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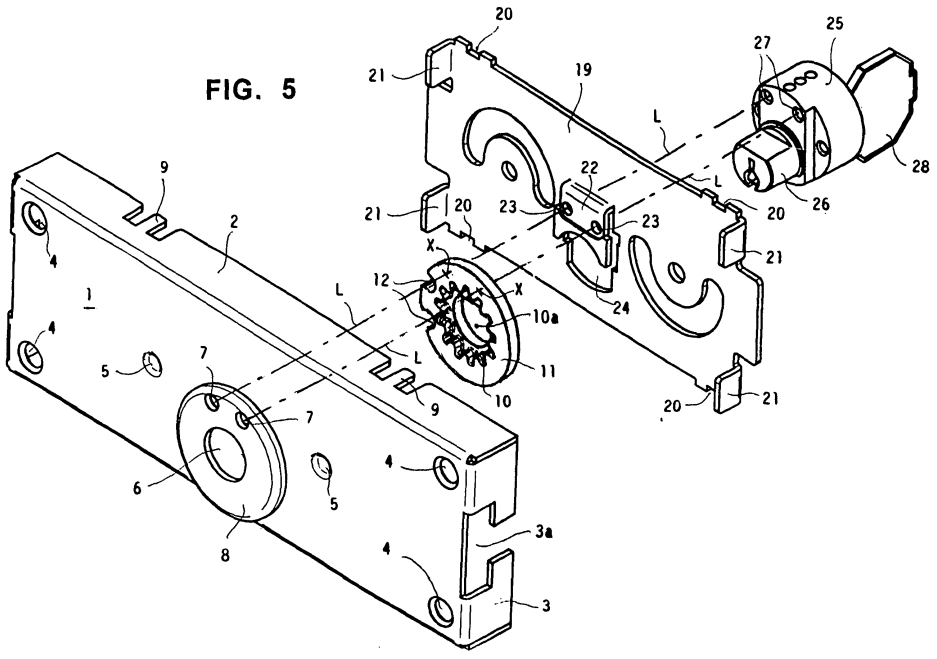
## (54) Lock for rolling shutters, swinging doors and section doors

(57) A lock for rolling shutters, swinging doors and section doors, comprising a box (1-3), a box covering (19), a pair of bolt actuating members (15) selectively displaceable between withdrawn positions and extracted positions, and an operating system of toothed wheels (10,13) intended for driving the bolt actuating members (15) under control of a lock cylinder (26) included in a cylinder lock unit (15). According to the invention, the cylinder lock unit (15) is connected to the lock box covering (19) by means of at least one screw acting between the box covering (19) and the cylinder lock unit (25); the screw is accessible by a maneuver tool through at least one corresponding bore (7) formed in the front wall (1) of the lock box, and the lock comprises a shutter member (11) arranged for preventing the insertion of the tool through the bore (7) when the lock cylinder (26) is situated in any position different from a preestablished change position, which can be attained only by rotating the lock cylinder (26) by means of the corresponding key (28). Preferably, the shutter member (11) is formed by a flange portion (11) of the central toothed wheel (10) of the lock operating system, and this central toothed wheel (10) is embodied by means of a half-shear operation from a metal plate disk whose periphery forms the flange (11).

FIG. 5

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## Description

**[0001]** The subject of the present invention are some improvements in a lock for rolling shutters, swinging doors and section doors, of a kind which comprises a box, a box covering, a pair of bolt actuating members selectively displaceable between withdrawn positions and extracted positions, and an operating system of toothed wheels intended for driving said bolt actuating members under control of a lock cylinder included in the lock. This kind of lock is known, in its general characters, for example by the Italian Patent No. 851.968.

**[0002]** In the more improved known embodiments, these locks are arranged for allowing the replacement of the cylinder lock unit which controls the lock. Such replacement may be required either for the need of replacing a damaged cylinder lock unit, or in order to bring the codification of the lock in line with the codification of other locks intended for being operable by the same key.

**[0003]** In the more improved known embodiment of such a lock, the cylinder lock unit is fixed to the lock box covering by means of two screws screwed in the cylinder lock unit from the inner face of the lock box covering, whereby these screws are accessible only after having dismounted the lock from the rolling shutter, swinging door or section door, and then having dismounted the box covering from the lock box. Of course, after having replaced the cylinder lock unit, the box covering should be mounted again onto the lock box, and the lock should be mounted again onto the rolling shutter, swinging door or section door. Therefore, this operation involves a relatively long and complicated work. Moreover, the box covering keeps in their correct working positions at least a part of the inner operating component parts of the lock, whereby dismounting the box covering involves the danger that some inner component parts be displaced, which may jeopardize the lock operation. Therefore the operation for replacing the cylinder lock unit also is delicate. In view of all the above, a complete replacement of the lock is often preferred to the replacement of the cylinder lock unit.

**[0004]** Moreover, according to the state of art, the box covering of the lock should be connected to the lock box by means of a number of screws screwed in little columns connected to the lock box. In addition to the task of connecting the box covering, these little columns also have the task of offering to the inner portions of the bolt operating members a rest when the bolts are extracted, in order to prevent any damage when they are submitted to abnormal stresses while they are in extracted position, which may happen for example due to a break attempt, or even when a motor operating the rolling shutter or the door is started before the lock has been unblocked. The known described embodiment is effective, however it is expensive both for the manufacture of the component parts and for their assemblage.

**[0005]** In view of the above, the main object proposed by this invention is to provide a lock for rolling shutters, swinging doors and section doors, which allows effecting the replacement of the cylinder lock unit through relatively simple and quick operations, though maintaining the certainty that such operations cannot be effected by not authorized persons. Another object of the invention is to simplify the lock structure and to render more easy the manufacture and the assemblage thereof, tough maintaining unchanged or improved all performances of the lock. Still another object of the invention is to provide such a lock in which the improvements made do not involve any increase in the lock cost and, on the contrary, may possibly allow a reduction of this cost.

**[0006]** The main object of the invention is attained by a lock for rolling shutters, swinging doors and section doors, comprising a box, a box covering, a pair of bolt actuating members selectively displaceable between withdrawn positions and extracted positions, a replaceable cylinder lock unit having a lock cylinder operable by a key, and an operating system of toothed wheels intended for driving said bolt actuating members under control of said lock cylinder, said cylinder lock unit being connected to the lock box covering by means of at least one screw acting between said box covering and said cylinder lock unit, characterized in that said at least one screw is accessible by a maneuver tool through at least one corresponding bore formed in the front wall of the lock box, and that the lock comprises a shutter member arranged for preventing the insertion of said tool through said at lest one bore when said lock cylinder is situated in any position different from a preestablished change position, which can be attained only by rotating the lock cylinder by means of the corresponding key.

**[0007]** Thanks to these features, in order to maneuver the screw fixing the cylinder lock unit to the lock box covering there is no more any need for dismounting the lock from the rolling shutter or the swinging door or section door, nor for dismounting the box covering from the lock box, whereby the operations are substantially simplified and there is no danger that some inner operating component parts of the lock may be displaced. At the same time, this simplification of the operations does not involve the danger that the operations may be effected by not authorized persons, because in order to access with a tool to the screw fixing the cylinder lock unit it is needed that beforehand the lock cylinder is rotated by means of the corresponding key, in order to bring the same in the preestablished change position in which the shutter member allows the access to the fixing screw.

**[0008]** Preferably, the screws fixing the cylinder lock unit are two in number, two bores are correspondingly provided in the front lock wall for allowing the access to said screws, and said shutter member is arranged for simultaneously freeing both said bores when the lock cylinder is situated in said preestablished change position.

**[0009]** Preferably, said shutter member is formed by a flange portion of one of the toothed wheels of said lock operating system, a portion of said flange being situated in correspondence of the bores of the front lock wall for

covering said bores, and said flange having openings intended for corresponding to said bores when said toothed wheel having said flange is brought by the lock cylinder rotation in the position corresponding to said pre-established change position of the lock cylinder.

**[0010]** Preferably, said toothed wheel having said flange with openings is a central wheel of the lock operating system of toothed wheels, which is intended to be connected to said lock cylinder for being put in rotation by the same.

**[0011]** It is of advantage that said wheel having a flange is produced from a metal plate disk coined by means of a half-shear operation in order to form, projecting on a face thereof, the toothed wheel, and to form at the periphery the flange having recesses which define the required openings.

**[0012]** In this way the characteristic component part described is obtained by means of manufacturing operations very simple and inexpensive.

**[0013]** According to a further development of the invention, the connection between the lock box and the box covering is done by means of tabs projecting from the box rims, these tabs being folded onto the box covering after this latter has been mounted on the inner operating components of the lock.

**[0014]** In this way, the connection of the box covering can be effected through a simple operation, suitable for being easily carried out by instrumental means, and an important simplification of the lock assemblage operations is attained, along with a considerable reduction in the cost of some component parts.

**[0015]** Preferably, the box covering has wings folded towards the box inner space, disposed in correspondence of the position taken by inner portions of the bolt operating members when these latter are in their extracted positions.

**[0016]** In this way an effective rest of the inner portions of the bolt operating members is attained, that allows these members tolerating abnormal stresses when they are in their extracted positions. Thus, by more simple and inexpensive means, the same function is attained that according to the known technique is attained by the expensive little columns fixed to the lock box.

**[0017]** These and other features, objects and advantages of the present invention will appear more clearly from the following description of an embodiment, which represents a preferred but not limiting example. The following description is drawn up with reference to the appended drawings, wherein:

Figure 1 shows a front view of a lock embodied according to the invention.

Figure 2 is a side view thereof, observed according to the arrow II of Figure 1.

Figure 3 is a back view thereof, observed according to the arrow III of Figure 2.

Figure 4 is a view corresponding to Figure 3, but therein the box covering has been removed in order to show the inner component parts.

Figure 5 shows in perspective some component parts of the lock, in order to clarify their positions and tasks.

Figure 6 is a detail view of a toothed wheel having a flange with openings which acts as a shutter member.

**[0018]** With reference to the Figures, reference 1 designates the front wall of the lock box, from which are bent the upper and lower walls 2 and the side walls 3. Some bores 4 are provided for mounting the lock on a rolling shutter or swinging door or section door, the front wall being situated at a distance from the plane of the rolling shutter or swinging door or section door. Box 1 has at the inner part two pivots 5 for two toothed wheels of the inner mechanism. An opening 6 is provided for being traversed by a lock cylinder 26, and two bores 7 are intended for the insertion of a tool in order to fix or unfix a cylinder lock unit, as it will be explained later on. The front wall of the lock further has a protrusion 8 of a cylindrical shape, whose task is described later on. The upper and lower walls 2 have tabs 9 for fixing the box covering in the manner described later on.

**[0019]** Inside box 1, coaxially with opening 6 of box 1, there is mounted a central toothed wheel 10, intended to be coupled with a lock cylinder for being actuated thereby, as it will be clarified later on. With the central toothed wheel 10 are engaged two side toothed wheels 13, which are mounted on the pivots 5 of box 1. Every toothed wheel 13 carries an excentrical pin 14 which engages a slit 17 of a portion 16, situated inside box 1, of a bolt operating member 15. The bolt operating members 15 traverse corresponding windows 3a of the side walls 3 of box 1; in the normal mounting position of the lock, the members 15 are displaceable along horizontal directions, and their slits 17 are oriented in vertical directions. Therefore, the rotation of the central toothed wheel 10 and the consequent rotation of the therewith engaging side toothed wheels 13 causes, in view of the co-operation of the pins 14 and the slits 17, the displacement of the bolt operating members 15, between a retracted position represented in Figures 1 to 4, and an extracted position, which is diagrammatically shown at 15a in Figure 4, for only one of the members 15.

**[0020]** The inner members described are covered, protected and kept in correct position by a box covering 19 (Figures 3 and 5) which, when the lock is mounted, is adjacent to the rolling shutter, swinging door or section door. The box covering 19 has some seats for receiving the tabs 9 of box 1, which are bent onto the box covering 19 for fixing the same. It is to be understood that the number and position of the tabs 9 and the seats 20 could be chosen in a manner different from the represented one. Moreover the box covering 19 has some wings 21 folded towards the interior of box 1. Against these wings 21 come to rest the shoulder 18 of the inner portions 16 of the bolt operating members 15, when these members

take their extracted positions. Then the members 15, through the wings 21, find on the box covering 19 a sure rest allowing to support even abnormal stresses.

**[0021]** The lock is intended to be controlled by a cylinder lock unit 25 comprising a lock cylinder 26 which can be rotated by a key 28. The cylinder lock unit 25 is so shaped that it may be inserted in a precise position into a corresponding opening 24 of the box covering 19, whilst the lock cylinder 26, whose outer profile is non-circular, is inserted in the opening 6 of the box front wall 1, passing through a correspondingly outlined bore 10a of the central toothed wheel 10. Thus the lock cylinder 26, in its operative position, supports the central toothed wheel 10, and these component parts are solid in rotation because their mutual coupling is non-circular. The cylinder lock unit 25 has two threaded bores 27 for fixing to the box covering 19. On the side of the rolling shutter or swinging door or section door to which the lock is applied, the cylinder lock unit 25 passes through a corresponding opening of the rolling shutter or swinging door or section door and somewhat projects therefrom.

**[0022]** The box covering 19 has along a side of the opening 24 a bent portion 22 wherein two bores are formed which, when the cylinder lock unit 25 is mounted, correspond with the threaded bores 27 thereof, and allow fixing the cylinder lock unit 25 to the box covering 19 by means of two screws (not represented) whose head is internal to box 1.

**[0023]** Moreover, the two bores 7 formed in the front wall 1 of the lock box are so disposed that they are in line with the bores 23 and 27, as it is shown in Figure 3 by the broken lines L, when the lock is completely mounted and it is provided with the box covering 19 and the cylinder lock unit 25. The bores 7 allow reaching and maneuvering, by a tool inserted in said bores, the screws (not represented) intended to fix the cylinder lock unit 25 to the box covering 19. However, the insertion of said tool is prevented by a flange 11 surrounding the central toothed wheel 10, which intercepts in the points X the lines L along which the tool should be inserted; this takes place for the greatest part of the positions of the lock cylinder 26 and therefore of the central toothed wheel 10 and, in particular, takes place for the positions corresponding to the open and closed conditions of the lock, in which the key 28 can be withdrawn from the lock cylinder 26.

**[0024]** However, the flange 11 has two recesses 12 which, when the lock cylinder 26 is placed in a specific preestablished change position, correspond to the bores 7, do not intercept the lines L and thus allow to insert a tool and to reach and maneuver the screws fixing the cylinder lock unit 25. This change position is so chosen that it does not correspond to any position of the lock cylinder 26 in which the key 28 can be withdrawn, whereby the change position may be attained only by rotating beforehand the lock cylinder 26 by means of the corresponding key 28. This ensures that the operation for replacing the cylinder lock unit 25 may be accomplished only by those who are authorized, being in possession of the corresponding key.

**[0025]** After having unscrewed the screws fixing the cylinder lock unit 25, this latter can be pulled out of the opening 24 of the box covering 19 and can be extracted through the corresponding opening of the rolling shutter or swinging door or section door traversed by the same, and a new cylinder lock unit can be inserted; thereafter the fixing screws are screwed and tightened again. It will be understood that the new cylinder lock unit may be inserted only after having rotated its lock cylinder, by means of the corresponding key, to the preestablished change position.

**[0026]** Therefore, in the described lock, in order to replace the cylinder lock unit there is no need to dismount the lock from the rolling shutter or swinging door or section door, as according to the known technique, nor it is needed to dismount the box covering 19 from the lock box 1, which on the other hand would not be practically possible in this lock, due to the practical irreversibility of the connection of the box covering 19 by means of the bent tabs 9.

**[0027]** In the preferred embodiment shown, the central toothed wheel 10 having the flange 11 with the recesses 12, as particularly represented in Figure 6, is produced by a coinage operation with half-shear, starting from a metal plate disk. In this manner, this component part having a relatively complicated shape can be manufactured in a simple and inexpensive way. However, of course, also other manufacture processes may be chosen.

**[0028]** As already said, the front wall 1 of the lock box has a protrusion 8 of a cylindrical shape, as it particularly appears from Figure 5. In the practice, this protrusion can be used for housing in its interior the flange 11 of the central toothed wheel 10, but this function is not necessary, because the flange 11 is operatively centered and supported by the lock cylinder 26 with which it is engaged, and it could be arranged adjacent to the wall 1 and be kept in position, during the change of the cylinder lock unit, by protruding tabs of the covering 19, or by the same screws intended for fixing the cylinder lock unit, or in any other manner.

**[0029]** Therefore, the reason for which the cylindrical protrusion 8 has been devised is not a technical one. On the contrary, this protrusion is provided in order to give to the lock a distinguishing mark which allows distinguishing the loch from the other locks of the same kind wherein this invention does not find application. In effect, the application of the invention, per se, does not modify the outer appearance of the lock.

**[0030]** As it appears from the foregoing, the application of the invention allows providing a lock which is improved in its structure and operation, the improvements being of interest both for the manufacturer and for the user, and moreover allowing to reduce the difficulties and costs of the lock production.

**[0031]** This invention is not limited to the embodiment which has been described and shown as an example. Several possible modifications have been stated in the

description, and others are available to those skilled in the art. These modifications, as well as any replacement by technically equivalent means, may be applied to what has been described and shown, without departing from the spirit of this invention and the scope of the present Patent as defined by the appended Claims.

**Claims**

1. A lock for rolling shutters, swinging doors and section doors, comprising a box (1-3), a box covering (19), a pair of bolt actuating members (15) selectively displaceable between withdrawn positions and extracted positions, a replaceable cylinder lock unit (25) having a lock cylinder (26) operable by a key (28), and an operating system of toothed wheels (10,13) intended for driving said bolt actuating members (15) under control of said lock cylinder (26), said cylinder lock unit (25) being connected to the lock box covering (19) by means of at least one screw acting between said box covering (19) and said cylinder lock unit (25), **characterized in that**-said at least one screw is accessible by a maneuver tool through at least one corresponding bore (7) formed in the front wall (1) of the lock box, and that the lock comprises a shutter member (11) arranged for preventing the insertion of said tool through said at lest one bore (7) when said lock cylinder is situated in any position different from a preestablished change position, which can be attained only by rotating the lock cylinder (26) by means of the corresponding key (18).

2. A lock as set forth in Claim 1, **characterized in that** said screws fixing the cylinder lock unit (25) are two in number, that two bores (7) are correspondingly provided in the front lock wall (1) for allowing the access to said screws, and that said shutter member (11) is arranged for simultaneously freeing both said bores (7) when the lock cylinder (26) is situated in said preestablished change position.

3. A lock as set forth in Claim 1, **characterized in that** said shutter member (11) is formed by a flange portion (11) of one of the toothed wheels (10,13) of said lock operating system, a portion of said flange (11) being situated in correspondence of the bores (7) of the front lock wall (1) for closing said bores, and said flange (11) having openings (12) intended for corresponding to said bores (7) when said toothed wheel (10,13) having said flange (11) is brought by the lock cylinder rotation in the position corresponding to said preestablished change position of the lock cylinder (26).

4. A lock as set forth in Claim 3, **characterized in that** said toothed wheel (10,13) having said flange (11) with openings (12) is a central wheel (10) of the lock operating system of toothed wheels, which is intended to be connected to said lock cylinder (26) for being put in rotation by the same.

5. A lock as set forth in Claim 4, **characterized in that** said wheel (10) having a flange (11) is produced from a metal plate disk coined by means of a half-shear operation in order to form, projecting on a face thereof, the toothed wheel (10), and to form at the periphery the flange (11) having recesses (12) which define the required openings.

6. A lock as set forth in Claim 4, **characterized in that** the connection between the lock box (1-3) and the box covering (19) is done by means of tabs (9) projecting from the box rims, these tabs (9) being folded onto the box covering (19) after this latter has been mounted on the inner operating components of the lock.

7. A lock as set forth in Claim 1, **characterized in that** said box covering (19) has wings (21) folded towards the box inner space, disposed in correspondence of the position taken by inner portions (18) of the bolt operating members (15) when these latter are in their extracted positions.

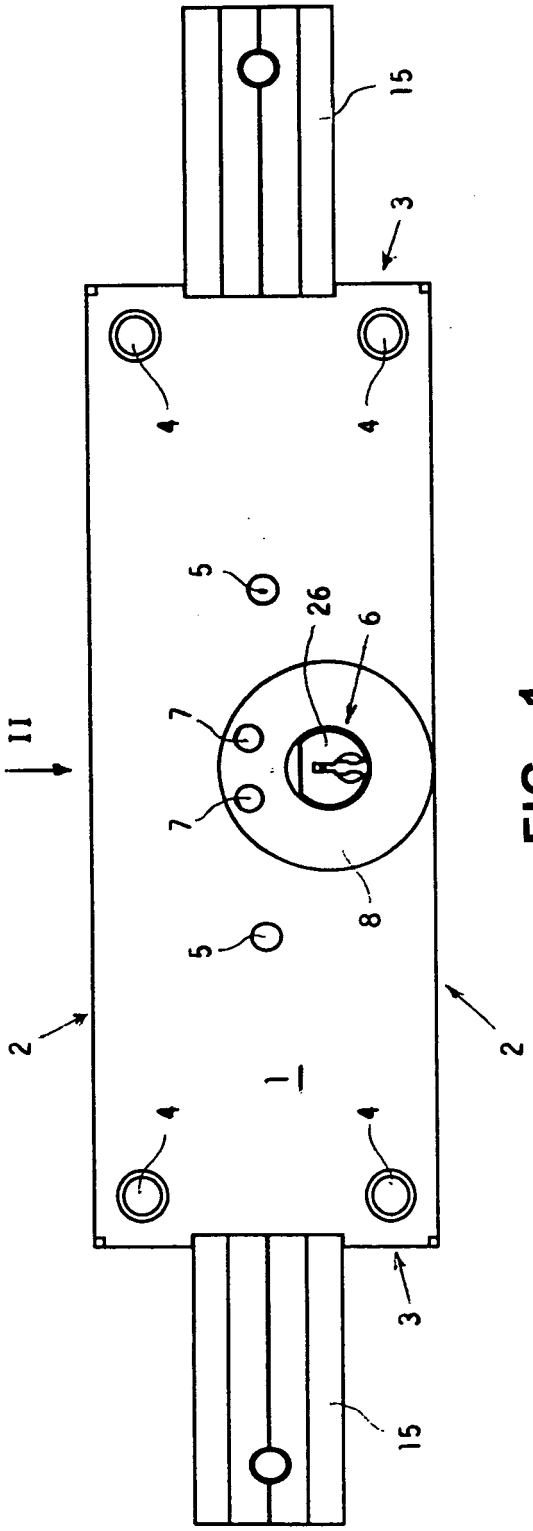


FIG. 1

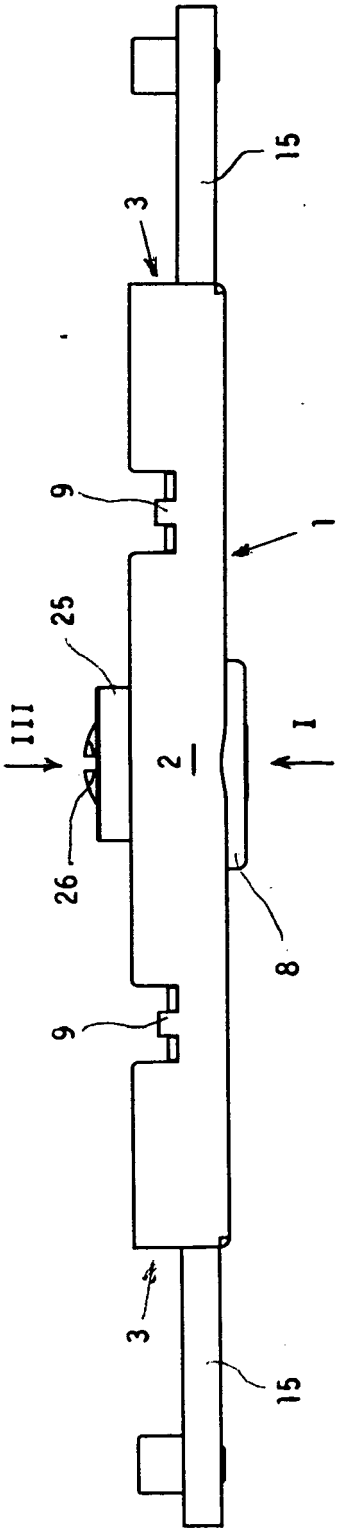


FIG. 2

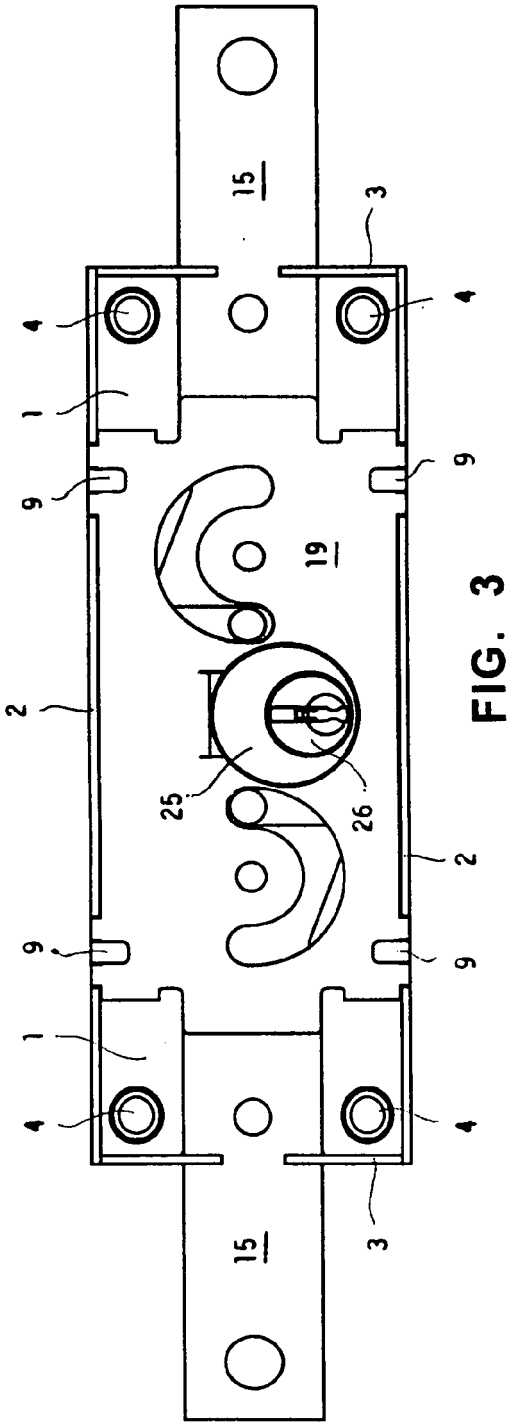


FIG. 3

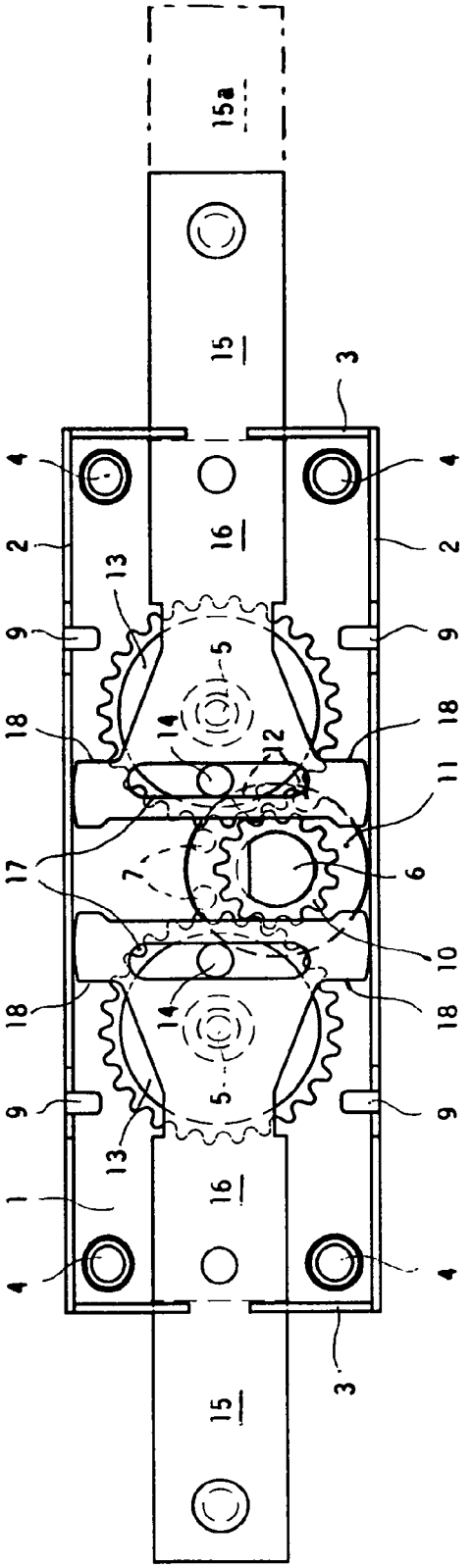


FIG. 4

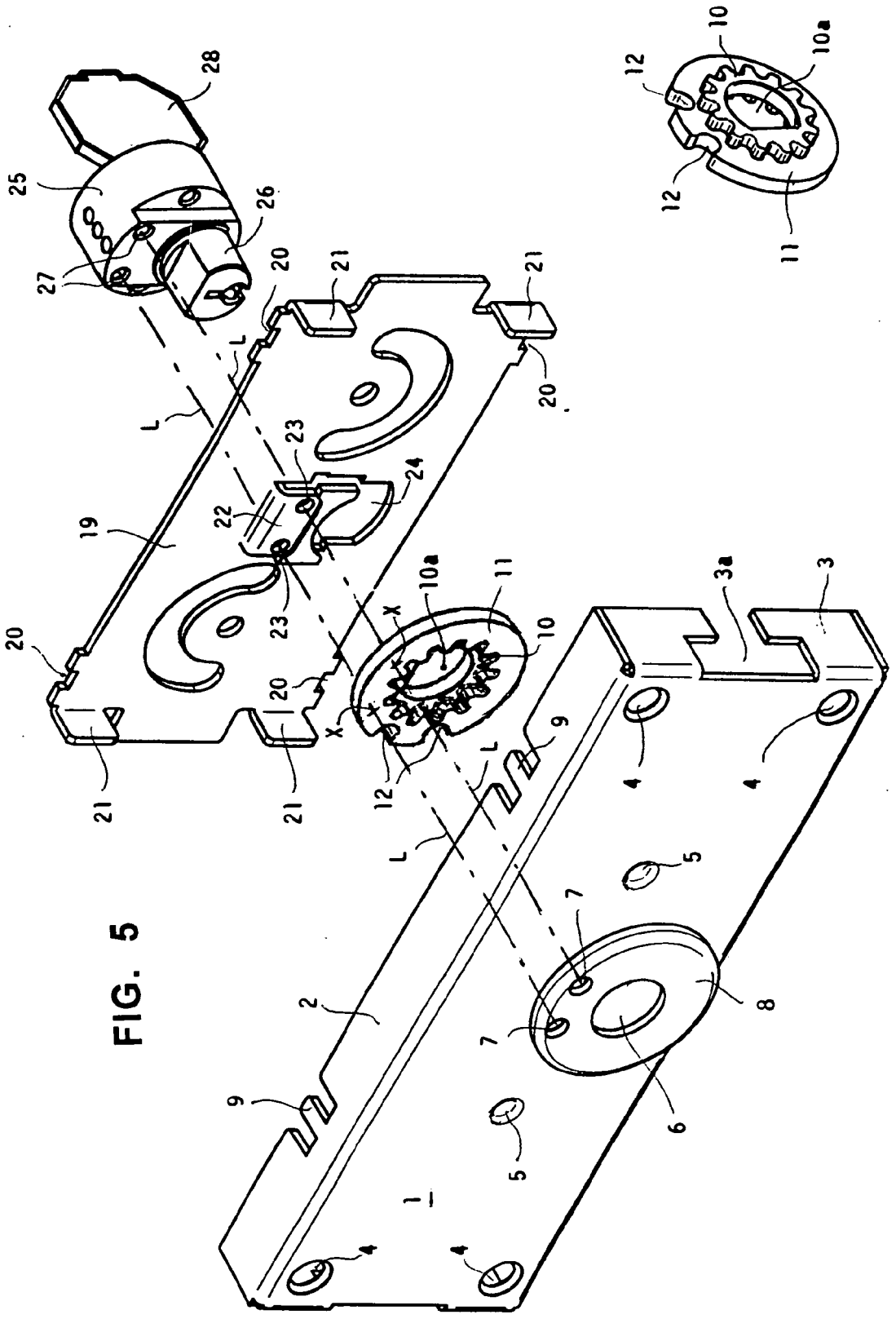


FIG. 5

FIG. 6