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(54) Lock for door and window frames with a high use flexibility

(57) The lock for door and window frames with a high use flexibility comprises a cylinder (1) exhibiting a stator (2), inside which there is housed a rotor (3) whose rotation is performed through the introduction of a key (4) into the same, the cylinder comprises at least one mechanical deadlock exhibiting a pin (5) ciphering and at least one electromechanical deadlock (6) exhibiting an electronic code, the rotor is freely turnable into the stator (2) when the mechanical ciphering and the electronic code of the cylinder correspond to those of the key, the electromechanical deadlock (6) is exclusively housed into the rotor and into the key (4) so that the stator (2) is indifferently adapted to receive, according to the needs, a rotor (3) with the electromechanical deadlock (6) or a rotor with the mechanical deadlock (5) or a rotor (3) with the mechanical and electromechanical deadlock.

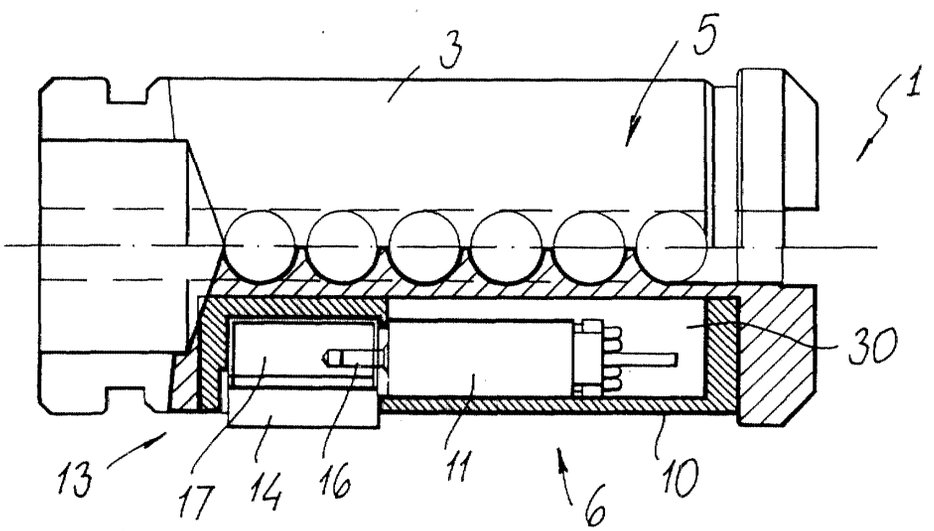

Fig. 7

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Description

[0001] The present finding relates to a lock for door and window frames with a high use flexibility.

[0002] As known, on the market there are different types of locks comprising a cylinder defined by a stator inside which there is arranged a rotor, which is made to rotate by using a key.

[0003] In some types of locks, the cylinder comprises a mechanical deadlock exhibiting an electronic code so that, when the mechanical ciphering and the electronic code of the cylinder correspond to those of the key, it is possible to rotate the rotor into the stator.

[0004] This type of locks provided with mechanical and electromechanical deadlock exhibit the electromechanical components that are partly arranged into both the stator and the rotor, and also, of course, into the rotor control key.

[0005] The above implies several disadvantages essentially caused by the extreme manufacture and use stiffness of the locks, since a lock with mechanical deadlock cannot be changed into a lock with mechanical and electromechanical deadlock, or only electromechanical and vice versa.

[0006] This implies the production and storage of a sufficient number of locks and relevant spare parts, according to the type, so as to meet market requirements.

[0007] This disadvantage arises, above all, from the fact that the in the lock cylinder, the stator is structured so as to not receive, for example, a rotor with electromechanical deadlock, or in replacement of it a rotor with only mechanical deadlock, or a rotor with both electromechanical and mechanical deadlock without distinction.

[0008] This has a great impact on business production systems that, according to the requirements, must realise cylinders with mechanical deadlock or cylinders with mechanical and electromechanical deadlock, or cylinders with electromechanical deadlock.

[0009] As a consequence, for the same man skilled in the art, also the replacement of the lock implies the fact of not having the possibility to easily and quickly pass to the realisation, for example, of a lock with electromechanical and mechanical deadlock from a lock with mechanical deadlock and vice versa, without replacing all components of the cylinder of the same.

[0010] As a consequence, besides having considerable production costs, there are also considerable expenses for storing the different types of cylinders for locks for door and window frames, for managing the same, for spare parts and, last but not least, for less safety since the same type of deadlock must be used for both the inside and the outside of a lock.

[0011] Object of the present finding is that of eliminating the above disadvantages of the prior art.

[0012] Within the scope of such object, an important purpose of the finding is that of realising a lock for door and window frames with a high use flexibility which should allow using the same stator for introducing into the same rotors with mechanical and electromechanical, or only mechanical, or only electromechanical, deadlock, without having to make any changes to the stator.

[0013] Another purpose of the finding is that of realising a lock with a cylinder having electromechanical and mechanical deadlock outside the lock, so as to guarantee higher security (non-duplicable key, resistant cylinder and mechanical handling systems, etc.) and more flexibility for access control management (creation of new keys, cancellation, usage limitations in some times, etc.) and a cylinder with mechanical deadlock into the lock, so as to allow higher safety for the inside (opening without electrical contacts) without having to make any changes to the stator.

[0014] Another purpose of the finding is that of realising a lock which should exhibit a very low impact on the production systems being used for cylinders with mechanical deadlock.

[0015] A further purpose of the finding is that of realising a lock which should exhibit maximum flexibility in the production of rotors in a factory, since a rotor with electronic deadlock can be mounted in the same way as a rotor with electromechanical and mechanical deadlock in the same stator.

[0016] A further purpose of the finding is that of realising a lock which should be replaced more easily since there should be less parts and thus, less replacement time, since the possibility of adapting the lock cylinder, changing from an operation with mechanical deadlock to a mechanical and electromechanical deadlock is possible also without using special tools and without having particular technical skills.

[0017] Last but not least, another purpose of the finding is that of realising a lock which, among the other things, should allow the operator to change the electromechanical deadlock ciphering and, among the other thing, to mount a rotor with mechanical deadlock into the lock, and a rotor with also electromechanical deadlock outside the same.

[0018] This object, as well as these and other purposes, are obtained through a lock for door and window frames with a high use flexibility comprising a cylinder exhibiting a stator, inside which there is housed a rotor whose rotation is performed through the introduction of a key into the same, said cylinder comprising at least one mechanical deadlock exhibiting a pin ciphering and at least one electromechanical deadlock exhibiting an electronic code, said rotor being freely turnable into said stator when said mechanical ciphering and said electronic code of said cylinder correspond to those of said key, characterised in that said electromechanical deadlock is exclusively housed into said rotor and into said key so that said stator is indifferently adapted to receive, according to the needs, a rotor with said electromechanical deadlock or a rotor with said mechanical deadlock or a rotor with said mechanical and electromechanical

deadlock.

[0019] Further features and advantages of the present invention shall appear more clearly from the description of a preferred but non-exclusive embodiment of the lock for door and window frames with a high use flexibility according to the finding, illustrated by way of an indicative and non-limiting example in the attached drawings. In such drawings:

- Figure 1 shows a longitudinal sectioned view of the cylinder of the lock according to the finding;
- Figure 2 shows a view along the section line 2.2 of figure 1 showing the system for opening and closing the lock according to the finding;
- Figure 3 shows a section line along line 3.3 of figure 1 according to the finding;
- Figure 4 shows a view along the section line 4.4 of figure 1 according to the finding;
- Figure 5 shows a view along the section line 5.5 of figure 1 according to the finding;
- Figure 6 shows a view along the section line 6.6 of figure 1 according to the finding;
- Figure 7 shows a view along the section line 7.7 of figure 1 according to the finding;
- Figures 8 and 9 respectively show a side elevation view and a plan view of the key of the cylinder according to the finding;
- Figure 10 shows an exploded view of the lock according to the finding, provided with a mechanical resetting unit;
- Figure 11 shows a schematic and side elevation view of the mechanical resetting unit;
- Figure 12 shows a transversal section of the lock provided with the mechanical resetting unit with vibration-damping mechanism;
- Figure 13 shows a transversal section of the lock provided with the mechanical resetting unit without vibration-damping mechanism;
- Figure 14 shows a side elevation view of the key adapted to actuate the mechanical resetting mechanism;
- Figure 15 shows a longitudinal section of the electromechanical deadlock.

[0020] With reference to the above figures, the lock according to the finding comprises a cylinder 1 exhibiting, in an in se known manner, a stator 2 inside which there is housed a rotor 3 whose rotation is performed through the introduction of a key 4 into the same.

[0021] The cylinder taken as an example exhibits a mechanical deadlock having a pin ciphering of the known type, and indicated with reference numeral 5.

[0022] Advantageously, as it is evident from the attached figures (in particular, from figure 7, 12, 13) the mechanical deadlock is of the traditional type, with vertical flat key and pins arranged in line into the stator and coplanar with the rotor slit wherein key 4 is introduced.

[0023] In particular, such solution provides for the key slit to be substantially arranged coaxially to the rotor and so that consequently, the pins are arranged on the rotor centre line.

[0024] What said also applies to horizontally arranged slits.

[0025] Moreover, the cylinder also exhibits an electromechanical deadlock, collectively indicated with reference numeral 6, exhibiting an electronic code so that, when the mechanical ciphering and the electronic code of cylinder 1 correspond to those of key 4, it is possible to make the rotor rotate into stator 2.

[0026] Advantageously, the electromechanical deadlock is exclusively housed into rotor 3 and into the control key 4 of the same.

[0027] In this way, stator 2 is indifferently adapted to receive, according to the needs, a rotor 3 with electromechanical deadlock or with mechanical deadlock, or a rotor 3 with mechanical and electromechanical deadlock.

[0028] Advantageously, rotor 3 is adapted to receive indifferently the mechanical and/or electromechanical deadlock on one of the two sides or on both, so as to have a technical solution suitable for the user's requirements on both the inside and the outside of the door.

[0029] In particular, on one or on both its sides rotor 3 exhibits a housing 30 adapted to house the electromechanical deadlock 6.

[0030] The electromechanical deadlock 6 comprises a body 10 inside which there is present an actuator 11, a first electronic circuit 12 and a linkage 13 adapted to bring a deadlock element 14 in engagement and disengagement with a recess 15 into stator 2.

[0031] More in detail, linkage 13 comprises a small shaft 16 that is actuated by actuator 11, which for example can be a motor or an electro-magnet, which exhibits an end connected to a cam 17 whose rotation determines the movement of the deadlock element, defined for example by a pin moving along a guide 18 of body 10 so as to engage and disengage with recess 15 of stator 2.

[0032] Cam 17 exhibits a semi-cylindrical housing 19 with elongated configuration conjugated with that of pin 14.

[0033] Clearly, recess 15 is arranged into the inside surface of stator 2 so as to face guide 18 of body 10, so that the rotation of cam 17, moving pin 14 into recess 15, determines the lock of the rotor into the stator whereas, on the contrary, when pin 14 is housed into the semi-cylindrical housing 19, the rotor is free to rotate into the stator.

[0034] Moreover, the electronic circuit 12 is provided with a first and a second contact 20 and 21 that are mobile in contrast and under the action of elastic means, for example springs 22, into body 10.

[0035] Moreover, key 4 is provided with a second electronic circuit 25 that is powered by a battery 26 arranged into its handle, as the second electronic circuit 25.

[0036] Moreover, key 4 is provided with third contacts 27 arranged on its body portion 28 that can be introduced into rotor 3.

[0037] During the introduction of the key into the rotor, the third comb-wise contacts 27 of the key are adapted to connect to the first and second contacts 20 and 21 so as to allow data transmission from the second electronic circuit 25 to the first electronic circuit and vice versa, and they also allow powering actuator 11.

[0038] Advantageously, body 10 is removably associated - through connection means such as screws or clamping systems of the known type, into housing 30 of the rotor, and it exhibits its surface, facing stator 2, whose configuration is conjugated to the same.

[0039] The operation of the lock for door and window frames according to the finding is evident from what described and illustrated.

[0040] In particular, once key 4 has been introduced into the rotor and thus the mechanical ciphering and the electronic code of the key and of the cylinder match, the cam rotates and thus pin 14 disengages from recess 15, thus allowing the rotation of the rotor into the stator and the opening of the lock.

[0041] Moreover, the lock according to the finding is provided with a mechanical resetting unit adapted to lock the electromechanical deadlock, thus preventing the rotation of rotor 3 when the key is extracted from rotor 3.

[0042] In practice, the mechanical resetting unit makes cam 17 rotate, making it lock pin or deadlock element 14 into recess 15 of the stator.

[0043] In this way, rotor 3 cannot turn into stator 2 and the lock cannot be opened.

[0044] The mechanical resetting unit comprises an end tooth 51 integral with cam 17 and operatively associated to a first arm 52 of a spring 53.

[0045] Spring 53 is supported in 54 by body 10, and exhibits a second arm 55 associated to an end of pin of deadlock element 14, so as to push it towards body 10 (thus moving it away from cam 17).

[0046] The mechanical resetting unit also comprises a second spring 56, also supported by body 10, which pushes the other end of the deadlock element 14 towards body 10 (thus moving it away from cam 17).

[0047] Body 10 exhibits inside portions 57 against which arm 52 of spring 53 abuts so as to limit the rotation of cam 17.

[0048] The mechanical resetting unit also comprises a resetting pin 58 that can be actuated by the key upon extraction, sliding into a housing of body 10 connected to slit 59 of rotor 3.

[0049] Pin 58 exhibits a substantially conical portion and a cylindrical portion provided with shoulder to prevent the pin from exiting from the housing.

[0050] A base portion of pin 58 is operatively associated to arm 52 so that the same pin 58 is mobile in contrast and under the action of arm 52 of spring 53.

[0051] The mechanical resetting unit requires a key of the type shown in figure 14.

[0052] Such key exhibits a groove 60 provided with inlets/outlets at the ends in which the resetting pin 58 is introduced.

[0053] In fact, when the key is inserted the unit is not active since the resetting pin introduces into groove 60 and does not press arm 52 of spring 53.

[0054] On the other hand, when the key is extracted, the pin exits from groove 60 and is pressed by the side surface of the key against arm 52 of spring 53.

[0055] This makes tooth 51, and thus cam 17, rotate by about 90°, thus locking rotor 3 (figures 12 or 13).

[0056] The successive introduction of key 4 into rotor 3 does not free rotor 3 since it re-enters into its housing and moves arm 52 without making the latter act on tooth 51.

[0057] In two different realisation times, the resetting pin 58 is aligned with one of the pins of the mechanical deadlock 5 (as shown in figure 12) or arranged between two pins of the mechanical deadlock 5 (as shown in figure 13).

[0058] In the first case (figure 12), when the key is extracted, the pins of the mechanical deadlock 5 rise and at least one pushes the resetting pin 58 into its housing.

[0059] In turn, this presses arm 52 of spring 53 that remains associated to tooth 51, thus preventing possible undesired vibrations, in particular of cam 17.

[0060] On the other hand, in the second case the resetting pin 587 is pushed towards slit 59 by arm 52 of spring 53.

[0061] The electronic circuit (not shown) is contained into a housing obtained in the rotor at an opposed side with respect to the electromechanical deadlock.

[0062] In practice, it has been proved that the lock according to the finding is particularly advantageous for exhibiting a lock cylinder wherein the stator remains unchanged irrespective of the use or of the introduction of rotors with electromechanical and mechanical deadlock into it, or only mechanical or electromechanical deadlock.

[0063] The finding thus conceived can be subject to several changes and variants, all falling within the scope of the inventive concept; moreover, all details can be replaced with technically equivalent elements.

[0064] In practice, the materials used as well as the sizes, can be of any type according to the requirements and to the prior art.

Claims

1. Lock for door and window frames with a high use flexibility, comprising a cylinder exhibiting a stator, inside which there is housed a rotor whose rotation is performed through the introduction of a key into the same, said cylinder comprising at least one mechanical deadlock exhibiting a pin ciphering and at least one electromechanical deadlock exhibiting an

electronic code, said rotor being freely turnable into said stator when said mechanical ciphering and said electronic code of said cylinder correspond to those of said key, **characterised in that** said electromechanical deadlock is exclusively housed into said rotor and into said key so that said stator is indifferently adapted to receive, according to the needs, a rotor with said electromechanical deadlock or a rotor with said mechanical deadlock or a rotor with said mechanical and electromechanical deadlock.

2. Lock for door and window frames with a high use flexibility, comprising a cylinder exhibiting a stator, inside which there is housed a rotor whose rotation is performed through the introduction of a key into the same, said cylinder comprising at least one mechanical deadlock exhibiting a pin ciphering and at least one electromechanical deadlock exhibiting an electronic code, said rotor being freely turnable into said stator when said mechanical ciphering and said electronic code of said cylinder correspond to those of said key, **characterised in that** at least the actuator of said electromechanical deadlock is housed into said rotor.

3. Lock for door and window frames with a high use flexibility according to claims 1 or 2, **characterised in that** said rotor exhibits a housing realised on at least one of its sides and adapted to house said electromechanical deadlock.

4. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said electromechanical deadlock comprises a body containing said actuator, a first electronic circuit and a linkage adapted to bring a deadlock element in engagement and disengagement with a recess inside said stator.

5. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said linkage comprises a small shaft, actuated by said actuator, connected to a cam for moving said deadlock element along a guide of said body, in engagement and disengagement with said recess of said stator.

6. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said deadlock element is a pin and that said cam exhibits a semi-cylindrical housing adapted to move said pin along said guide.

7. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said recess is arranged into said stator facing said guide of said body.

8. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said electronic circuit comprises at least a first and a second contact mobile in contrast and under the action of elastic means into said body.

9. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said key comprises a second electronic circuit powered by a battery inside its handle, and at least third contacts arranged on its body portion that can be introduced into said rotor, said third contacts being adapted to connect with said first and second contacts for the data transmission from said second electronic circuit to said first electronic circuit and vice versa, and for powering said actuator.

10. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said body is removably associated through connection means into said housing of said rotor.

11. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said body exhibits the surface facing said stator having a configuration conjugated to the same.

12. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** it comprises a mechanical resetting unit adapted to lock said electromechanical deadlock thus preventing the rotation of the rotor when the key is extracted from the rotor.

13. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said mechanical resetting unit comprises an end tooth that actuates the cam and that is operatively associated to elastic means, in turn such elastic means is associated to a resetting pin that can be actuated by the key upon extraction.

14. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** it comprises further elastic means adapted to push said deadlock element towards the body, thus moving it away from said cam.

15. Lock for door and window frames with a high use

flexibility according to one or more of the previous claims, **characterised in that** said key exhibits a groove in which the resetting pin is introduced.

16. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said mechanical deadlock is of the type with traditional key and pins centrally arranged in line into the stator and rotor, and coplanar with the substantially vertical slit of the rotor wherein said key is introduced.

17. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said mechanical deadlock is of the type with flat key and pins substantially arranged orthogonally to the substantially horizontal slit of the rotor wherein said key is introduced.

18. Lock for door and window frames with a high use flexibility according to one or more of the previous claims, **characterised in that** said slit of said key is substantially arranged on a longitudinal axis of said rotor (3).

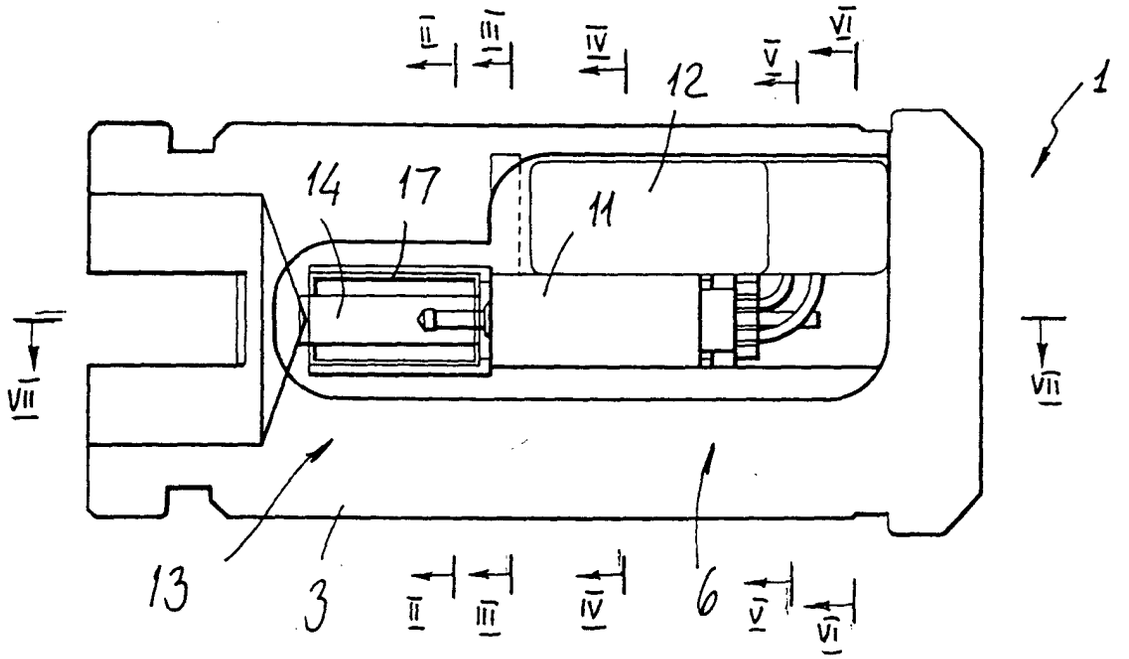
II
III
IV
V
VI
12
1
14
17
11
VII
VII
13
3
II
III
IV
6
V
VI

Fig. 1

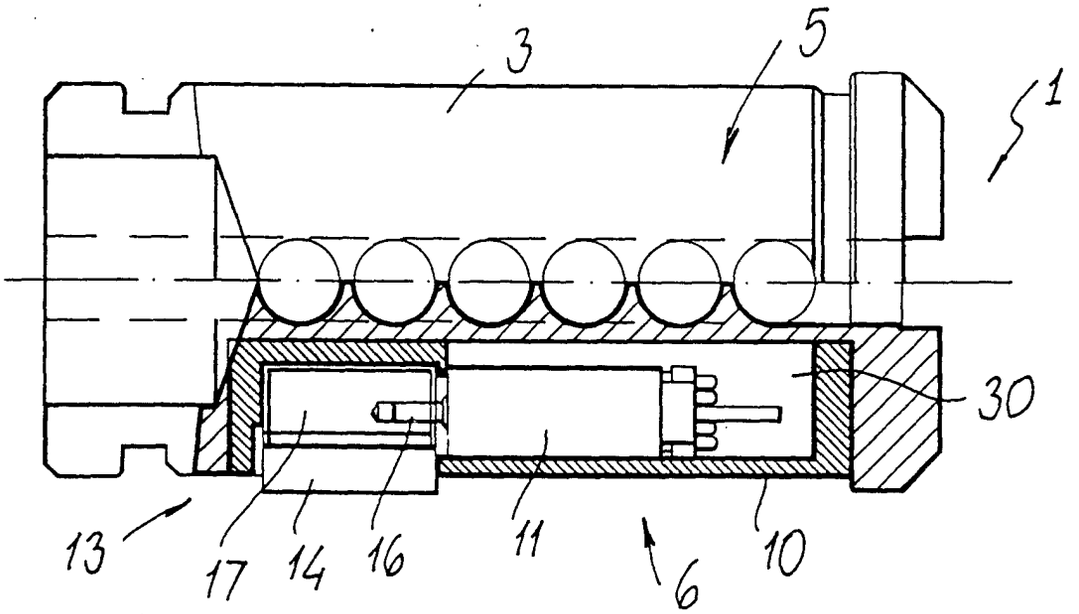
3
5
1
30
13
17
14
16
11
6
10

Fig. 7

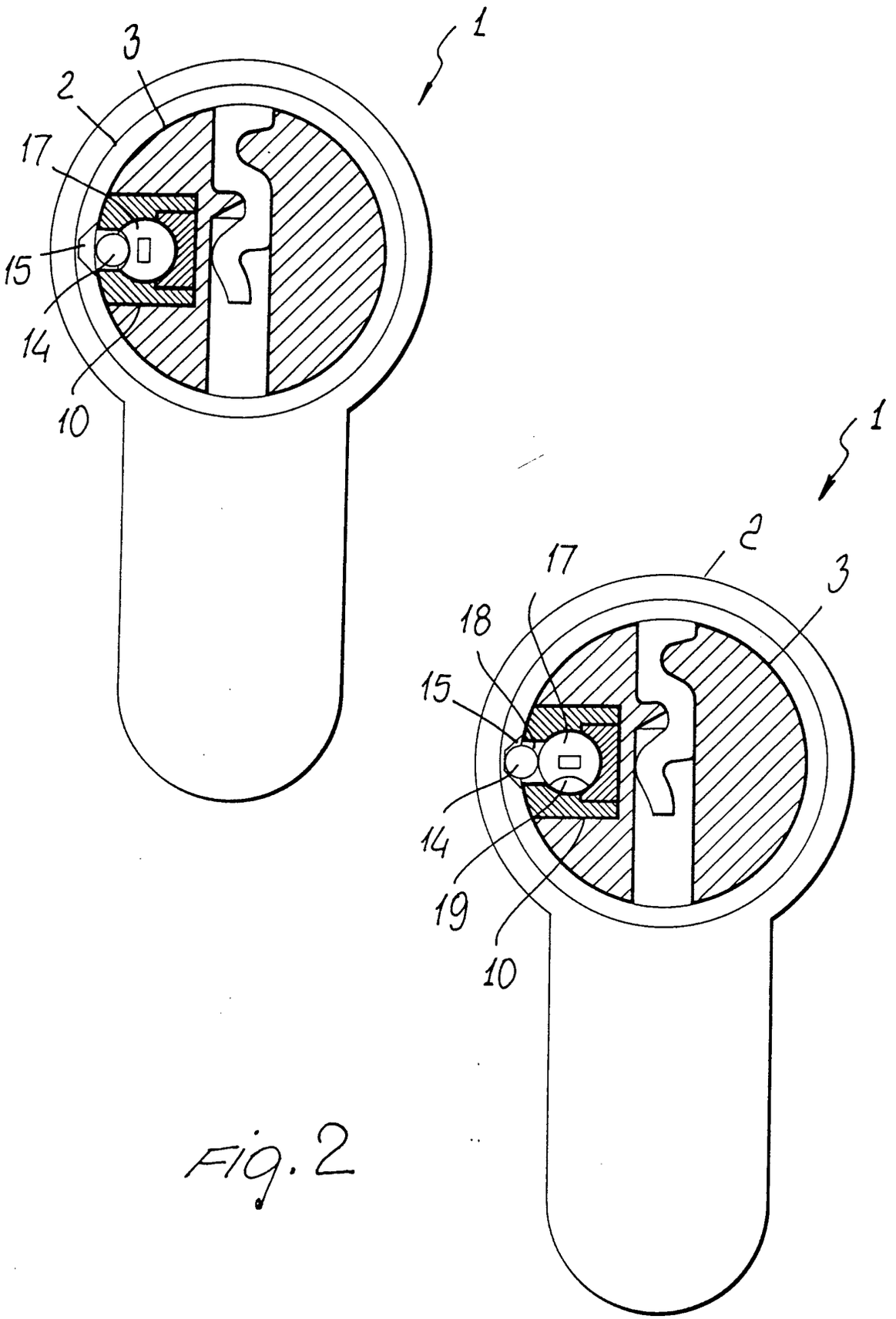

Fig. 2

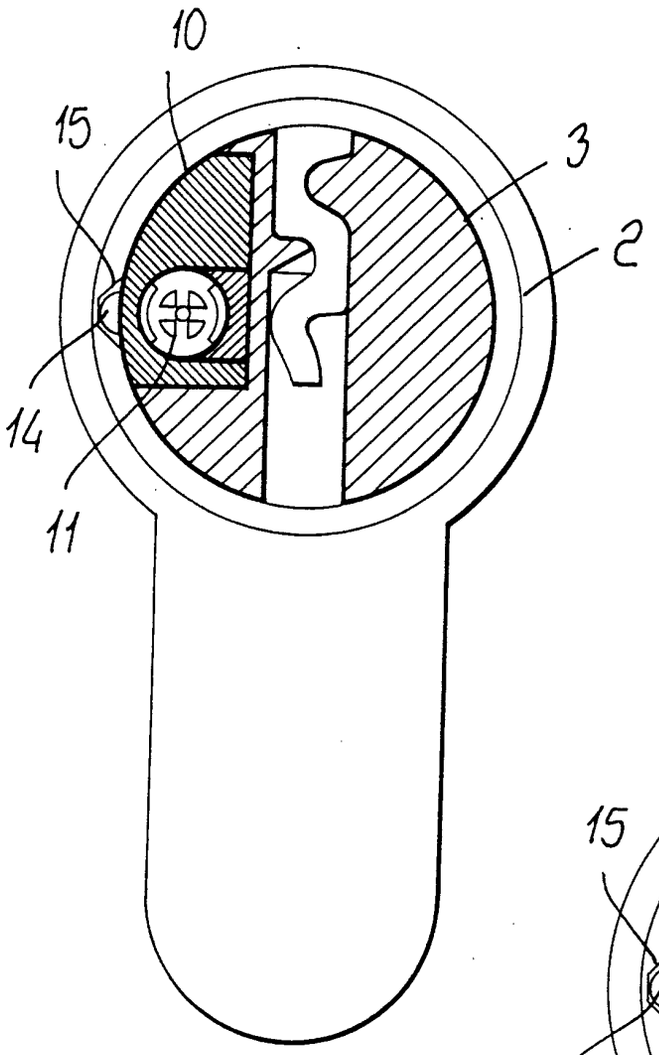

FIG. 3

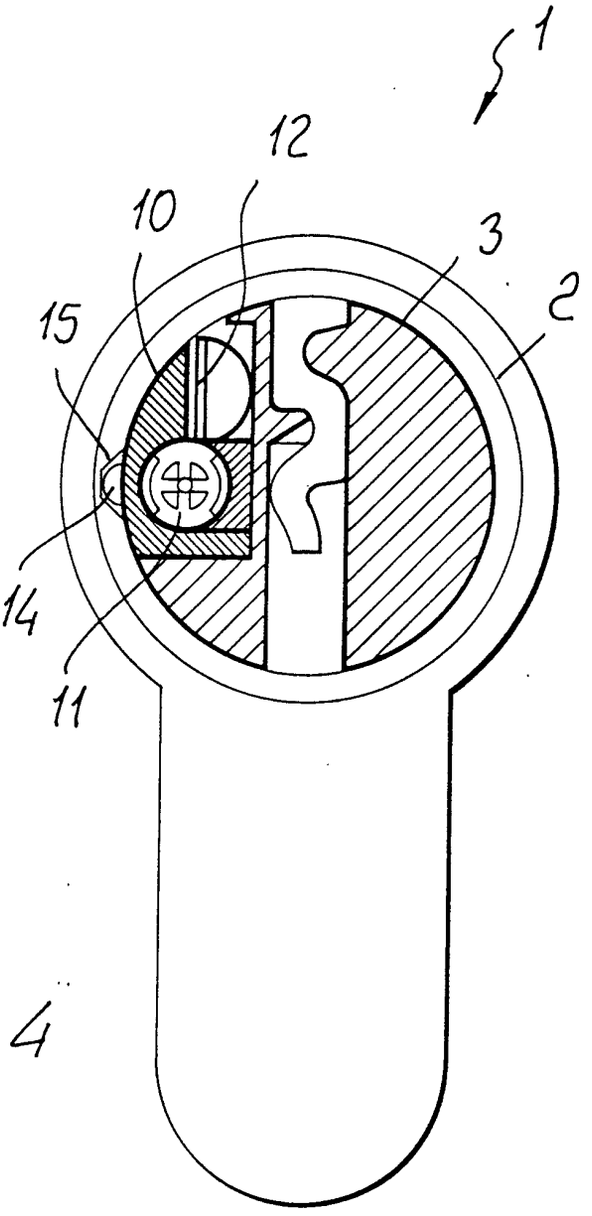

FIG. 4

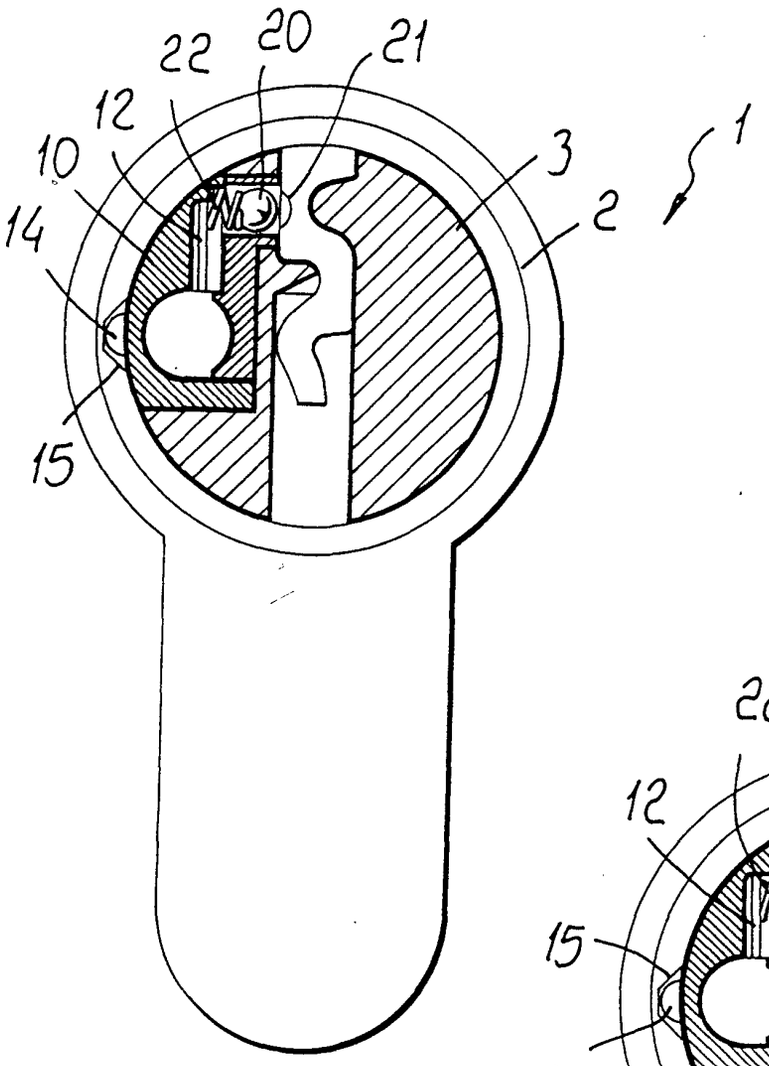

FIG. 5

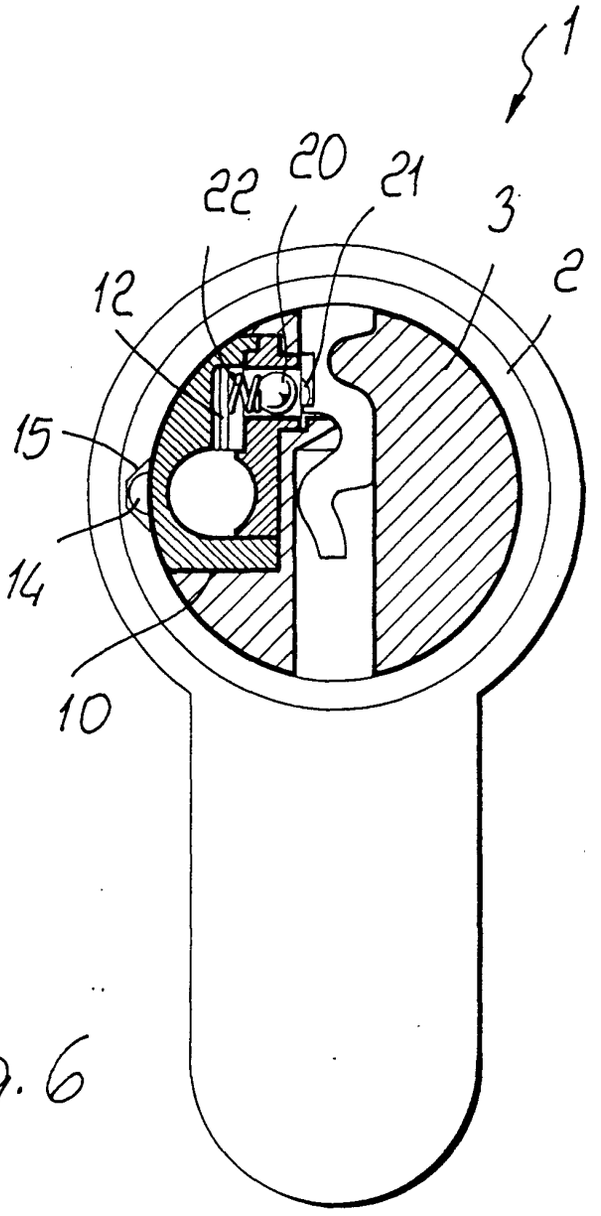

FIG. 6

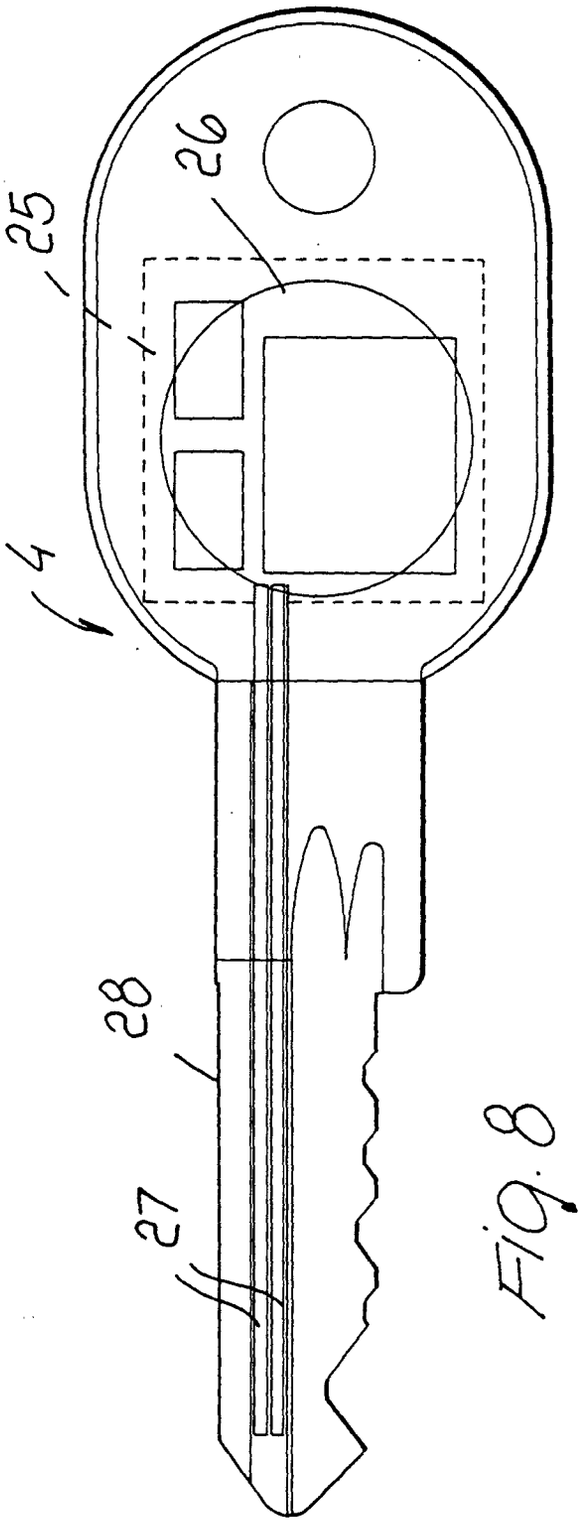

Fig. 8

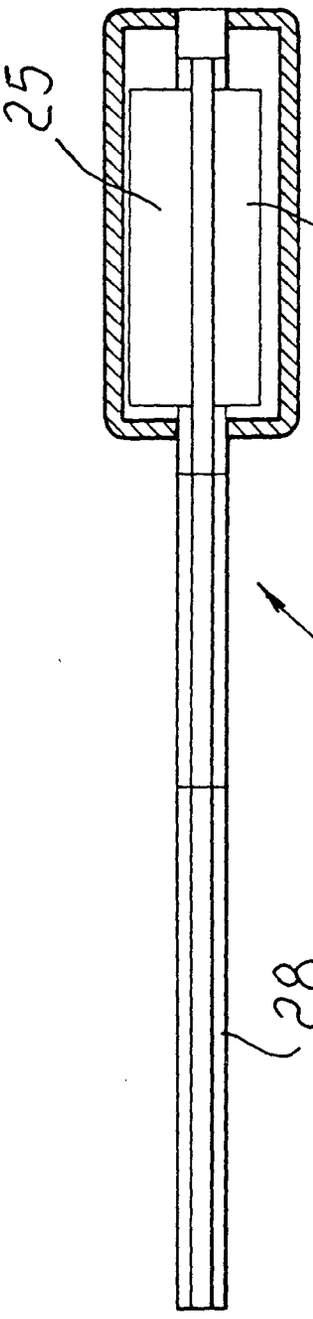

Fig. 9

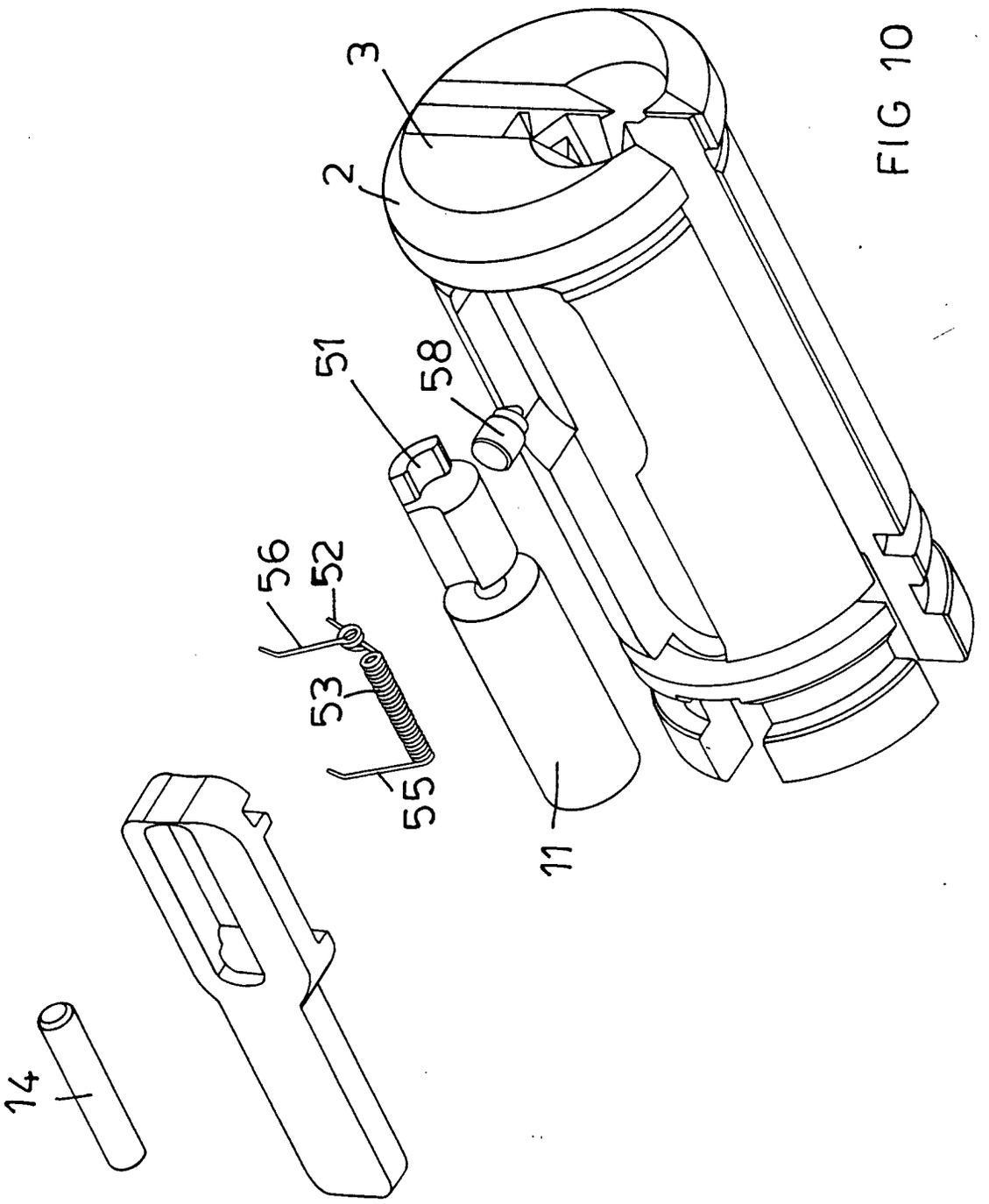

FIG 10

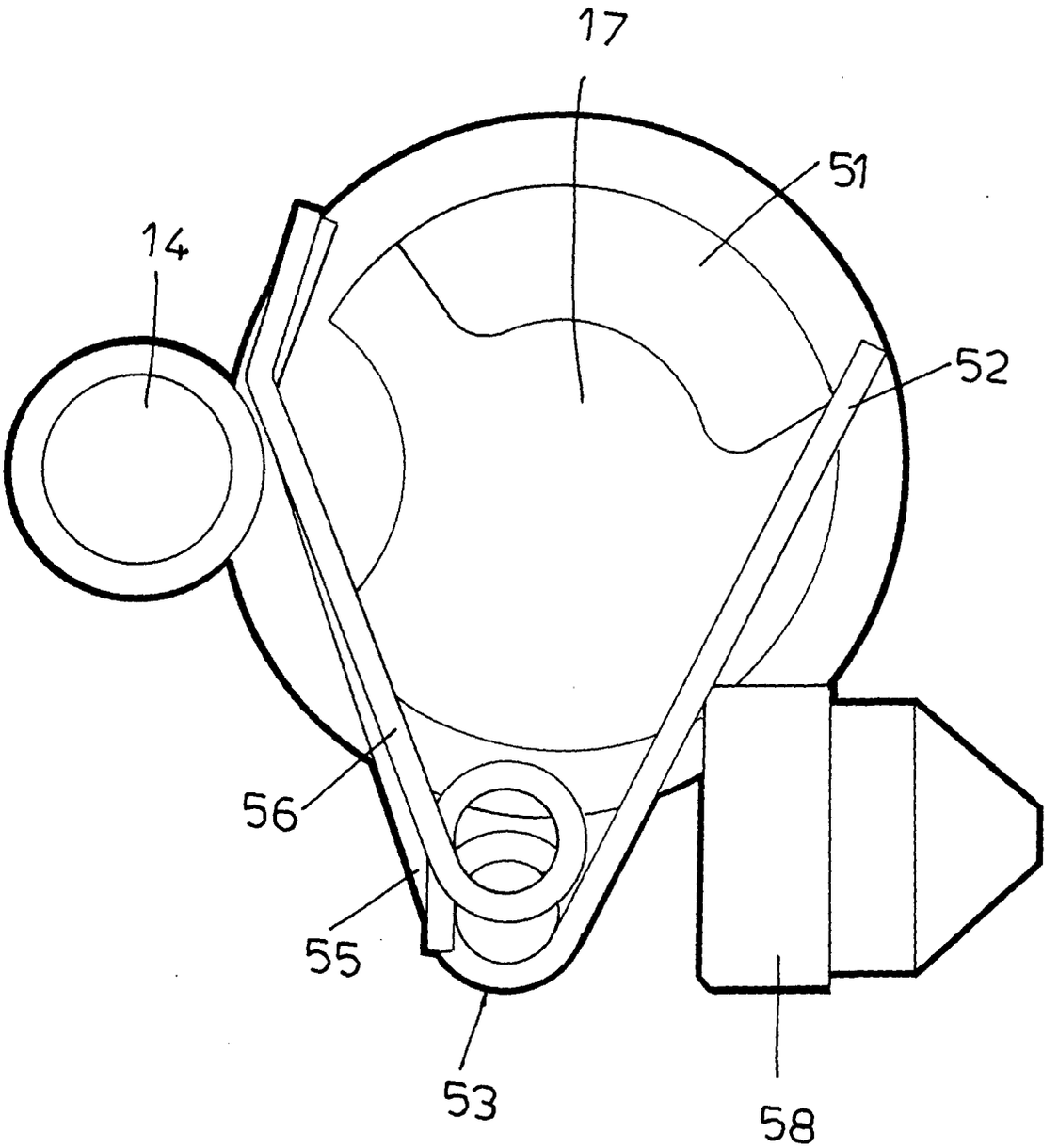

FIG 11

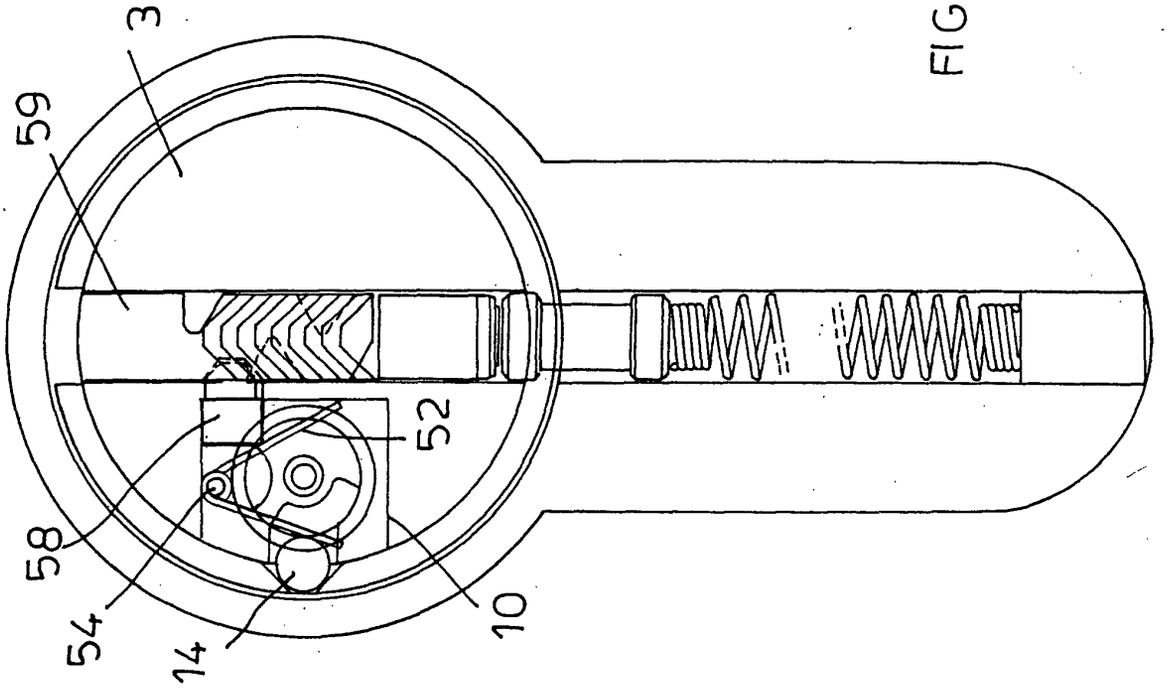

FIG 13

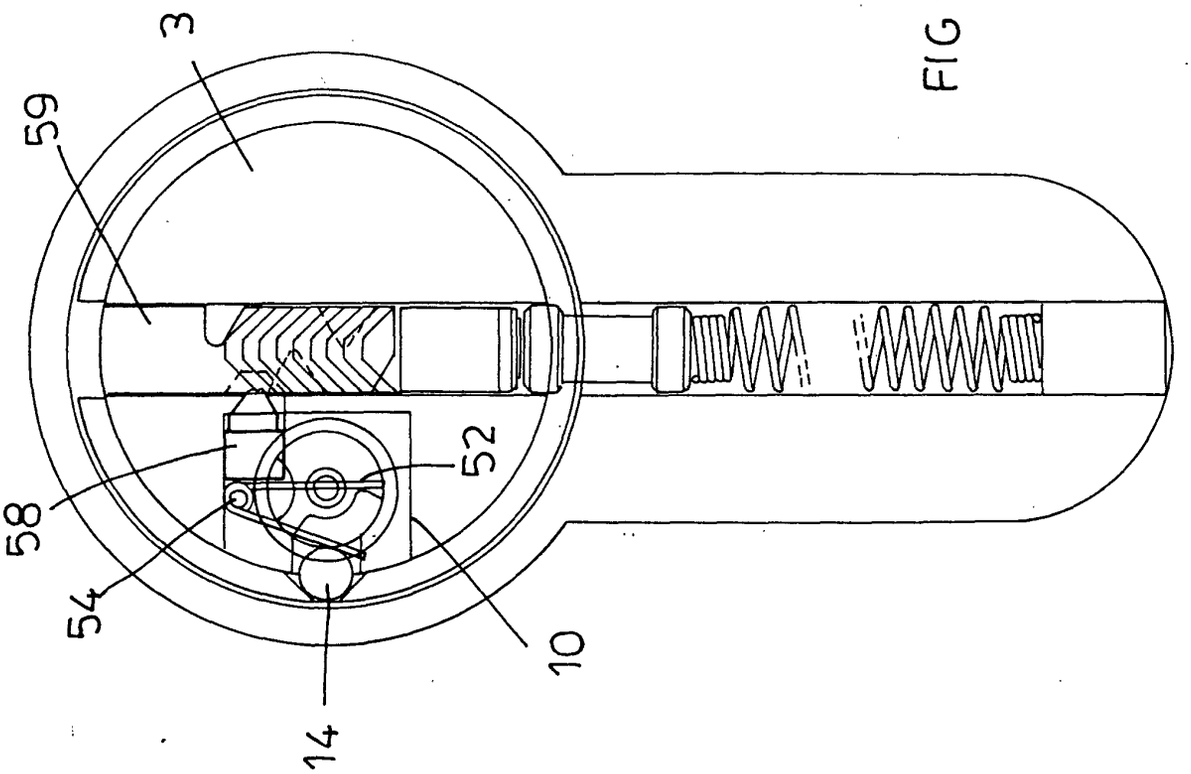

FIG 12

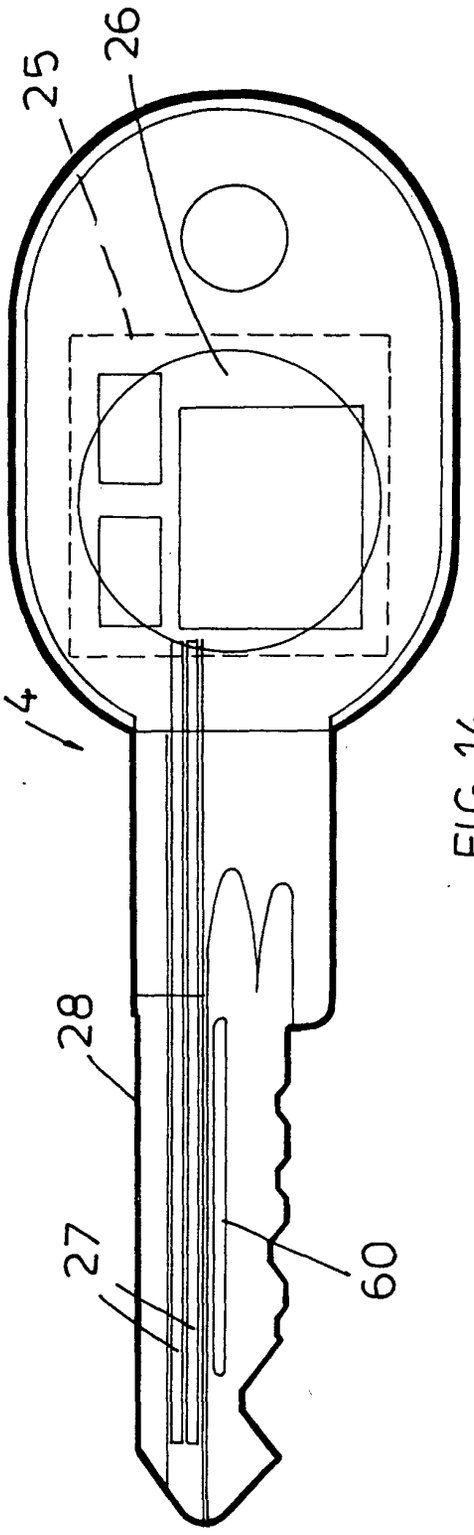

FIG 14

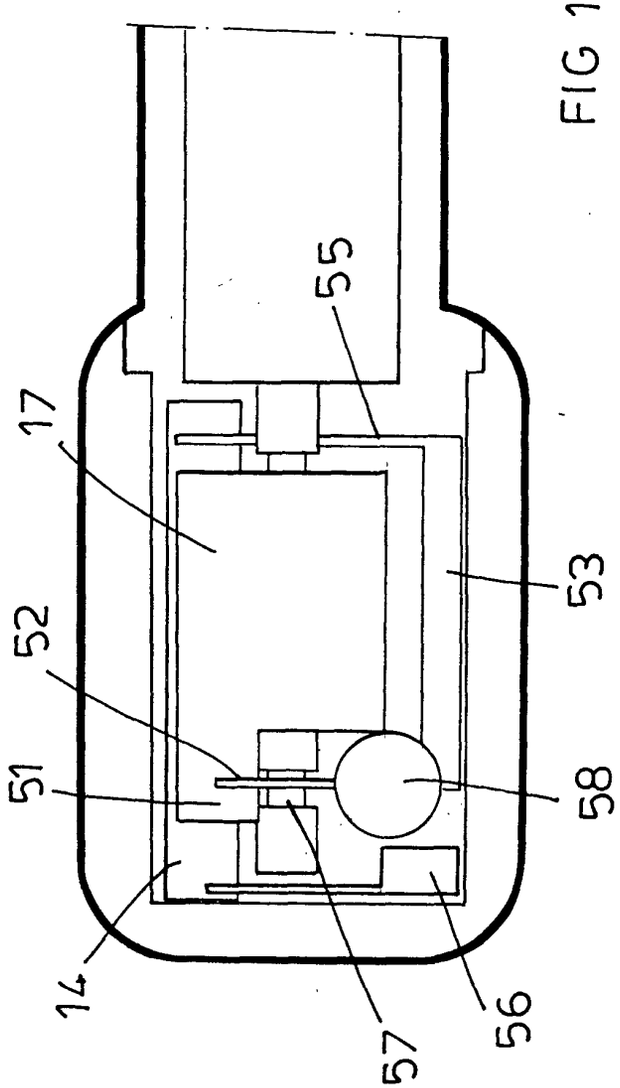

FIG 15