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(54) Lock, particularly for uprights of metal door frames

(57) The lock (1), particularly for uprights of metal door frames, comprises a boxlike body or casing (2) associable with a front plate (3), and having a bolt (4) inside it, the bolt (4) is operated by a cylinder through a kinematic means (5), the cylinder is operated by a key, a moving means (6) for moving the rotational fulcrum (14) of the bolt (4) from at least a first position to a second position for preventing the return of the bolt (4) into the casing (2) when the bolt (4) is subjected to an undesired return force to make it return into the casing (2).

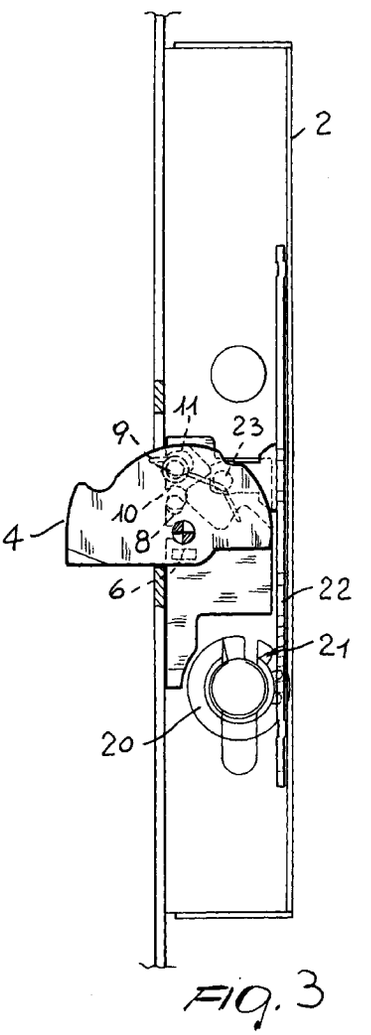

Fig. 3

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Description

[0001] The present invention relates to a lock, particularly for uprights of metal door frames.

[0002] It is known that in the present types of locks for door or window metal frames the bolt is moved by rotation about a fulcrum or by translation by means of gears through one or two turns of the key.

[0003] A rotating bolt has advantages over a translating bolt such as a greater resistance to breakage, a greater protrusion from the upright, and a higher resistance to a horizontal thrust which would push a translating bolt back into the casing.

[0004] However, a rotating bolt is less resistant to an upward thrust than the translating bolt, because an upward force would push the rotating bolt back into the casing.

[0005] Furthermore, in the conventional locks it is not possible to substitute the spring latch with a cylinder or viceversa, and/or modify the direction of the spring latch with a simple operation without disassembling the lock at least partially.

[0006] It is also noted that in the conventional locks it is not possible to adjust the return spring of the spring latch or roller.

[0007] The aim of the present invention is to eliminate the above cited inconveniences of the prior art.

[0008] An object of the present invention is to provide a lock wherein the bolt is prevented from going back into the casing when subjected to an undesired force, particularly an upward force.

[0009] It is a further object of the invention to provide a lock wherein the spring latch can be substituted with the roller and viceversa without the need to disassemble the lock.

[0010] A further object of the invention is to provide a lock wherein the spring of the spring latch or roller can be adjusted as desired.

[0011] Still a further object of the invention is to provide a lock wherein the latch or roller can be spaced from the casing as desired.

[0012] Still a further object of the invention is to provide a lock wherein the force required to turn the key is reduced, even though the size of the bolt is considerable.

[0013] Still a further object of the invention is to provide a highly versatile lock also having the casing closed on all sides.

[0014] The above aim as well as these and other objects are achieved by a lock, particularly for uprights of metal door frames, comprising a boxlike body or casing associable with a front plate and having at least one bolt, the bolt being operated by a cylinder through a kinematic means, the cylinder being operated by a key, characterized in that it comprises a moving means for moving the rotational fulcrum of said bolt from at least a first position to a second position for preventing the return of the bolt into the casing when the bolt is subjected to an undesired return force to make it return into the casing.

[0015] Further characteristics and advantages of the invention will be more apparent by the following description of a lock, particularly for uprights of metal door frames, according to the invention, illustrated, by way of example in the enclosed drawings in which

FIG. 1 is a side elevated view of the casing of the open lock showing the inner kinematics according to the invention;

FIG. 2 is a side elevated view of the lock of FIG. 1 shown in a simplified manner for an easier understanding of its operation;

FIGs. 3 to 6 schematically show how the rotation of the bolt is prevented when an upward force is applied to the bolt to force it back into the casing;

FIG. 7 is an exploded view of the component parts of the lock shown in FIG. 1 according to the invention;

FIGs. 8 to 11 show the different and versatile uses of the lock according to the invention.

[0016] With reference to the above drawings, the lock, particularly for uprights of metal door frames, globally designated by the reference numeral 1, comprises a boxlike body or casing 2 which is associable with a front plate 3, as clearly seen in FIGs. 8 to 11.

[0017] The casing 2 contains at least one bolt 4 which is actuated by a cylinder through a kinematic means globally designated by the reference numeral 5. The cylinder, which is for example actuated by a key, is per se known and is not illustrated in the drawings.

[0018] The kinematic means actuate the bolt 4 and comprises a wheel 20 suitably provided with a toothed sector 21 engaging a rack 22 having a tooth 17 adapted to cause the rotation of the bolt, as for example illustrated in FIGs. 2 and 3. When the bolt is in a position completely external to the casing, the tooth 17 engages the bolt thus effectively contrasting any undesired force trying to push the bolt back into the casing.

[0019] By engaging the tooth 17, the bolt discharges the undesired force mainly on its fulcrum thus allowing the movement of the fulcrum by moving means 6. The moving means 6 make the bolt fulcrum move from at least one first position to a second position preventing the bolt from moving back into the casing when the bolt is subjected to an undesired force and particularly an upward force as indicated by the arrow in FIGs. 5 and 6. Furthermore, the lock is provided with safety means activated by the motion of the fulcrum 14 from the first position to the second position.

[0020] In particular, the safety means comprises first retaining members for keeping the bolt 4 outside the casing 2 once the bolt is outside the bolt, that is when the door or window frame is closed.

[0021] The first retaining members keep the bolt together with the casing 2 and are constituted by two mobile pins 8 and 9 arranged inside the bolt 4.

[0022] The pins are biased by first elastic means constituted by respective springs, that are not illustrated in the drawings, and that, as better illustrated further on, bias the mobile pins to enter respective seats 10 and 11 provided on a plate 12 associated with the casing 2.

[0023] The moving means 6 comprises a preset resistance member adapted to yield when the undesired force applied to the bolt exceed the resistance of the preset resistance member but is still lower of the contrast force applied by the tooth 17 to the bolt.

[0024] In a preferred embodiment, the preset resistance member is for example constituted by a diaphragm 6 which, as seen in FIGs. 5 and 6, yields when an upwards force is applied to the bolt and thus make the fulcrum 14 move upwards.

[0025] This upward motion makes the pins 8 and 9, that were previously staggered with respect to the respective seats 10 and 11, move to a position coaxial to the seats and then, biased by the respective springs that are not illustrated in the drawings, into the seats.

[0026] In this manner the bolt and the casing having the plate 12 become one piece allowing the bolt to resist forces much higher than those borne by the conventional locks.

[0027] In spite of the fact that by the embodiment described above the lock according to the present invention reaches a resistance effectively higher than that provided by the current statutory provisions on locks, when the undesired force applied upwards is very high, the bolt is nevertheless prevented from going back into the casing because of second retaining means outside the casing 2.

[0028] The second retaining means comprises an edge 15 of a casing aperture 16 for the bolt 4 when its fulcrum is in the first position, i.e. in the operating position.

[0029] In particular, as shown in FIG. 6, once the fulcrum has moved from the first position, as shown in FIG. 3 for example, to the second position, shown in FIGs. 5 and 6, if the pins 8 and 9 break, the bolt will rotate as illustrated in dashed lines in FIG. 6 but will be prevented from going back into the casing through the aperture 16 because the motion of its fulcrum makes its end abut against the edge 15 of the aperture 16.

[0030] According to a further embodiment of the invention, the resistance member 6 may for example be constituted by a spring, not illustrated, adapted to bias the fulcrum 14 back into its first position when the undesired force is no longer applied to the bolt.

[0031] In this case, pins 8 and 9 may for example have a slanted face and therefore, when the undesired force is no longer applied and the fulcrum has returned to the bolt first position, the pins automatically go back into the bolt disengaging the respective seats 10 and 11 and thus fully reestablishing the operativity of the lock, if the lock has not been damaged.

[0032] The toothed sector 21 has two teeth 18 shaped differently from the third tooth 10 and adapted to engage the teeth of the rack. The rack teeth are shaped accordingly and spaced apart for an optimal meshing both when opening and closing the bolt.

[0033] The tooth 17 of rack 22 supports a control pawl 23 which does not directly act on the bolt but rather on second elastic means constituted by a spring 24 adapted to maintain a constant perfect meshing between the toothed sector 21 and the rack preventing any undesired motion of the rack 22 with respect of the toothed sector 21 while the bolt is moving out of, or into, the casing 2.

[0034] In the above embodiment, because of the toothed sector 21, the toothed wheel 20 allows a reduction of the effort required for opening and closing the bolt since the friction on the bolt is less than half of the friction in conventional locks.

[0035] Furthermore, the lock according to the invention may be provided with a translating bolt 26, as illustrated in FIG. 9. The translating bolt 26 combined with the rotating bolt 4 provides an effective barrier against unwanted handling of the lock.

[0036] In fact, the translating bolt is adapted to be inserted in a hole of its own provided on a counter plate, not illustrated in the drawings, which prevents the upright 3 from being raised with respect of the same plate.

[0037] Regardless of the fact that the above described bolt may have the possibility of moving its fulcrum, with the consequent advantages, the lock according to the invention may also be provided with a connection means adapted to connect a pawl 30, a roller 31 or a cap 39 to the casing 2.

[0038] In this manner it is provided a complete interchangeability, according to the needs, of the roller with the pawl and viceversa in a simple and rapid manner as herewith described.

[0039] The connection means allowing the interchangeability between roller and pawl and viceversa are constituted by a block 32 having an engagement member constituted by a pivot 33 biased by third elastic means, namely a spring which is not illustrated in the drawings, adapted to insert in a seat 34 provided on a plate 35 associated with the casing 2.

[0040] By means of a simple pressure on the pivot 33, through a corresponding hole 36 provided on the casing 2, the pivot 33 can be disengaged from the seat 34, by compressing the spring, and it is therefore possible to pull off the roller or the pawl from the casing 2 for its substitution.

[0041] The introduction of the roller or pawl back into the casing is performed by reversing the above operations.

[0042] The distance between the pawl 30 or roller 31 and its respective block 32 may also be adjusted by rotating the pawl or roller about its respective axis since the pawl or roller engages its respective block through a thread 36.

[0043] Furthermore, the force of the return spring 40 of the roller or pawl can be adjusted by means of an adjusting means comprising a seat 41 having two catch

projections 42 that engage the fulcrum pivot 43, about which rotates the spring 40, thus preventing the rotation of the spring.

[0044] In particular, the spring 40 has a section 45 adapted to engage in a seat 46 of pivot 43 which can be operated by a screw driver through a hole provided in the casing 2.

[0045] By pushing the pivot 43 out of the catch projections 42 by means of the screw driver, the screw driver can be rotated thus adjusting the spring 45 according to the needs or depending on whether the roller or pawl are used, thereby allowing to again engage pivot 43 with catch projections 42 thus keeping the spring adjusted in the selected position.

[0046] It should be noted that, as shown in FIGs. 8, 9 and 10, the lock according to the invention has a considerable modular capability.

[0047] It is in fact possible to obtain assemblies with different combinations allowing several modifications of the product thus providing a greater resistance to attempts of breaking the lock open.

[0048] The lock and diverters 50 assembly is in fact frontally fastened by screws, and the bars connecting the lock to the diverters 50 are the same for all the versions.

[0049] The diverters 50 may be provided with a rotating bolt and/or with a translating bolt thus allowing several versions of the product.

[0050] The lock according to the invention may have numerous modifications and variations, all within the inventive concept; furthermore, all the details may be substituted with technically equivalent elements.

[0051] The materials employed, as well as the dimensions, may be any according to the specific needs and the state of the art.

Claims

1. Lock, particularly for uprights of metal door frames, comprising a boxlike body or casing associable with a front plate and having at least one bolt inside, the bolt being operated by a cylinder through a kinematic means, the cylinder being operated by a key, characterized in that it comprises a moving means for moving the rotational fulcrum of said bolt from at least a first position to a second position for preventing the return of the bolt into the casing when the bolt is subjected to an undesired return force to make it return into the casing.

2. Lock, according to claim 1, characterized in that it comprises safety means activated by the motion of said fulcrum from said first position to said second position.

3. Lock, according to one or more of the preceding claims, characterized in that said safety means comprises first retention means for keeping said bolt out of said casing, said first retention means being adapted to make said bolt fixed to said casing.

4. Lock, according to one or more of the preceding claims, characterized in that it comprises second retaining means adapted to keep said bolt out of said casing.

5. Lock, according to one or more of the preceding claims, characterized in that said moving means comprises a preset resistance member adapted to yield when said undesired force exceeds said resistance.

6. Lock, according to one or more of the preceding claims, characterized in that said first retention means comprises at least one mobile pin biased by first elastic means inside said bolt, said at least one pin being adapted to insert in a respective seat provided on a plate associated with said casing when said fulcrum is in said second position.

7. Lock, according to one or more of the preceding claims, characterized in that said second retention means are constituted by an edge of the aperture of said casing through which said bolt passes when said fulcrum is in said second position.

8. Lock, according to one or more of the preceding claims, characterized in that said kinematic means comprises a wheel having a toothed sector and activated by said cylinder, said wheel engaging a rack having a tooth for rotating said bolt and adapted to keep said bolt out of said casing.

9. Lock, according to one or more of the preceding claims, characterized in that it comprises a pawl associated with said control tooth and engaging second elastic means provided on said bolt.

10. Lock, according to one or more of the preceding claims, characterized in that it comprises at least one translating bolt adapted to insert in a hole of its own provided on a counter plate for preventing said metallic upright from being raised.

11. Lock, particularly for uprights of metal door frames, comprising a boxlike body or casing associable with a metallic upright of the frame having at least one bolt operated through kinematic means and by a cylinder actuated by a key, characterized in that it comprises connection means for associating either a pawl or a roller to said casing.

12. Lock, according to claim 11, characterized in that said connection means comprises a block connected to either said pawl or roller, said block having an

engagement means adapted to engage said block to a seat provided inside said casing for removably keeping said block in said seat.

13. Lock, according to one or more of the preceding claims, characterized in that said engagement means comprises a mobile pin biased by third elastic means in said block.

14. Lock, according to one or more of the preceding claims, characterized in that said pawl and said roller comprise adjusting means for adjusting their distance from said block.

15. Lock, according to one or more of the preceding claims, characterized in that it comprises adjusting means for adjusting the force of the return spring of said pawl or roller.

16. Lock, according to one or more of the preceding claims, characterized in that said adjusting means comprises at least one seat having at least one catch projection adapted to prevent the rotation of a pivot of said spring in a first position and adapted to allow the rotation of the pivot in a second position for adjusting the force of said spring.

17. Lock, according to one or more of the preceding claims, characterized in that said preset resistance member is a spring adapted to bias said fulcrum of said bolt back into its initial position when said force ceases to be applied, at least said pivot being provided with an inclined face for the automatic return of said bolt when said fulcrum is in said initial position.

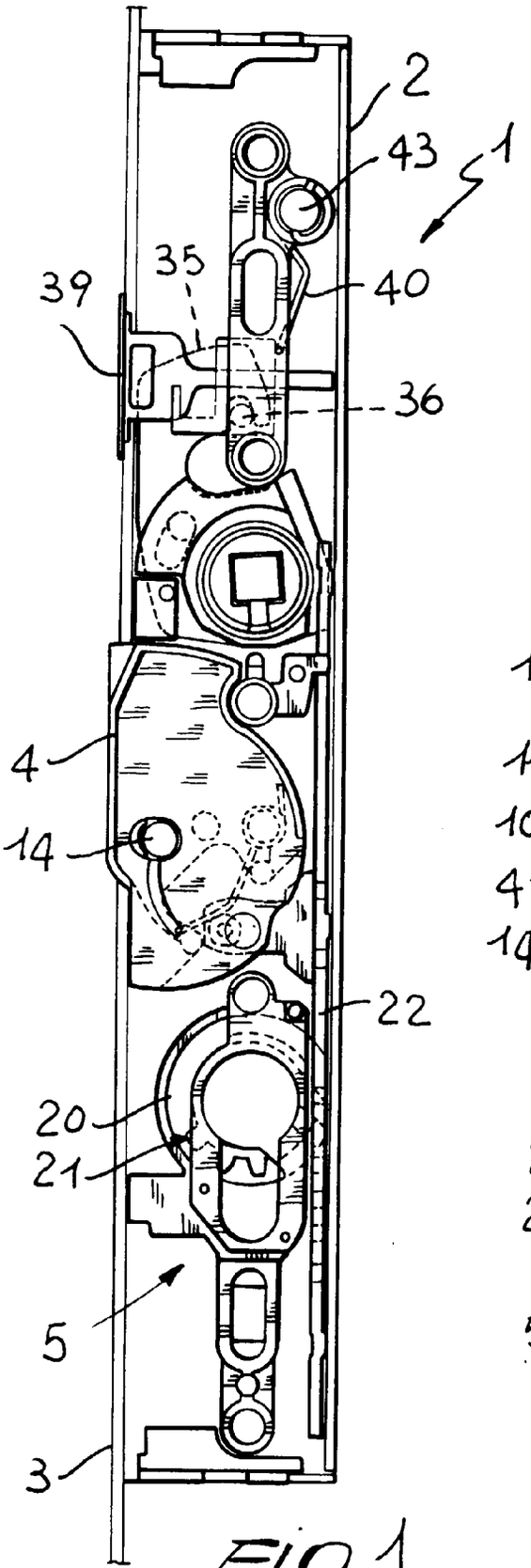

Fig.1

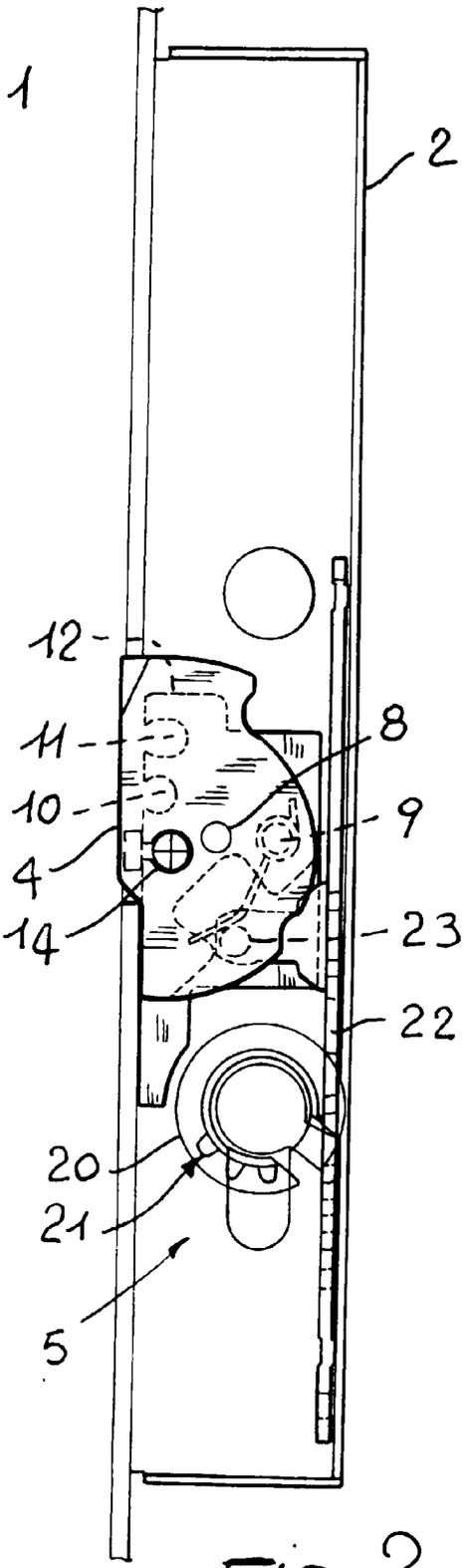

Fig.2

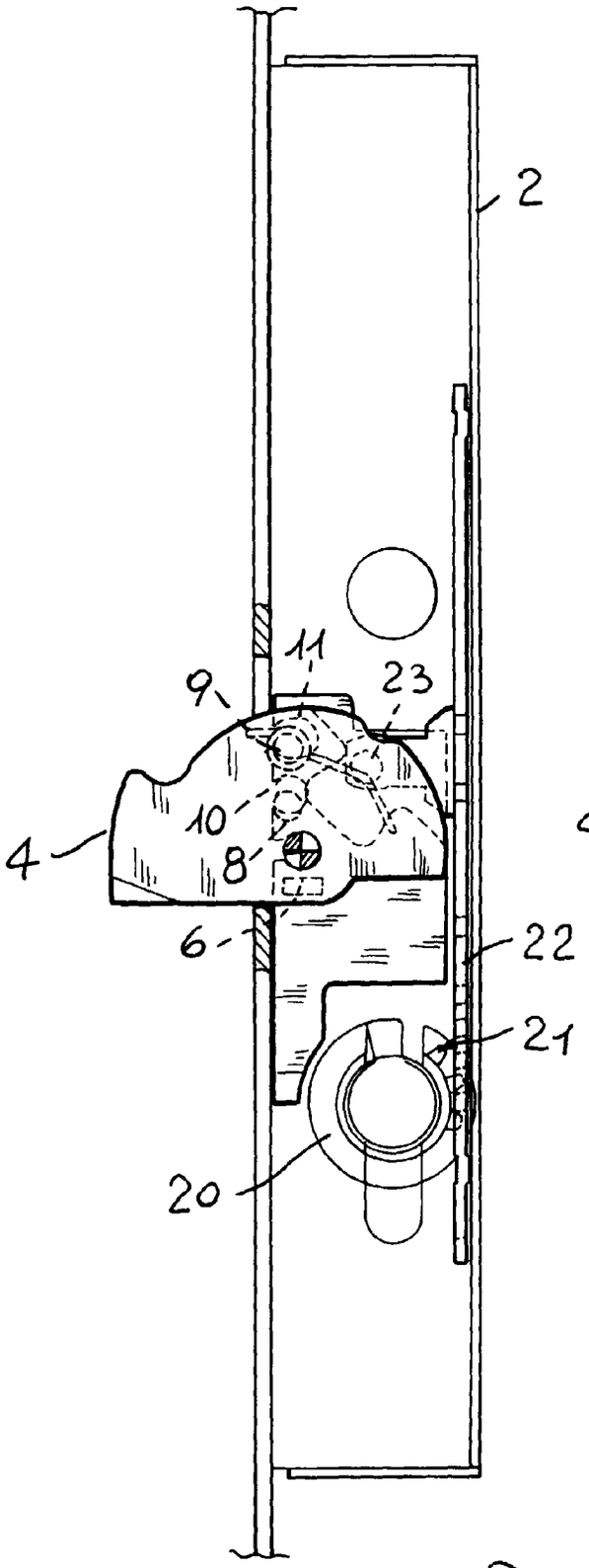

FIG. 3

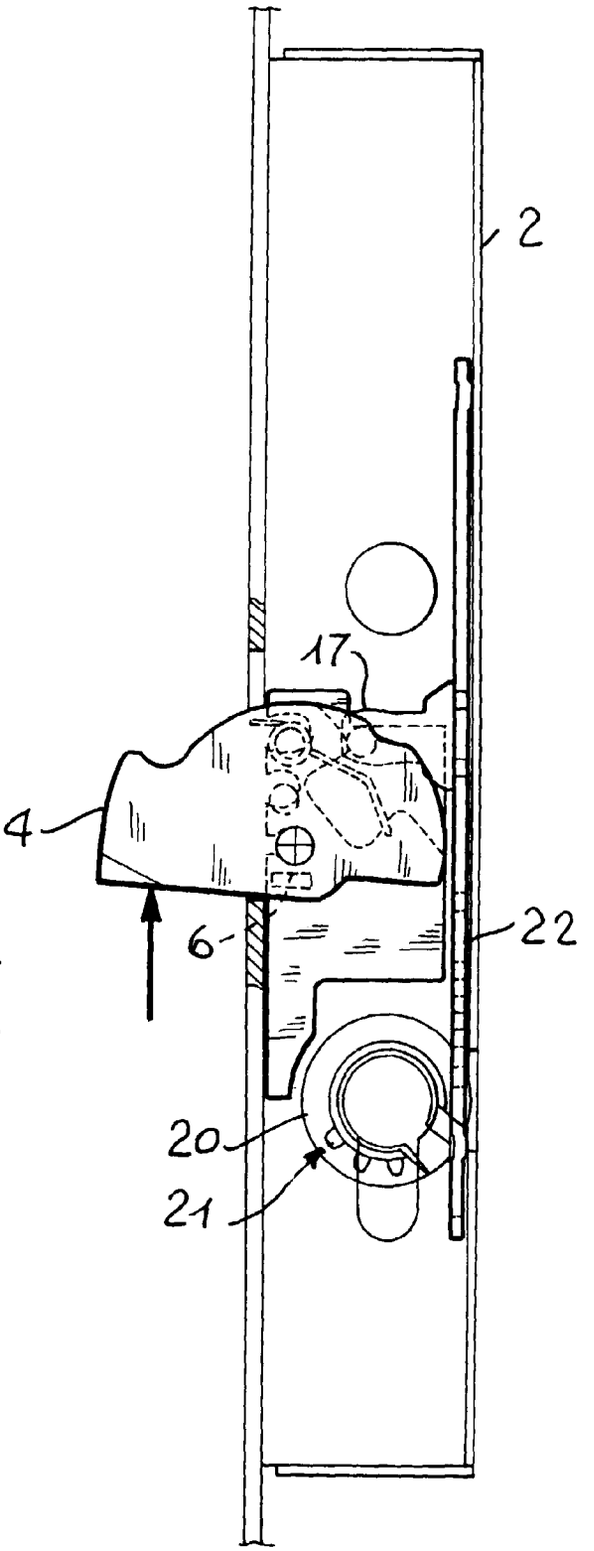

FIG. 4

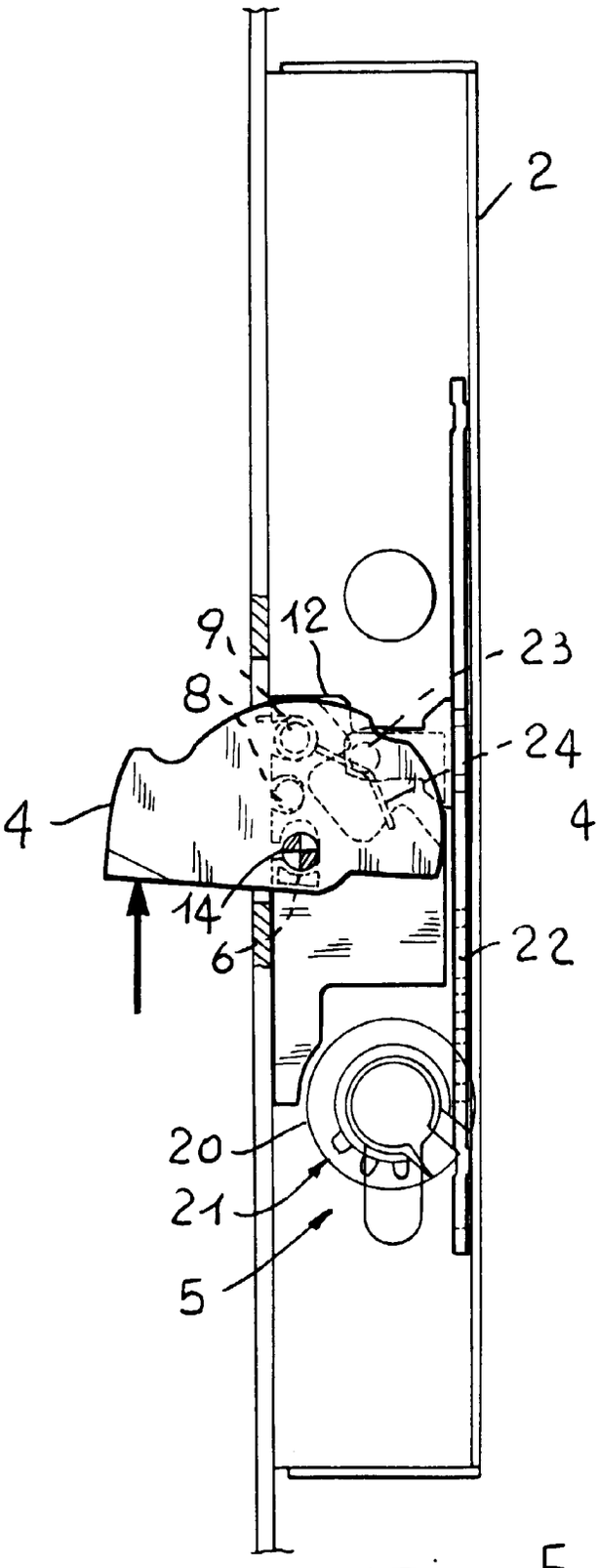

Fig. 5

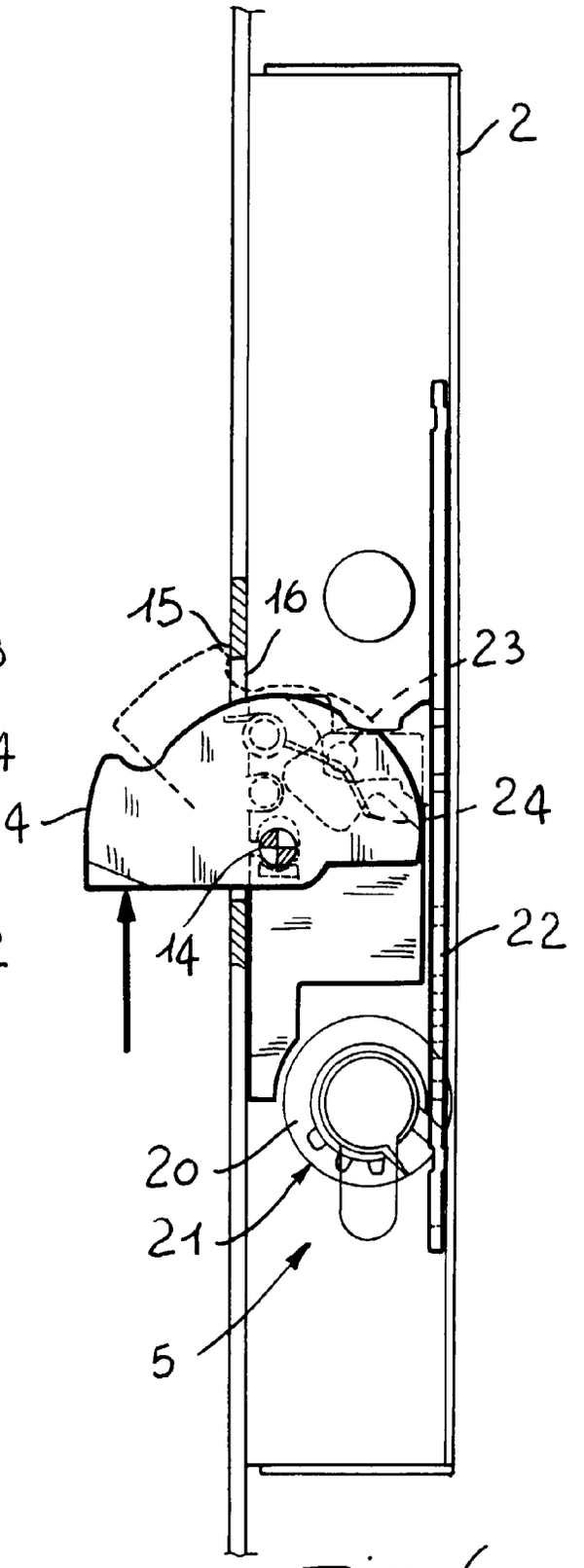

Fig. 6

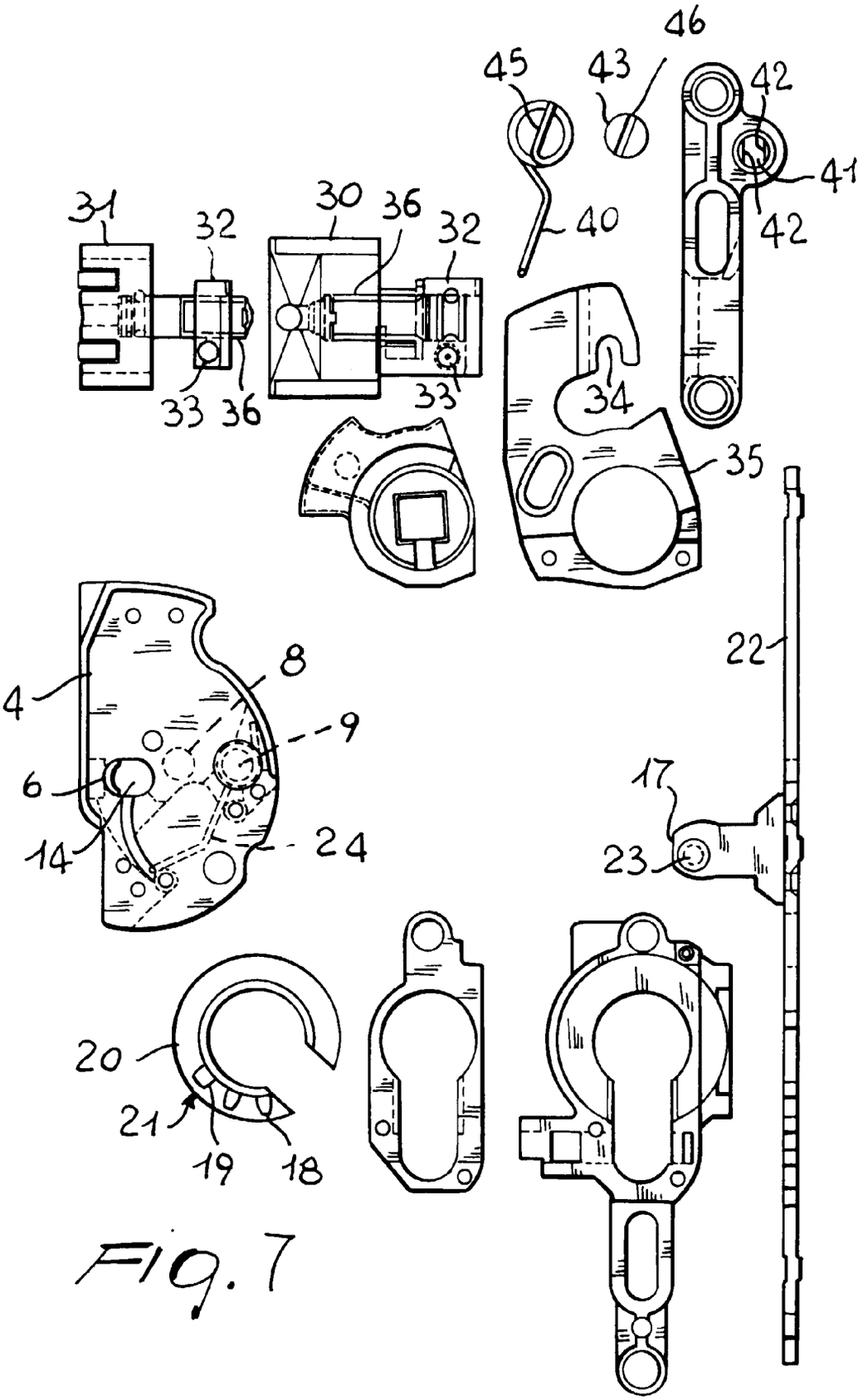
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FIG. 7

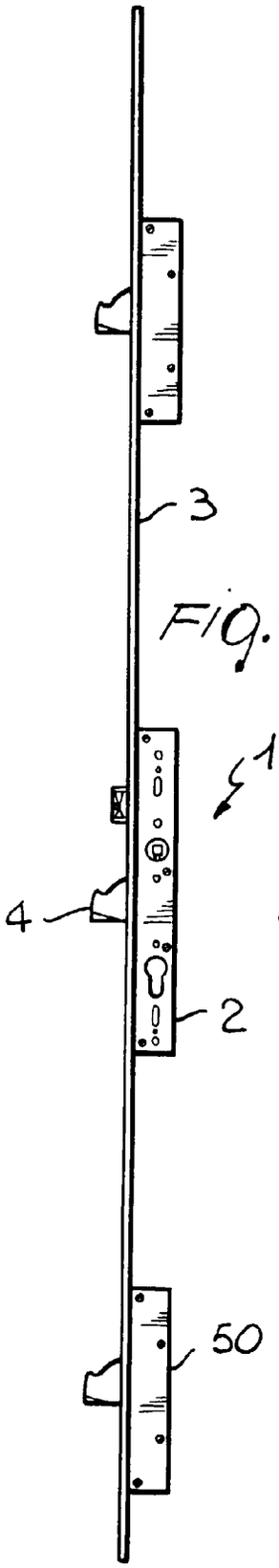

FIG. 8

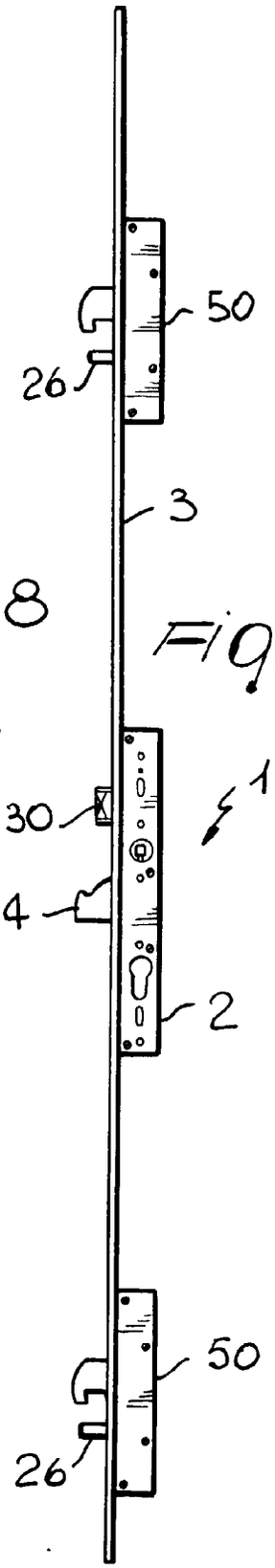

FIG. 9

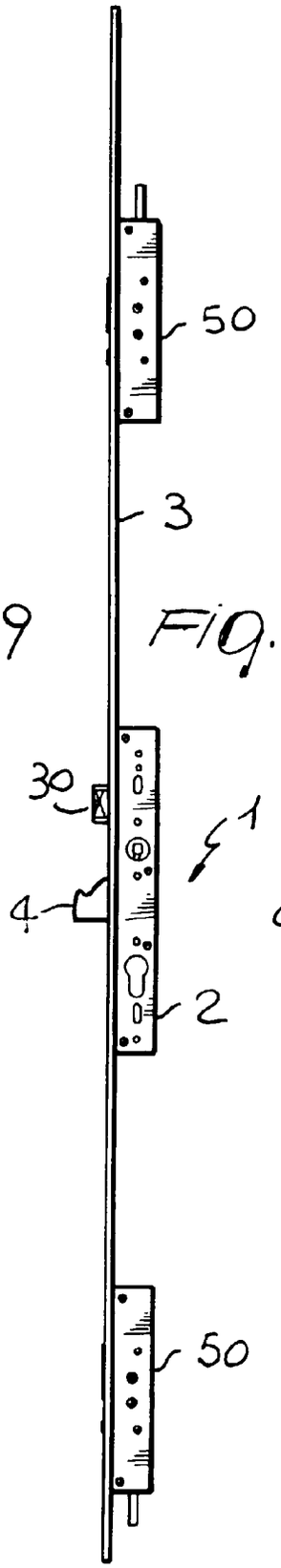

FIG. 10

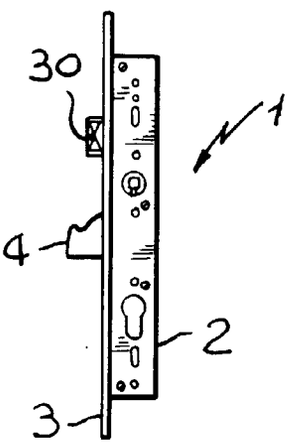

FIG. 11