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This application was filed on 20 - 06 - 2007 as a divisional application to the application mentioned under INID code 62.

(54) **Safety lock for doors of dwellings, gates and the like**

(57) A safety lock of the type with safety plates or gorges comprises means that **keep** temporarily one or more gorges **deactivated,** in such a way as to enable actuation of the lock with a first key, and means for deactivating said means in such a way as to enable actuation of the lock only with a second key different from the first key. The adaptation of the lock to operate only with the second key is obtained simply as a result of using the second key in the lock.

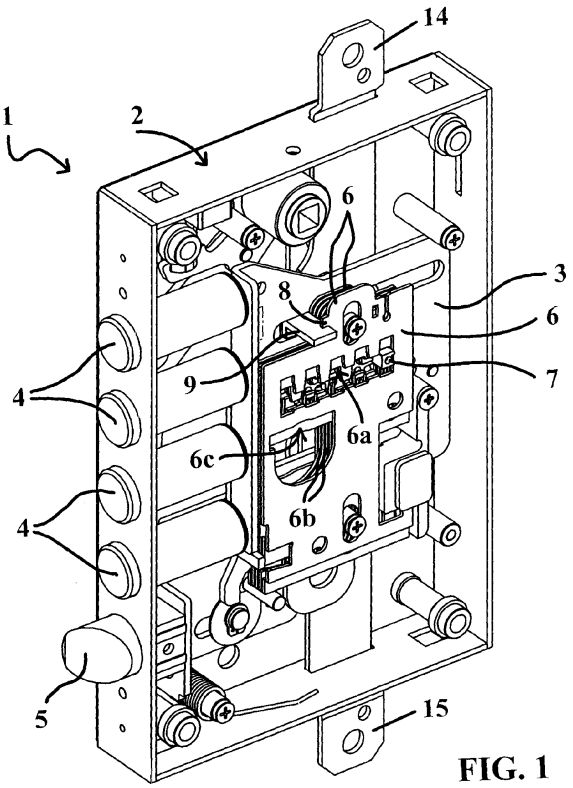

FIG. 1

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Description

[0001] The present invention relates to safety locks for doors of dwellings, gates, and the like, of the type comprising a frame, a bolt member, mounted movable in the frame and displaceable by means of rotation of a key in the lock between a first position and a second position corresponding, respectively, to the open condition and to the closed condition of the lock, **a safety pin associated to the aforesaid bolt member,** and a plurality of safety plates, or "gorges", arranged in the frame, and displaceable, against the action of spring means, or against the action of gravity, by means of rotation of the key in the lock, towards respective positions of enabling of the movement **of the safety pin** of the bolt member.

[0002] In many occasions there exists the need to restore the condition of safety offered by the lock of a door after the key that controls it has been in use with staff who are extraneous to the property in question. A frequent case is that of a building work-site, in which installed on the doors of the premises of a building or of an individual apartment under construction or undergoing restoration are locks controlled by keys with which the workers of the work-site are provided. Once the building works are completed, when the owner enters into possession of the premises on which work has been carried out, it is necessary to render the locks mounted on the doors no longer actuatable with the "work-site" keys used when work was in progress, but only with "master" keys in the exclusive possession of the owner.

[0003] The most conventional solution to the aforesaid problem is to replace the locks. Another solution consists in the provision of locks of the type having a replaceable lock core so as to enable adaptation of the lock to a new key by replacing just the core of the lock and not the entire lock. A further solution consists in the provision of locks of the recodable type, i.e., ones that can be adapted to operate with a different key. All the aforesaid solutions, however, are relatively complicated, entail expenditure in terms of time and additional costs.

[0004] The purpose of the present invention is to provide a safety lock of the type indicated at the start of the present description that can be adapted to operate with a different key with extremely simple means that are easy and convenient to use and do not entail expenditure in terms of time and costs.

[0005] With a view to achieving said purpose, the subject of the invention is a safety lock that presents all the characteristics that have been indicated at the start of the present invention and is characterized moreover in that the lock comprises means temporarily keeping one or more safety plates deactivated in such a way as to enable actuation of the lock with a first key, the lock moreover comprising means for deactivating the aforesaid means in such a way as to enable actuation of the lock only with a second key different from the first key.

[0006] The aforesaid deactivation means are shaped and arranged in such a way that they are actuated automatically as a result of the use of the aforesaid second key in the lock. In other words, the lock is able to operate initially with the first key, which can thus be the work-site key that is given for use to the workers technically involved in the works of construction or maintenance of the premises that is to be protected by the lock. After that, when the premises are handed over to the owner, the latter simply has to introduce, into the lock, the second key, which is the master key and is his exclusive property and available only to himself, in order to adapt the lock to operate only with the master key.

[0007] In a preferred embodiment of the invention, until the adaptation to the master key is made, one or more safety plates or gorges are kept in a position moved away from their resting position, against the action of the respective return springs, so as to be deactivated and to enable use of the first key in the lock. The arrangement may be such that the first key, or work-site key, can operate, for example, only through a complete turn of key, thanks to disabling of the gorges, which are temporarily kept in the aforesaid position where they are moved away from their resting position.

[0008] When the master key is introduced into the lock, it is able to cause release of the aforesaid blocking means so as to render a subsequent actuation of the lock impossible with the old work-site key. All the safety plates or gorges are prearranged for being actuated correctly by the master key so as to enable movement of the bolt member.

[0009] The aforesaid means keep one or more safety plates or gorges temporarily in the aforesaid position moved away from their resting position preferably comprise an arrest member with a catch co-operating with one or more safety plates to keep them in the aforesaid temporary position. Said arrest member is displaceable in the frame of the lock between an active position and an inactive position, and the aforesaid deactivation means preferably comprise cam-actuation means that are activated as a result of the rotation of the second key in the lock.

[0010] Alternatively, the aforesaid catch of the arrest member is carried by a facilitated-failure part, which breaks when the safety plates are displaced as a result of the use in the lock of the second key, or master key.

[0011] Finally, the invention applies also to locks of the type comprising a lock core that can be dismantled and replaced, in which case the aforesaid means of arrest and the aforesaid deactivation means are associated to the dismantlable core of the lock.

[0012] Further characteristics and advantages of the invention will emerge from the ensuing description, with reference to the annexed plate of drawings, which are provided purely by way of non-limiting example and in which:

- Figure 1 is a schematic perspective view, with the lid removed, of a first embodiment of the lock according to the invention;

- Figure 2 is a further perspective view of the lock of Figure 1, in which many parts of the lock have been removed in order to show some details of the lock;
- Figure 3 is a cross-sectional view at an enlarged scale of a detail of Figure 2;
- Figure 4 is a view corresponding to that of Figure 2, which illustrates the lock when it is actuated with the work-site key, in the condition reached after one turn of rotation of the key;
- Figure 5 is a schematic front view of the lock of Figure 1 illustrating the condition in which the lock is located when it is controlled with the master key at the moment in which the key is rotated through a second turn;
- Figure 6 is a perspective view of a second embodiment of the lock according to the invention;
- Figures 6a, 6b are views at an enlarged scale of a detail of Figure 6 in two different operating conditions;
- Figure 7 is a perspective view of a third embodiment of the invention, which uses a core that can be dismantled;
- Figure 8 is a perspective view of the core, with some parts removed for convenience of illustration;
- Figure 9 is a front view of the core of Figure 8 at the moment of use of the master key;
- Figure 10 is a front view of the core that can be dismantled of the lock of Figure 7 at the end of actuation with the master key; and
- Figures 11-16 are perspective views of a further embodiment of the lock according to the invention in different operating conditions.

[0013] In Figure 1, the reference number 1 designates as a whole a safety lock of the "double-bit" type comprising a case made of metal plate 2, closed on one side by means of a lid that is not illustrated in the drawing in order to enable illustration of the parts inside the lock. The general structure and operation of the double-bit lock are in themselves known and consequently are not described in detail herein. They are on the other hand illustrated in numerous patents and in numerous patent applications, filed in the name of the present applicant. Very briefly, the lock comprises a bolt member 3 constituted by a metal plate mounted slidably within the case 2 and having an edge, facing which are welded bolt pins 4, mounted slidably through corresponding openings made in a side wall of the case 2. The introduction and rotation of an authorized key within the lock 1 enables control of the displacement of the bolt member between a position corresponding to the open condition of the lock, in which the bolt pins 4 are retracted within the case 2, and a position corresponding to the closed condition of the lock, in which the bolt pins 4 project outside of the case 2 and are received in corresponding seats made in a frame fixed to the doorpost, set adjacent to the door on which the lock 1 is installed. The lock 1 can moreover comprise, in an altogether conventional way, a latch bolt or spring latch 5, pushed elastically towards a position where it is extracted from the case 2 and designed for click-action engagement of a seat in the fixed frame of the doorpost at the moment of closing of the door for withholding the latter in the closed condition even with the bolt member released. Once again in an altogether conventional way, the lock comprises a mechanism whereby, when the key has been rotated up to retraction of the bolt pins 4 within the case 2, the key itself is able to perform an overtravel, which controls recession of the latch bolt or spring latch 5 to enable opening of the door from outside, in the typical case where, on the outside of the door, a handle for control of the latch 5 is not provided. Said handle is, instead, normally provided on the inner side of the door.

[0014] Once again in a conventional way, provided within the case 2 is a pack of safety plates 6, or "gorges", made of metal plate, which are mounted slidably within the case in a direction parallel to their plane and orthogonal to the direction of movement of the bolt member 3. As already indicated, the details of construction regarding the way in which both the bolt member 3 and the safety plates 6 are mounted slidably in the case 2 are not described herein, said details possibly being made in any known way. Once again in an altogether conventional way, the safety plates 6 have windows 6a substantially mating with one another and having serrated edges. Finally, the safety plates 6 have corresponding openings 6b, for engagement of the key, with top edges 6c that are to be engaged by the serrated edges of two bit appendages of the key (an example of key of this type may be seen in Figure 8). When the key is introduced into the lock and rotated about its axis, the serrated edges of the two bits successively come into contact with the edges 6c of the gorges 6 in such a way that the latter are displaced (vertically upwards, as viewed in Figure 1) against the action of elastic means (not visible in Figure 1) or against the mere action of gravity. The serrated edges of the windows 6a of the safety plates 6 and the serrated edges of the two bits of the authorized key are shaped in such a way that the authorized key displaces the gorges 6 into positions such as to enable movement of the bolt member 3. The plate forming part of said member has in fact a safety pin 7 (or "mantonnet"), which projects through the windows 6a of the gorges 6 and finds a free corridor between the tips of the teeth of the windows 6a when the gorges have been displaced by means of the key into the position for enabling movement of the bolt member.

[0015] The structure and operation described so far are the conventional ones of any safety lock of the double-bit type.

[0016] According to the embodiment shown in the figures, the lock at the moment of its first installation has one or more gorges 6 that are withheld temporarily in a position where they are moved away from the resting position, towards which they are recalled by the respective return springs. In the specific case illustrated, only a first gorge 6 has a tooth 8 that is engaged against a catch

9 forming part of an arrest member 10 (Figures 2, 3) in such a way that said gorge 6 is located in a position moved away from its resting position, towards which it is pushed by the respective return spring (not visible in the drawings).

[0017] As may be seen in Figures 2 and 3, the arrest member 10 is constituted by a prismatic block mounted slidably in the case 2 in the same direction of movement as the bolt member 3, between two extreme positions defined by the engagement of an elastic tooth 10a within one or the other of two slits 11, 12 made in the bottom end wall of the casing 2.

[0018] As already said, the lock leaves the factory in the condition illustrated in Figure 1, so that it is installed with the first gorge 6 withheld in the way that may be seen in Figure 1 in a temporary position, in which it is deactivated. In said condition, the lock is controllable with a key of a first type, which is typically the work-site key that can be made available to the staff technically involved in the building works.

[0019] Figure 4 illustrates the lock in the condition of use with the work-site key. Since the first gorge 6 is in its temporary deactivated position, the safety pin 7 finds its way between the teeth of the windows of the gorges throughout a first turn of rotation of the key. At the end of said first turn, the safety pin 7 strikes against a tooth 13, so that further movement of the bolt member is prevented. However, in said condition the bolt pins 4 are extracted, so that the lock can be actuated by means of the work-site key for opening and closing the door on which it is installed.

[0020] Once the building works have been completed, when the premises are handed over to the legitimate owner, the latter uses his master key, inserting it in the lock and rotating it. The master key will be able to actuate the bolt member for both turns of rotation of the key in so far as it is equipped with the profile suited to displacing all the gorges 6 into their position of enabling movement of the bolt member. In particular, when the master key reaches the end of its first turn, the safety pin 7 is not arrested by the tooth 13 in so far as the key controls the raising (as viewed in the figures) of the first gorge 6 so as to prevent interference with the tooth 13. At the same time, once it has reached the end of its two turns of rotation, the master key will have caused a complete travel of the bolt member and at the same time a displacement of the plate 14 for controlling the top vertical sliding bar by an amount sufficient for bringing a cam 16a into contact with an inclined plane 16 of the arrest member 10 (Figure 2) so as to displace the arrest member 10 towards the left (as viewed in Figure 2), into the position illustrated in Figure 3. In this way, it will no longer be possible for the gorges 6 to be withheld in the original temporary position, so that any actuation of the lock by means of the first key, or work-site key, will be impossible.

[0021] As may be seen, the lock is actuatable by means of a work-site key, whilst after the first actuation of the lock with the master key, the lock itself will be actuatable only with the master key. Said result is obtained, in the case of the preferred embodiment, with the simple use of the master key in the lock.

[0022] The aforesaid result can be obtained by withholding even just one of the gorges 6 in the aforesaid temporary position. However, should it be desired to obtain, for example, that different locks of one and the same premises, which are to operate with different master keys, may be actuatable originally with a single work-site key, it is necessary to withhold originally a number of gorges 6 in a deactivated position.

[0023] The embodiment of Figures 6, 6a and 6b differs from the one described above simply as regards the way in which the first gorge 6 is withheld in its temporary position. In this case, said withholding is obtained by means of the engagement, in a slot 20 made in a side edge of the gorge 6, of a tooth 21 projecting from a fixed appendage 22 (in the specific case a body made of plastic material that functions as casing for the return springs of the gorges). As may be seen in Figure 6b, the material chosen and the arrangement of the parts are such that, when the master key is inserted and used, it causes a vertical movement (as viewed in the figure) of the gorge temporarily withheld by the tooth 21, which causes failure of said tooth, with consequent disabling of the work-site key.

[0024] Finally, the embodiment of Figures 7-10 relates to the case of a lock 1 equipped with a lock core 30 which can be dismantled and replaced. In this case, it is the core of the lock that incorporates a plurality of gorges 6 mounted slidably with respect to a frame 31 of the core 30. The core also comprises a plate constituting the bolt member 3, which, in the mounted condition of the core within the case of the lock, is coupled, in a way in itself known, with a plate connected to the bolt pins 4. In the example illustrated, the first one of the gorges 6 is withheld in its temporary position in so far as its tooth 33 is engaged on an appendage 34 of the arrest member 10. The latter has an appendage 35 with a catch engageable selectively in one or in another of two slits (just one of which may be seen in Figure 10, alongside the appendage 35) made in a plate forming part of the frame of the lock core. Insertion of the master key causes deactivation of the arrest member 10 in so far as the bolt member 3 has a pin 36 that comes into contact with a wall 37 of the arrest member 10. Otherwise, the structure and operation are altogether similar to the ones already described above.

[0025] As emerges clearly from the foregoing description, the lock according to the invention is able to achieve the purpose of enabling actuation with a work-site key in an initial stage and then of disabling said work-site key and enabling the master key with extremely simple operations, without expenditure in terms of time and without any additional costs in the manufacture of the lock. The result is obtained in an extremely simple and convenient way for the user in so far as it is precisely the first use of the master key that causes disabling of the work-site key.

[0026] Figures 11-16 illustrate a further embodiment

of the lock according to the invention, which enables a considerable increase in the number of locks that originally can be controlled by one and the same work-site key and subsequently can be adapted to operate with different master keys, so as to be totally independent of one another (something that in the first embodiment described above is possible, but limitedly to a smaller number of locks).

[0027] Figure 11 illustrates the lock in conditions of initial supply in the work-site version. In these conditions, the lock actuated by its special work-site key, which is the same for all the locks, has the possibility of performing just two of the four throws possible, as already described previously.

[0028] In this embodiment it may be seen that the lock is further provided with a lever 101 mounted oscillating via a pin 101a on the plate 3 of the bolt member and equipped with a tooth 102, which, under the action of a spring 103, is forced to remain in contact on the coded gorge 6 (for clarity and convenience of illustration the other gorges are not represented).

[0029] Upon insertion of the work-site key it is possible to carry out, as has already been said, only the first two throws in so far as the key, as already described above with reference to the first embodiment, does not enable release of the gorge bearing the tooth 13. In this extreme situation, as may be seen in Figure 12, the tooth 102 of the lever 101 is still kept in contact with the gorge 6, the bolt member 3 not having the possibility of performing a further throw on account of the safety pin 7 constrained by the tooth 13 of the gorge 6.

[0030] With insertion of the definitive master key, there occurs, as already described for the first embodiment, release of the gorge 6 so that the safety pin 7 has the possibility of passing into the window of the gorge 6 and sending the bolt member 3 forwards (Figure 13).

[0031] At this point, a further advance of the bolt member 3 (Figure 14) renders the lever 101 carried thereby free to rotate under the action of the spring 103 in a clockwise direction (as viewed in the figures).

[0032] At the end of the fourth throw, i.e., after two complete turns of rotation of the key (lock completely closed), the lever 101 is located in a final definitive and irreversible position (Figure 15), in which it is withheld against the bent-back edge of the plate 3 of the bolt member by the spring 103.

[0033] In said condition, in the case of opening of the lock, when the last throw is reached, the tooth 102 is located in a position corresponding to a slit 108 made on the gorge 6 at an appropriate height, which enables it to be introduced into a window 109 and to be located in the final opening position (Figure 16).

[0034] If the old work-site key were to be introduced by chance into the lock, unlike the first embodiment described above, the bolt member 3 would not have the possibility of moving, in so far as the tooth 102 would prevent advance thereof since it would not find the slit 108 on account of the different code of the gorge or gorges 6, which is/are released with the insertion of the master key (according to the level of mastering, up to six gorges can be provided).

[0035] Naturally, without prejudice to the principle of the invention, the details of construction and the embodiments may vary widely with respect to what has been described and illustrated purely by way of example herein, without thereby departing from the scope of the present invention.

Claims

1. A safety lock comprising:

- a frame (2; 31);
- a bolt member (3) mounted movable in the frame and displaceable by means of rotation of a key in the lock between a first position and a second position corresponding, respectively, to the open condition and to the closed condition of the lock;
- **a safety pin (7) associated to said bolt member (3),**
- a plurality of safety plates or gorges (6) arranged in the frame (2; 31) and displaceable, against the action of spring means or against the action of gravity, by means of rotation of the key in the lock, towards respective positions of enabling of the movement of **said safety pin (7) of** the bolt member (3), said safety lock being **characterized in that** said lock moreover comprises:
- means (10; 22) for temporarily keeping one or more safety plates (6) **deactivated**, so as to enable actuation of the lock with a first key; and
- means for deactivating said means 22) so as to enable actuation of the lock only with a second key different from the first key,- **wherein** said deactivation means are shaped and arranged in such a way that they are actuated automatically as a result of the use of the aforesaid second key in the lock.

2. The safety lock according to Claim 1, **characterized in that** said means comprise an arrest member (10) with a catch (9) co-operating with one or more safety plates (6) to keep them **deactivated.**

3. The safety lock according to Claim **2**, **characterized in that** said catch (9) is carried by an arrest member (10) displaceable in the frame (2) between an active position and an inactive position.

4. The safety lock according to Claim 3, **characterized in that** said arrest member (10) and said frame (2) have surfaces of mutual click-action engagement (10a, 11, 12) to provide a reference of said active

position and of said inactive position of the arrest member (10) .

5. The safety lock according to Claim **3**, **characterized in that** said deactivation means comprise cam-actuation means (16a, 16), which are activated as a result of the rotation of said second key in the lock.

6. The safety lock according to Claim **2, characterized in that** said catch (21) is carried by a part with facilitated failure, which breaks when said safety plates are displaced as a result of the use in the lock of the aforesaid second key.

7. The safety lock according to any one of the preceding claims, **characterized in that** it is of the type comprising a lock core, which can be dismantled and replaced, and **in that** said bolt member (3), said safety plates (6), said arrest member (10) and said deactivation means are carried by the aforesaid core that can be dismantled.

8. The safety lock according to Claim 1, **characterized in that** it comprises auxiliary means for disabling the first key, which prevent, once the second key has been enabled, control of a movement of the bolt member (3) of the lock with said first key starting from the position of complete opening of the lock.

9. The safety lock according to Claim **8**, **characterized in that** one or more of the safety plates (6) has an auxiliary opening (108, 109) for a safety catch (102) carried by the plate (3) of the bolt member, said opening (108, 109) being positioned and shaped in such a way as to prevent the movement of the safety catch (102) and hence of the bolt member in the case of actuation of the lock with the first key, and **in that** said auxiliary means of disabling are designed to cause engagement of said safety catch (102) within said opening (108, 109) following upon the first use of the second key.

10. The safety lock according to Claim **9**, **characterized in that** said safety catch (102) is carried by a movable member (101) mounted on the plate of the bolt member and pushed by elastic means (103) towards a position of end-of-travel.

11. The safety lock according to Claim **10, characterized in that** said movable member (101) is a lever mounted oscillating on the plate (3) of the bolt member.

12. The safety lock according to Claim **10, characterized in that** said movable member (101) is mounted on the plate (3) of the bolt member in a position such that it interferes with said safety plates (6) until the bolt member reaches the position of complete closing following upon the first use of the second key, in such a way that, in the aforesaid condition of closing of the lock, the movable member (101) is free to reach its end-of-travel position, in which it remains definitively, with its safety catch (102) prearranged for engaging the auxiliary opening (108, 109) of the safety plate.

13. **Method of operating a safety lock, said safety lock comprising:**

- a frame (2; 31) ;
- a bolt member (3) mounted movable in the frame and displaceable by means of rotation of a key in the lock between a first position and a second position corresponding, respectively, to the open condition and to the closed condition of the lock;
- a safety pin (7) associated to said bolt member (3),
- a plurality of safety plates or gorges (6) arranged in the frame (2; 31) and displaceable, against the action of spring means or against the action of gravity, by means of rotation of the key in the lock, towards respective positions of enabling of the movement of said safety pin (7) of the bolt member (3);

wherein said method provides:

- temporarily keeping one or more safety plates (6) deactivated, so as to enable actuation of the lock with a first key; and
- activating said one or more safety plates (6) so as to enable actuation of the lock only with a second key different from the first key, wherein said activation is a result of the use of the aforesaid second key in the lock.

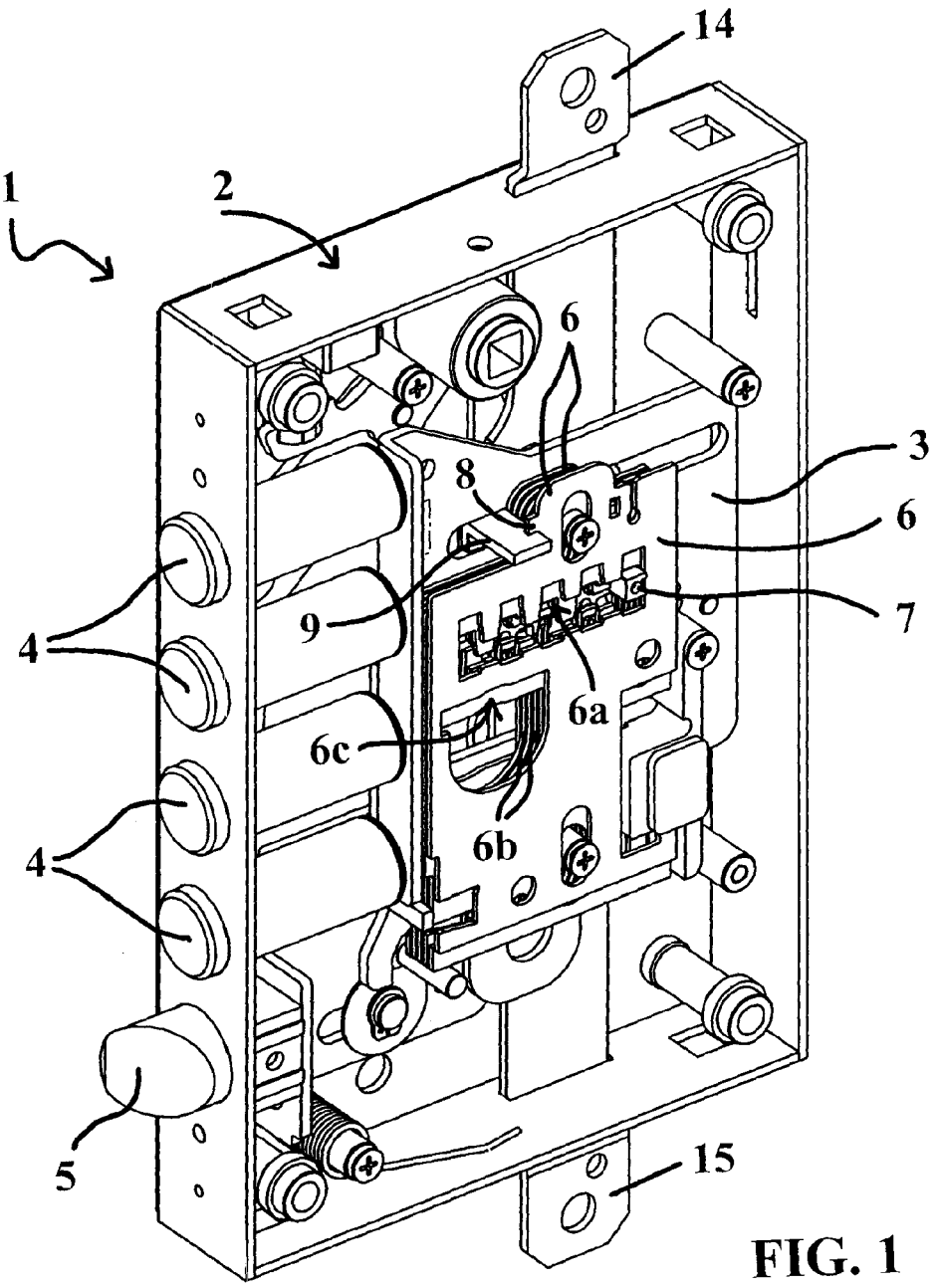


FIG. 1

FIG. 2

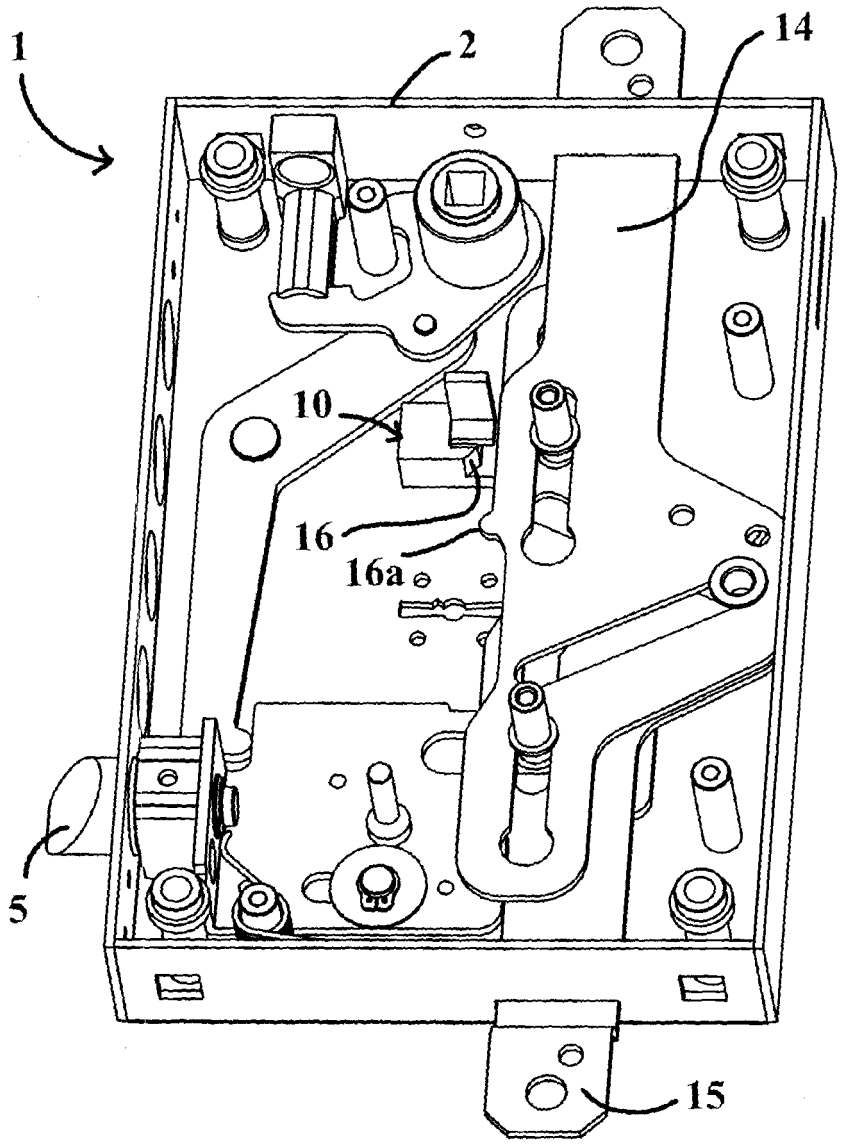


FIG. 3

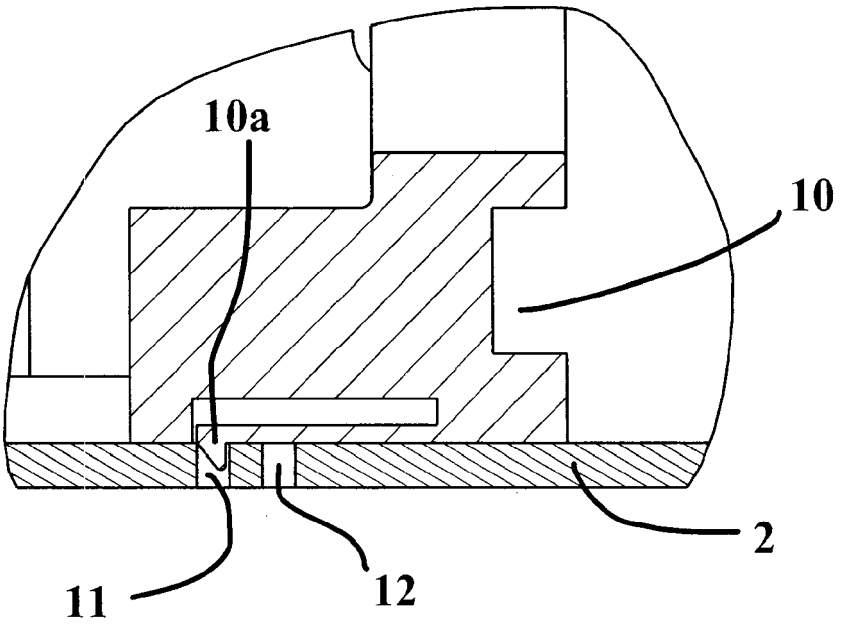


FIG. 4

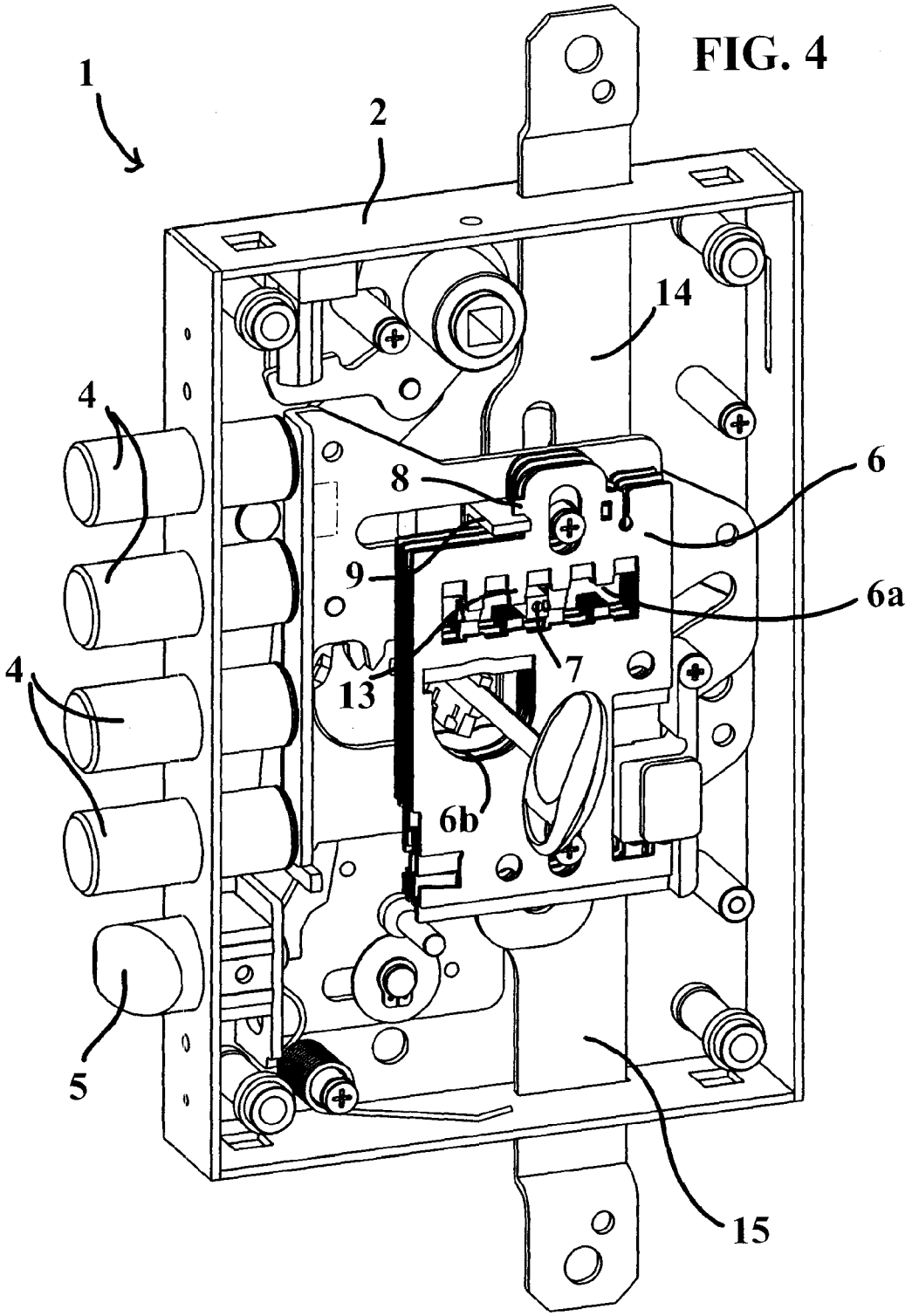


FIG. 5

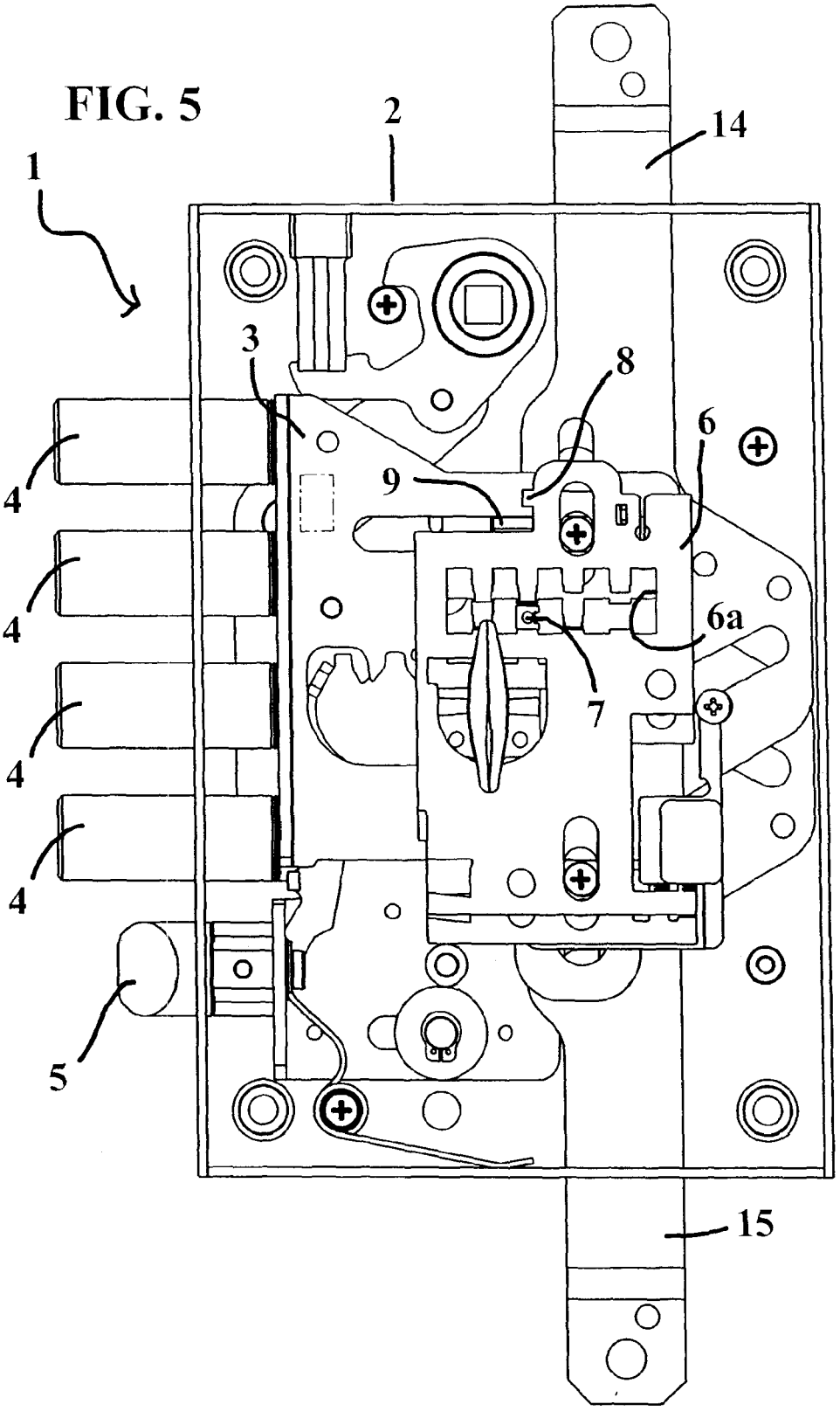
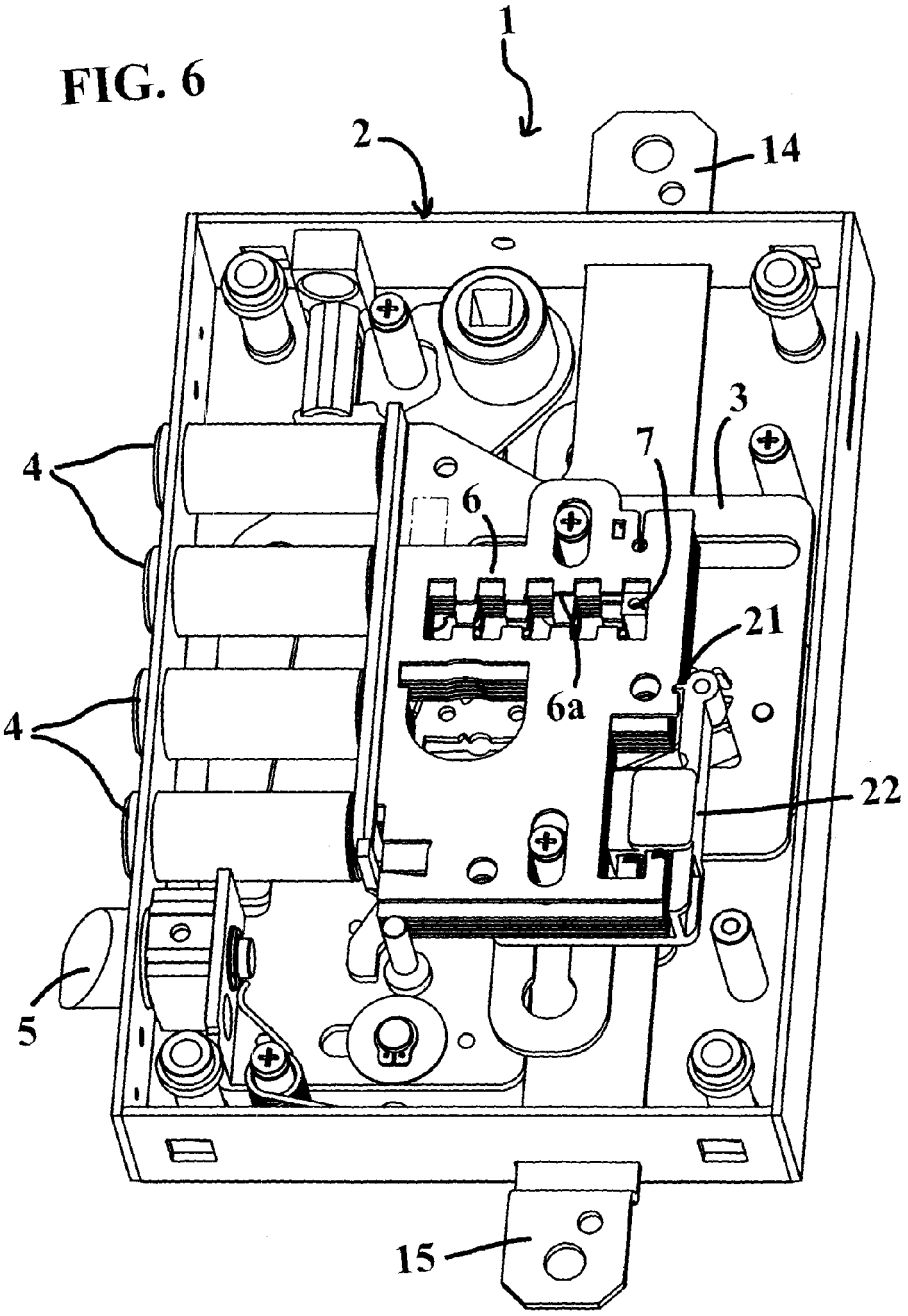


FIG. 6



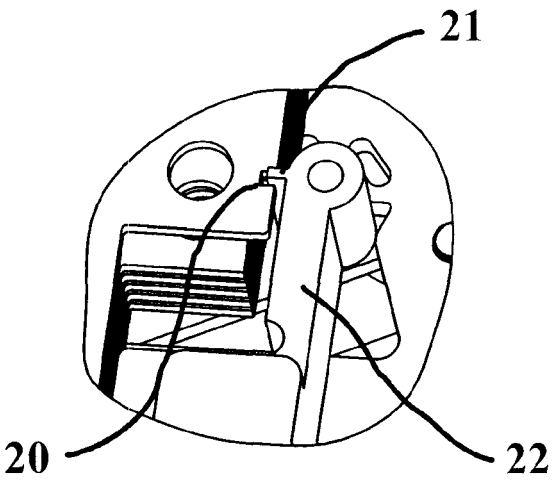


FIG. 6A

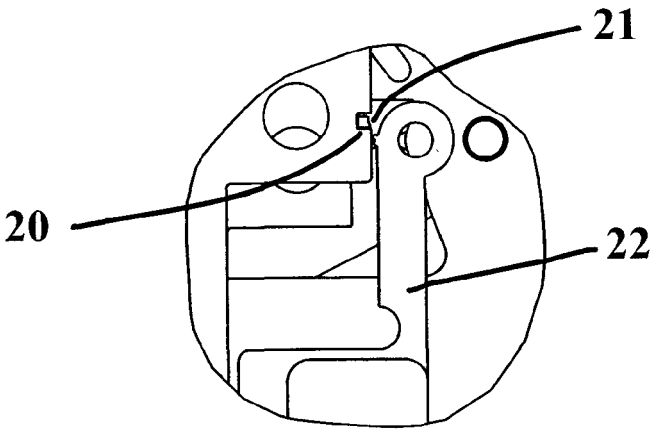
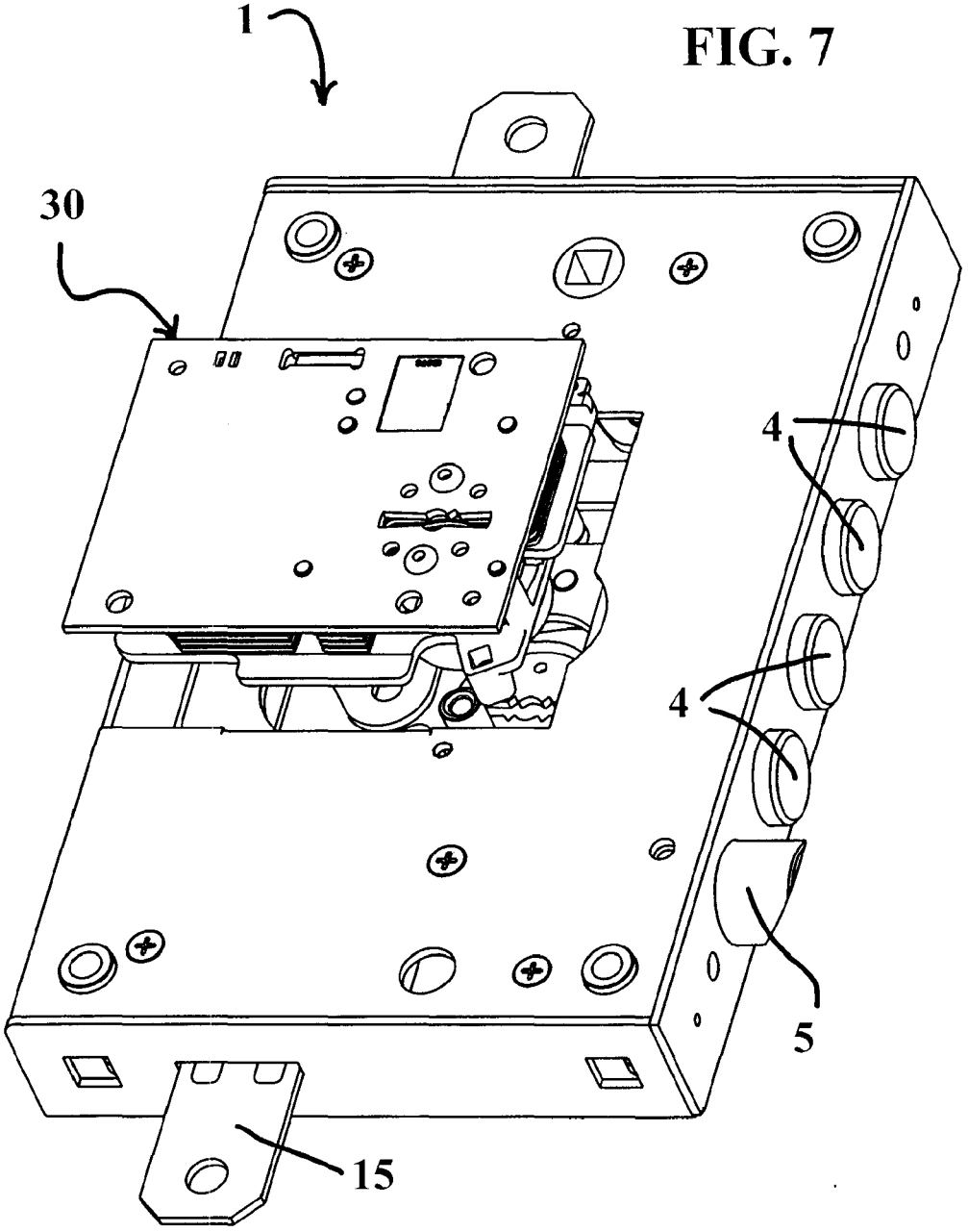


FIG. 6B

FIG. 7



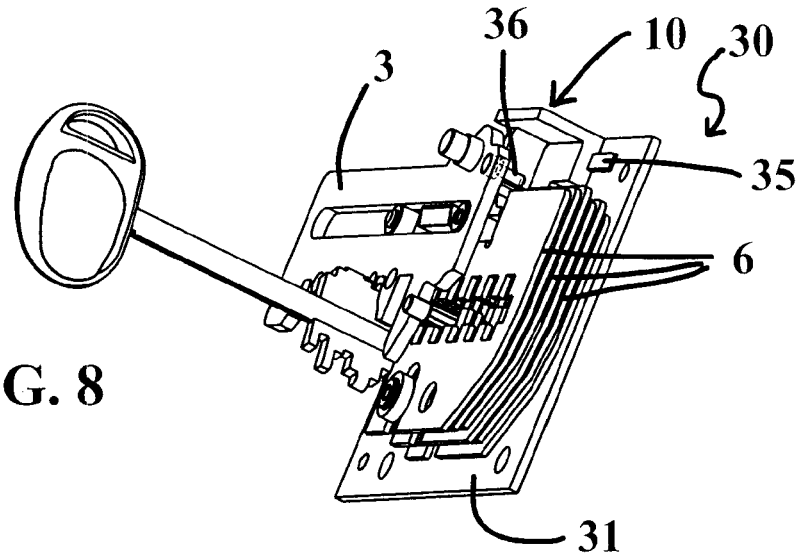
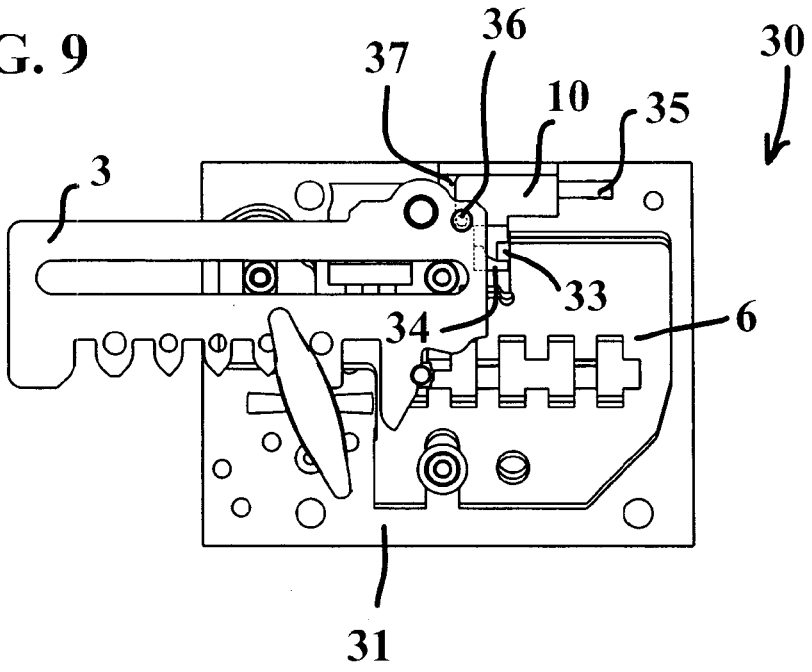


FIG. 8

FIG. 9



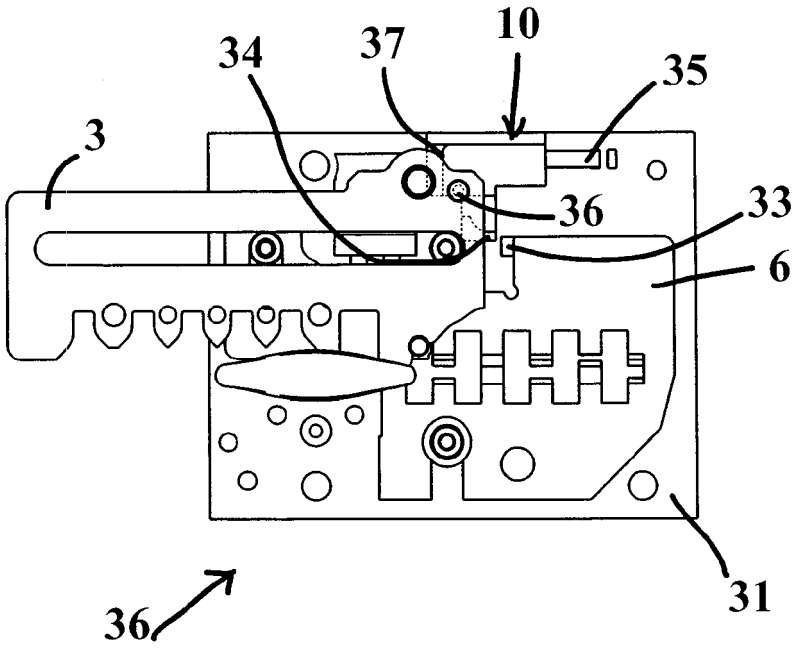


FIG. 10

FIG. 11

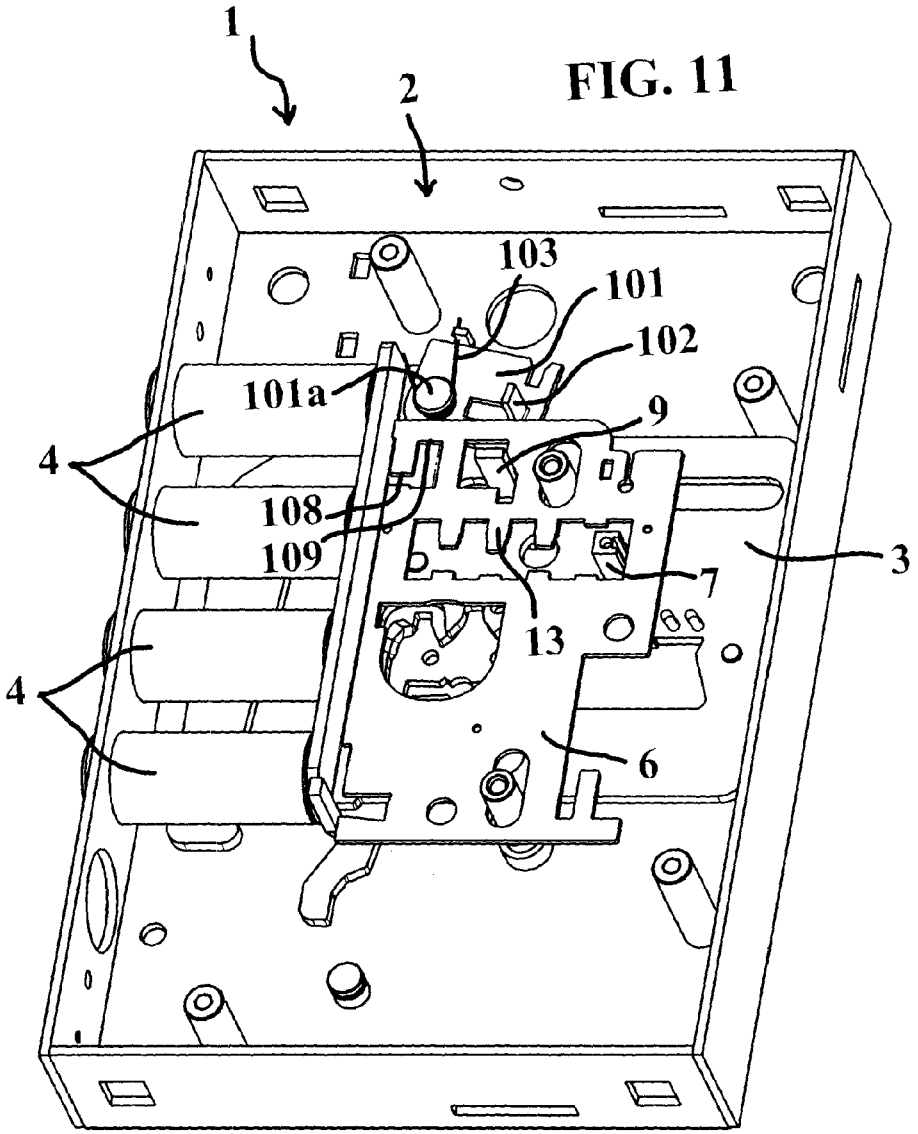
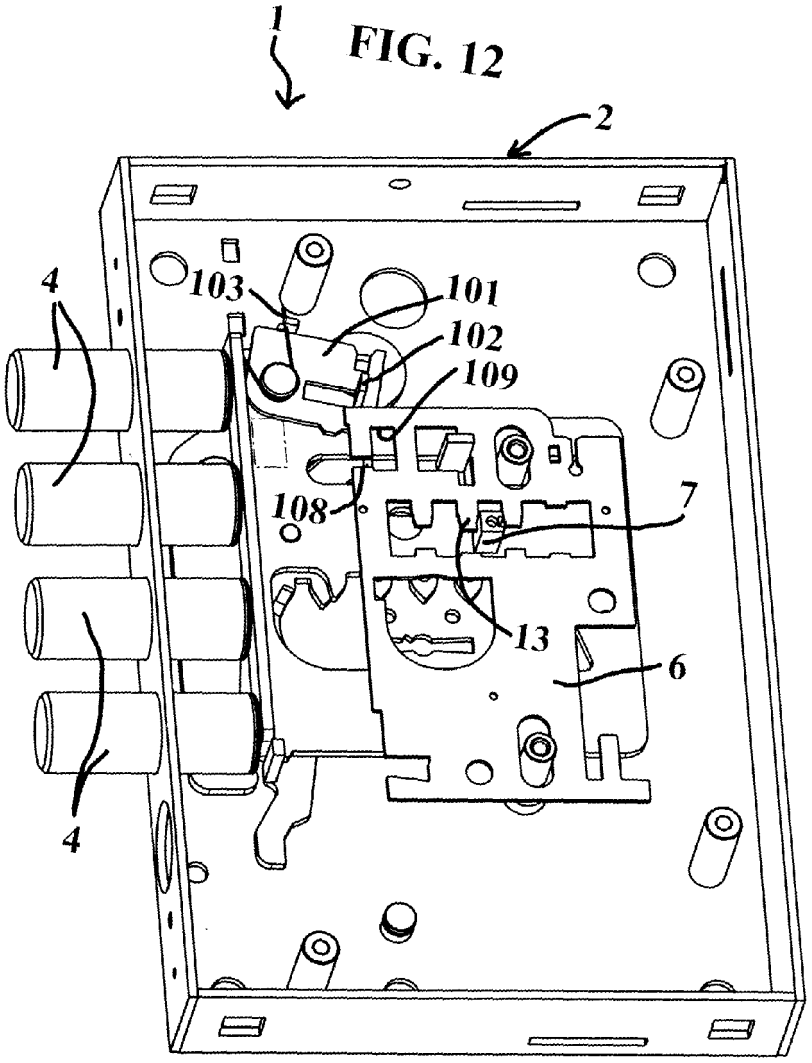


FIG. 12



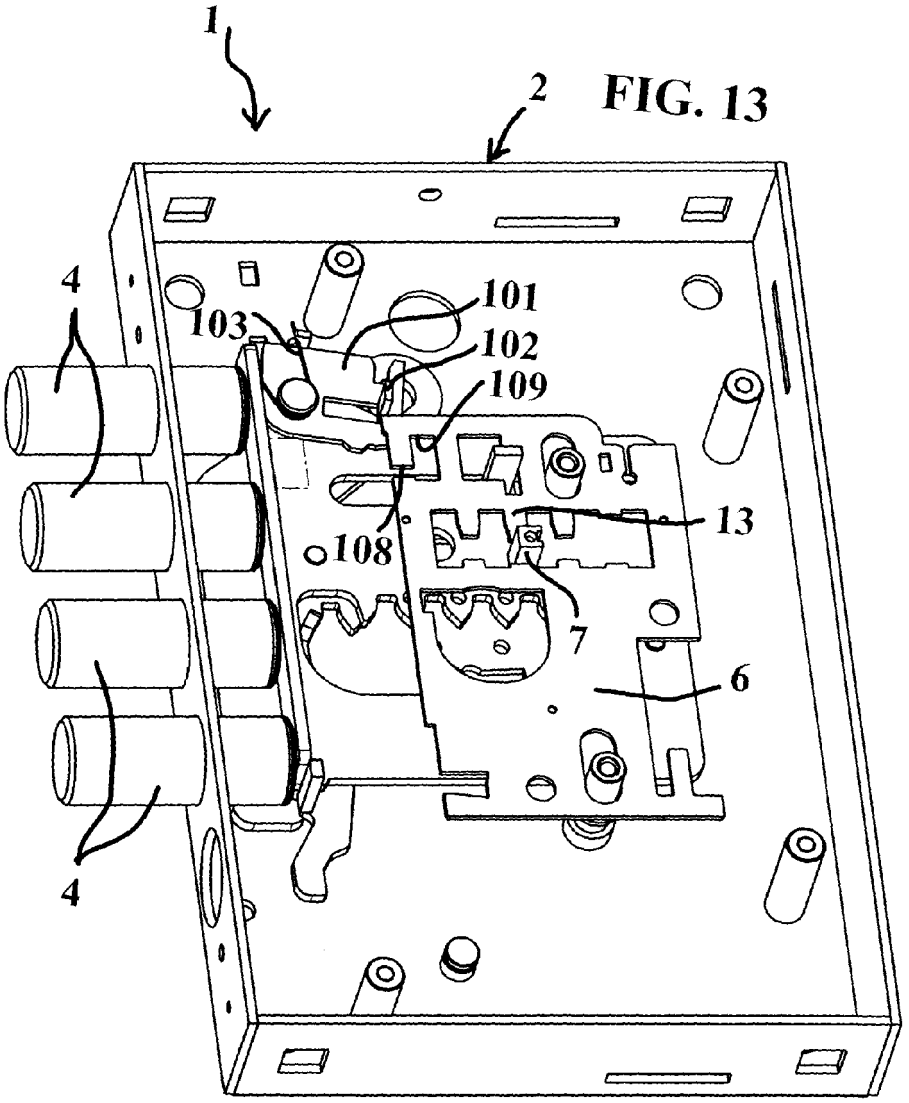
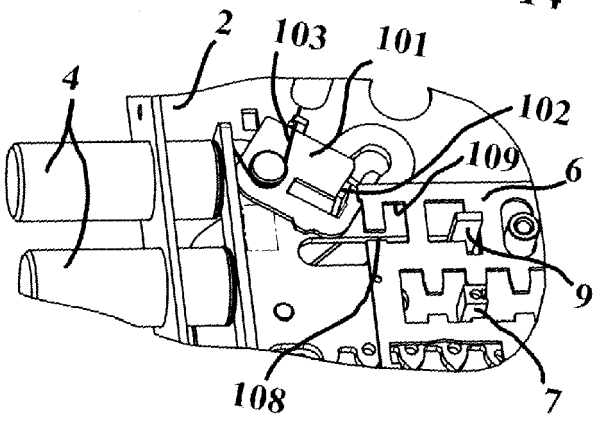


FIG. 13

FIG. 14



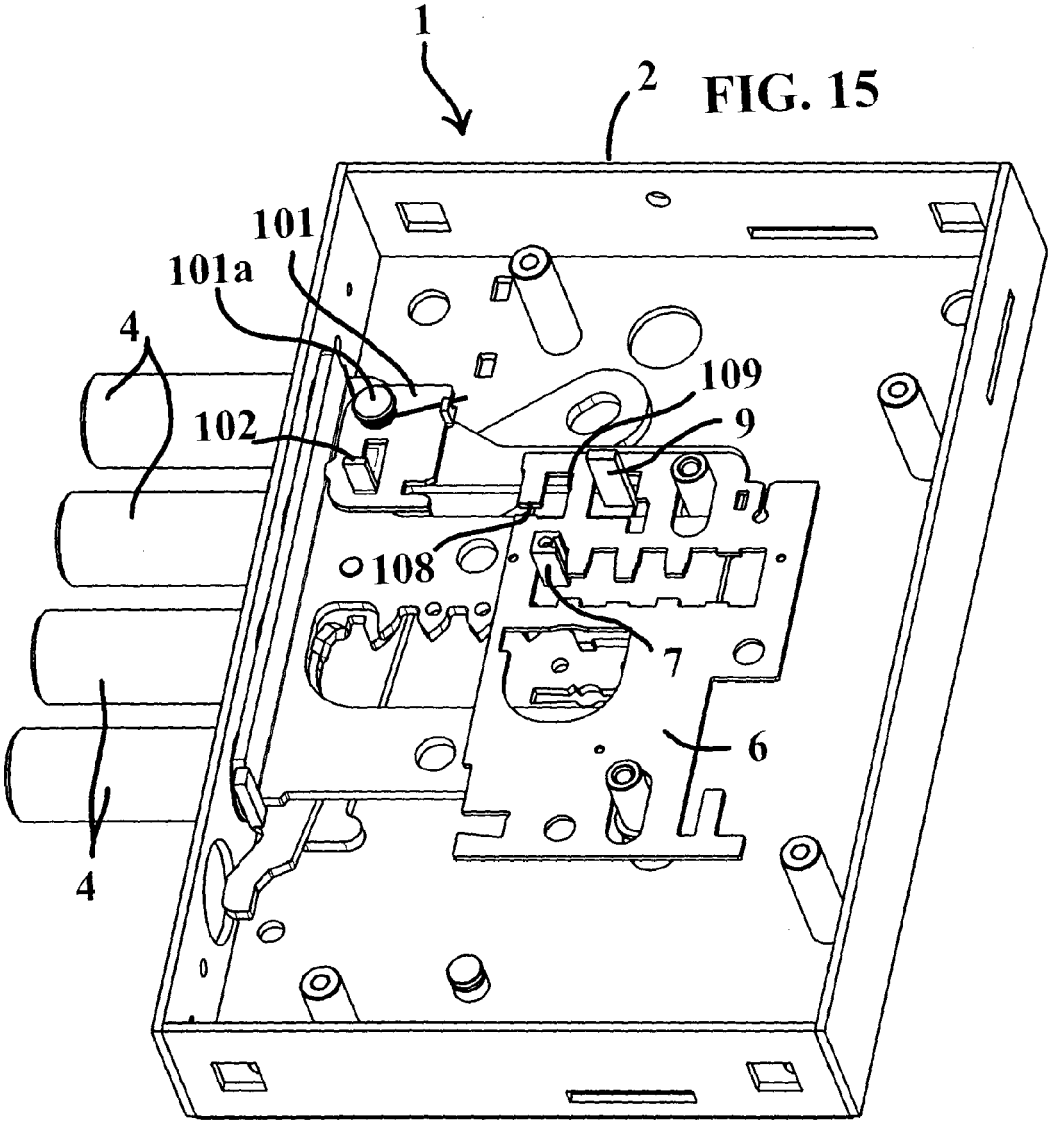
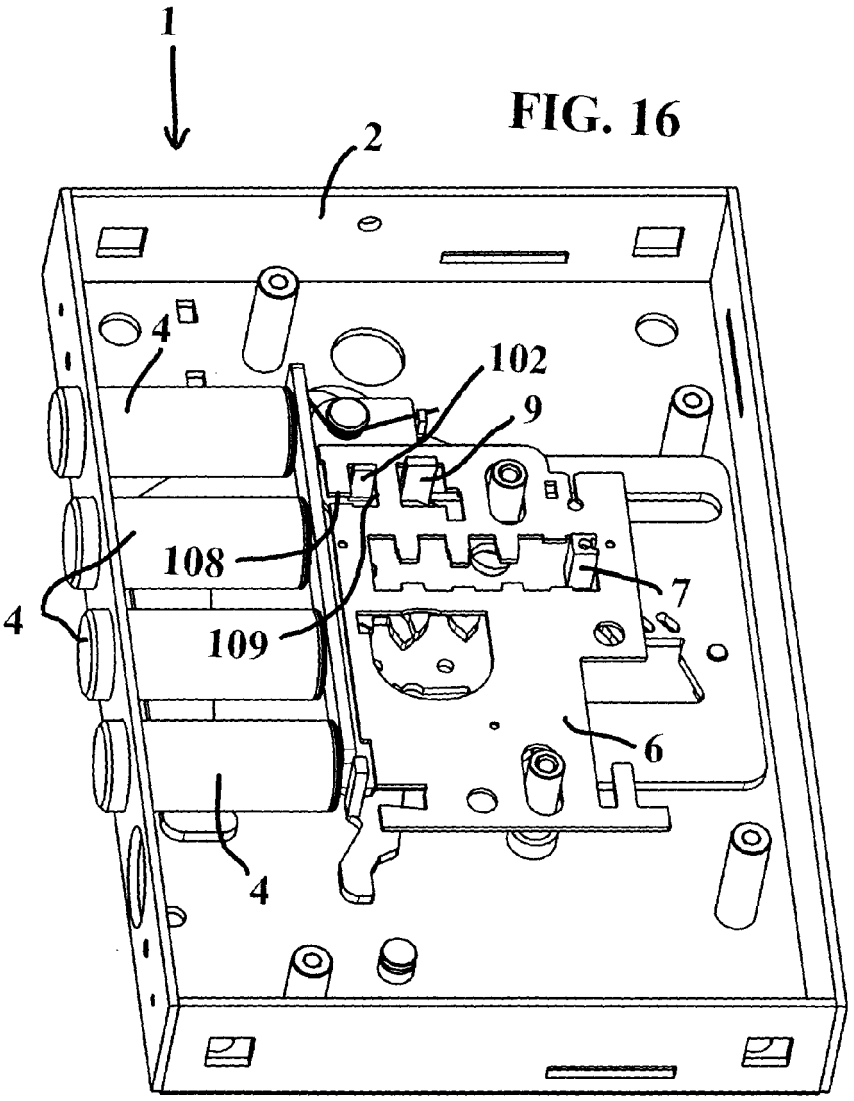


FIG. 15

FIG. 16



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The present search report has been drawn up for all claims

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