0021] A helical spring 35 with axial action is accommodated inside the cavity 32: said spring rests, with a first end 35a, on the bottom of the cavity 32, while the opposite end rests on the surface of a bottom 37 that is designed to block the spring inside the cavity 32.

[0022] The bottom 37 has, at the end that lies opposite the end on which the spring 35 rests, a slot 38, which is open at one end. A retention element 36, constituted by a transverse pin accommodated in a transverse through hole (not shown in the figure) provided in the ferromagnetic core 13, is designed to prevent the sliding of the bottom 37 inside the cavity 33 until it exits from said cavity. The end of the bottom 37 that lies opposite the end that is in contact with the spring 35 rests against the surface 40 of the electric lock, with a pawl-type engagement system: the surface 40 can be made of any material.

[0023] A second helical spring 39 is arranged externally to the core 13a between the retention element 36 and the electromagnet 12, with an action that contrasts the action of the spring 35.

[0024] The synergistic effect of the two springs 35 and 39 is to contrast the translational motions of the core 13a that might cause accidental opening of the lock.

[0025] It has thus been shown that the invention achieves the intended aim and object.

[0026] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0027] It is possible to combine at least two of the various described embodiments in order to provide hybrid solutions, which are in any case suitable to be installed both in conventional electric locks and in electric locks with a pawl-type engagement system, which is suitable to fasten a cylindrical pin supported by a selvage that is rigidly coupled to the fixed wall, for example of the type disclosed in Italian Patent Application BO2001A000033.

[0028] All the details may further be replaced with other technically equivalent ones.

[0029] In the embodiments cited above, individual characteristics, given in relation to specific examples,

may actually be interchanged with other different characteristics that exist in other embodiments.

[0030] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0031] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the protective scope of the appended claims.

[0032] The disclosures in Italian Patent Application No. BO2003A000669 from which this application claims priority are incorporated herein by reference.

[0033] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An antivibration assembly for electric lock, comprising a casing (2) that is provided with guiding means for a translational motion of a ferromagnetic core (4) that is controlled by an electromagnet (3) and is associated with mechanical closure and opening elements (7), **characterized in that** indirect contact means are interposed between said core (4) and said casing (2) and are adapted to dampen impulsive translational motions of said core (4) within said casing (2) generated by break-in percussive actions against said casing (2).
2. The assembly according to claim 1, **characterized in that** said indirect contact means are constituted by a pad made of a material such as rubber (9), which is interposed between a fixed abutment (8), which is rigidly coupled to said casing (2), and a bottom for connecting said core (4) to said mechanical opening and closure elements (7), which is mounted on the rear end of said core (4) and is directed toward, and proximate to, said fixed abutment (8).
3. The assembly according to claim 1, **characterized in that** said indirect contact means are constituted by a pad (9), which comprises elastic means and is interposed between a fixed abutment (8), which is rigidly coupled to said casing (2), and a bottom for connecting said core (4) to said mechanical opening and closure elements (7), which is mounted on the rear end of said core (4) and is directed toward, and proximate to, said fixed abutment (8).
4. The assembly according to claim 1, **characterized in that** said indirect contact means comprise the ferromagnetic core (4), which is provided with a longitudinal blind internal cavity (33), a spring (35) that acts axially within said cavity (33) and is coaxial thereto, a closure bottom (37) that can slide within said cavity (33), and a transverse retention element (36), and **in that** said spring (35) rests with one of its ends on the bottom of said cavity (33) and with its other end on the surface of said bottom (37), which is retained inside said cavity (33) by means of a transverse retention element (36).
5. The assembly according to claim 1, **characterized in that** said indirect contact means are constituted by a bottom (15a) for connecting said core (4) to said mechanical opening and closure elements (7), which is mounted on the rear end of said core (4) and is directed toward, and proximate to, said fixed abutment (8), which is rigidly coupled to said casing (2), and is made of a material such as rubber.
6. The assembly according to claim 1, **characterized in that** said indirect contact means comprise a bottom (15a) for connecting said core (4) to said mechanical opening and closure elements (7), which is mounted on the rear end of said core (4) and is directed toward, and proximate to, said fixed abutment (8), and a corresponding surface of a fixed abutment (16a), which is rigidly coupled to said casing (2), which have respective inclined facing surfaces (21), the translational motion of the core (4) produced by a percussion on said casing (2) causing a retracting translational motion of said bottom (15a) until contact occurs with the inclined surface of the fixed abutment (21), which diverts its path downward, halting it.
7. The assembly according to claim 1, **characterized in that** said indirect contact means are constituted by a pin (31), which protrudes laterally from said core (4) and is guided within an inclined slot (30) provided on said casing (2), the translational motion of the core (4) produced by a percussion on said casing (2) causing a retracting translational motion of said pin (31) prevented by the guiding slot (30), within which said pin (31) is movably retained.
8. The assembly according to claim 2, **characterized in that** said pad (9) made of a material such as rubber is rigidly coupled to the surface of said fixed abutment (8).
9. The assembly according to claim 2 and as an alternative to claim 8, **characterized in that** said pad (9) made of a material such as rubber is rigidly coupled to the surface of said bottom.
10. The assembly according to claim 4, **characterized in that** said bottom has at least one appropriately

provided slot for the axial sliding of said retention element (17), and **in that** said bottom (15a) is suitable to oscillate between two extreme positions, one in which the retention element (17) rests on the end portion of said slot and the other in which the spring is compressed and the outer surface of the bottom (15a) is co-planar with respect to the boundary surface of the core.

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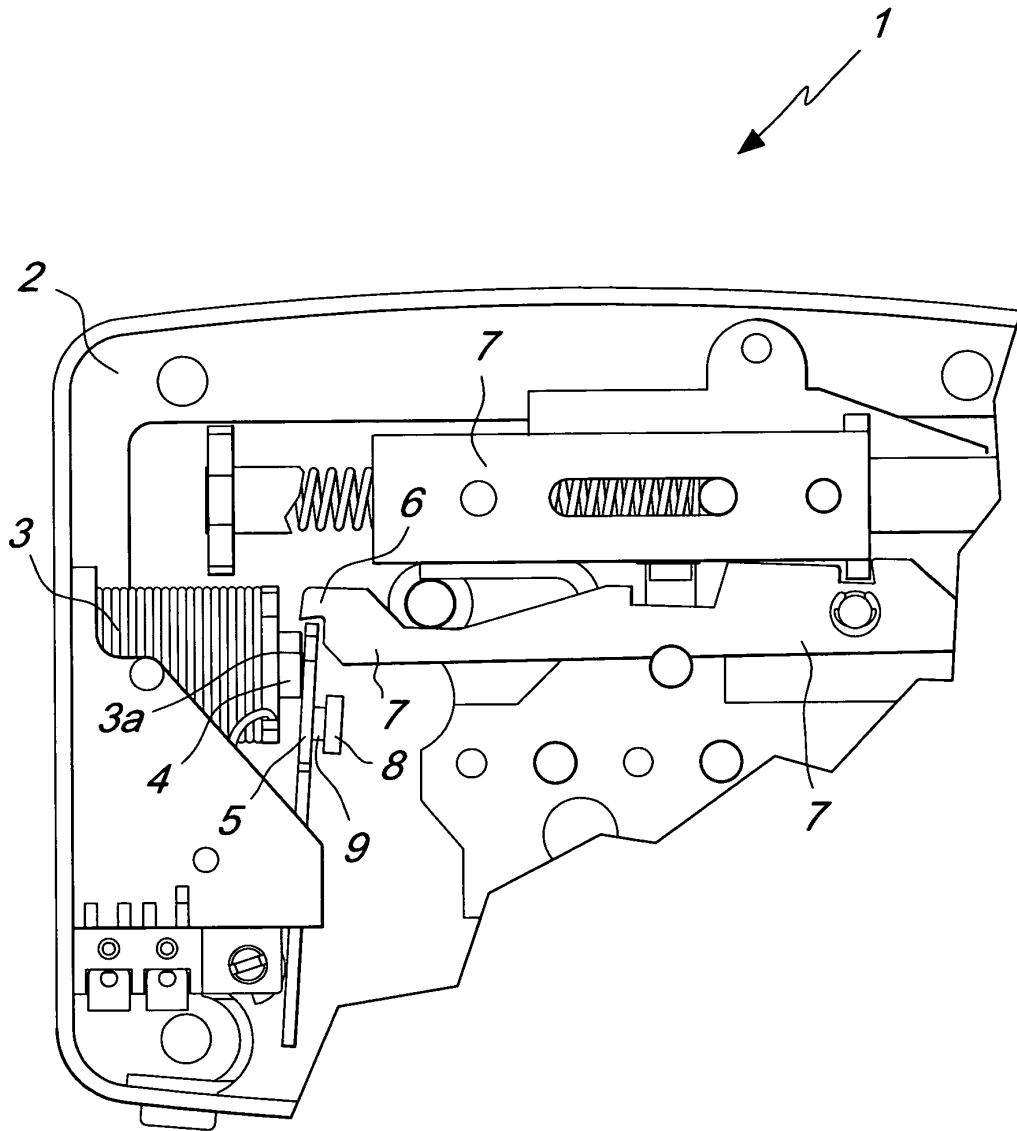


Fig. 1

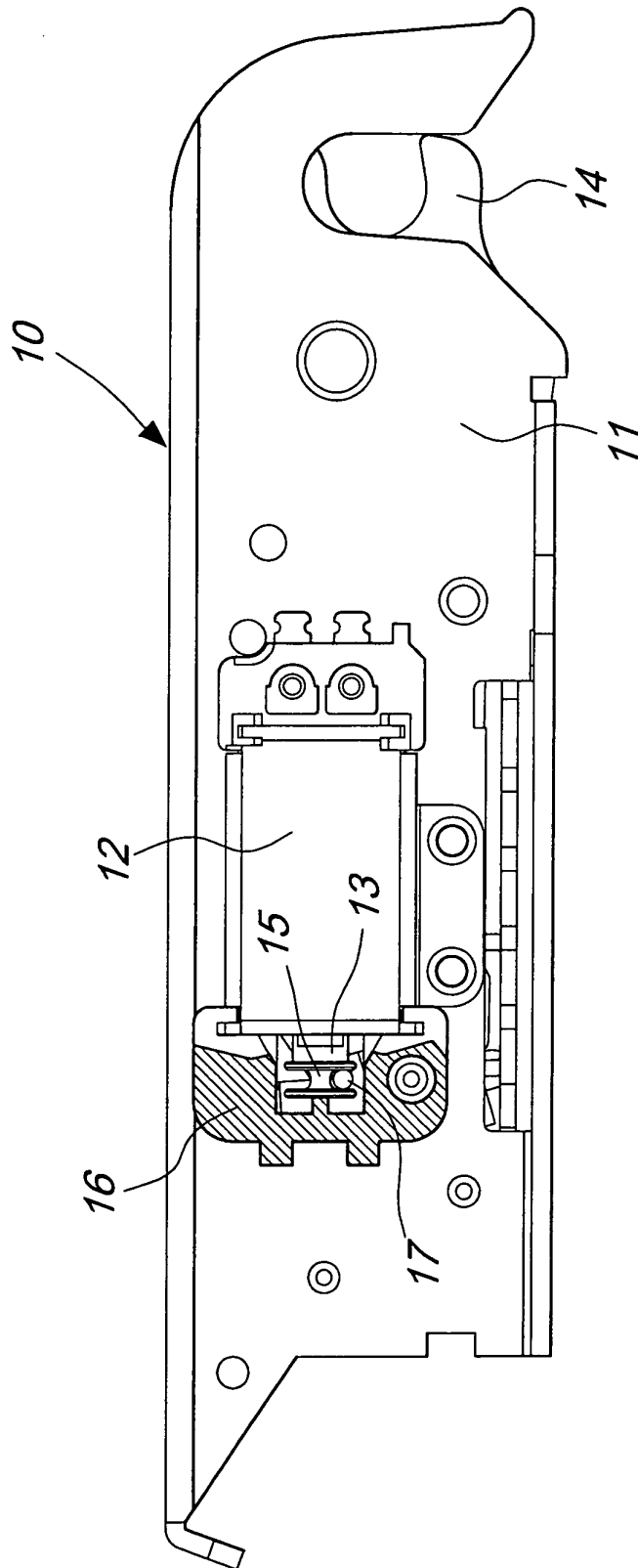


Fig. 2

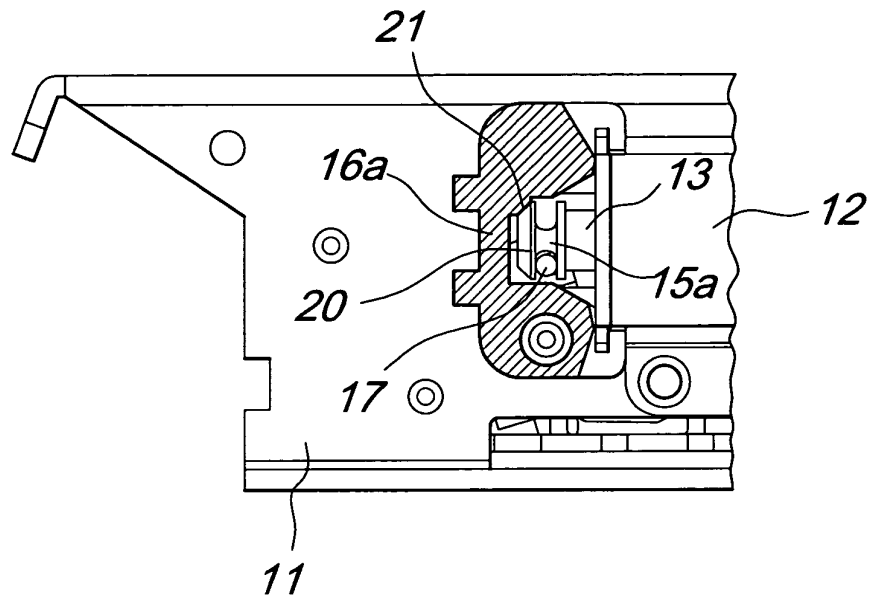


Fig. 3

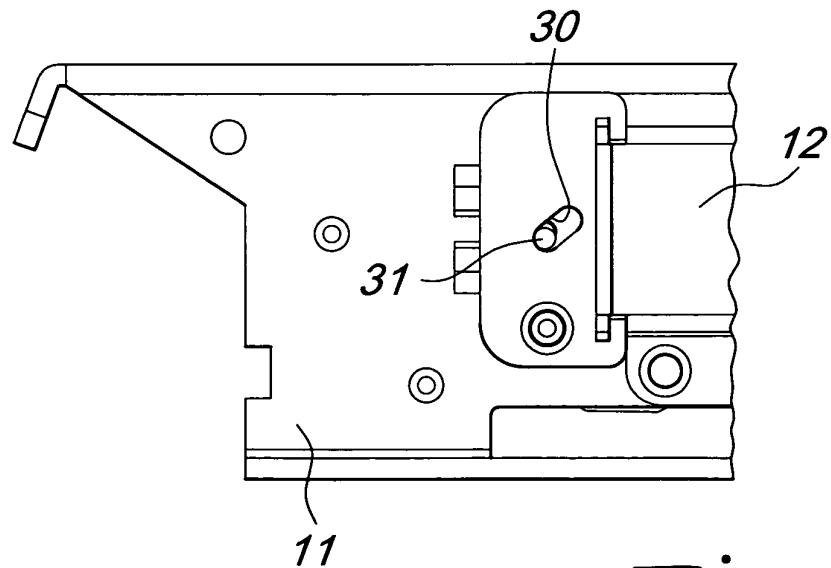


Fig. 4

