(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 816 598 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.01.1998 Bulletin 1998/02

(51) Int. Cl.[6]: **E05B 27/00**, E05B 35/10

(21) Application number: **96830373.5**

(22) Date of filing: **01.07.1996**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV SI

(71) Applicant:
SERRATURE MERONI S.p.A.
I-20054 Nova Milanese (Milan) (IT)

(72) Inventor: **Meroni, Gersam**
22040 Capriano di Briosco (IT)

(74) Representative:
Siniscalco, Fabio et al
c/o JACOBACCI & PERANI S.p.A.
Via Visconti di Modrone, 7
20122 Milano (IT)

(54) Cylinder lock that can be disabled by means of a master key

(57) In a cylinder lock that can be operated with a normal key (C) and a master key (M), and can be disabled only with the master key (M), the master key (M) can move the plug (12) of the lock into a special disabled position which the normal key (C) cannot reach because a stop piece (27) is in its way; the same stop piece (27) prevents the normal key (C) from being fully inserted into the keyway (16) in the disabled position; so that it can pass the stop piece (27) both when being turned and when being inserted into the keyway (16), the master key (M) is provided with a cut (36). The advantage is that both the common and the master keys (C,M) are of the same length and turn in the same direction. Furthermore the lock is simple and reliable.

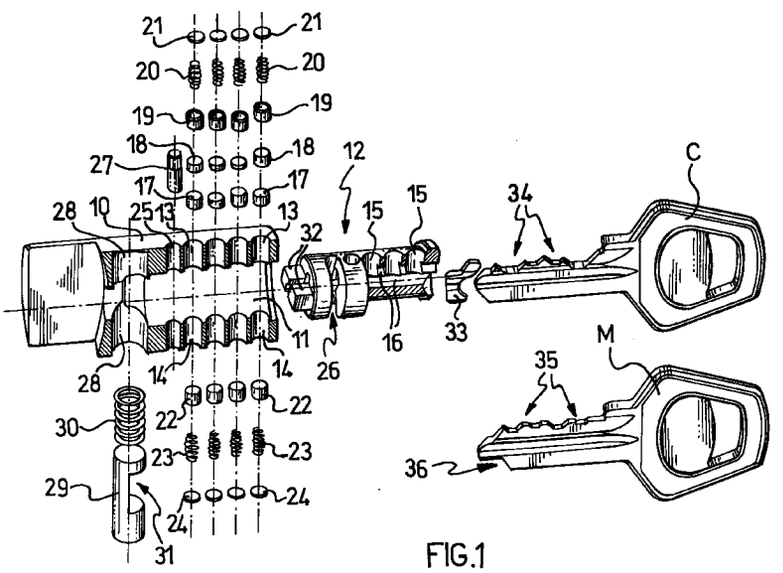


FIG.1

EP 0 816 598 A1

Description

The subject of the present invention is a cylinder lock that can be disabled by means of a master key.

The prior art includes cylinder locks that can be disabled by means of a master key, comprising a cylinder containing a rotatable plug that operates a bolt and comprising spring-activated pins, housed in the cylinder and in the plug, that immobilize the plug inside the cylinder and can be moved into a release position by a normal key or by the master key, inserted into the keyway of the plug, in order to allow the plug to be turned and the bolt operated; the master key is able to turn the plug from a first angular position, in which the bolt is closed but the plug can be released and the bolt withdrawn either with the normal key or with the master key, to a second angular position, in which the bolt is closed but the plug can be released and the bolt withdrawn only with the master key.

This lock is obviously useful in all situations where it becomes necessary to disable the lock or enable it to be operated by means of a master key only.

For example, this lock can be fitted to the stop cock of a gas meter so that the gas supplier can cut off the gas supply if the user falls into arrears.

The lock can also be fitted to cupboards and containers in general where the particular features it provides are required.

However, there are disadvantages to the known locks of this type.

In the first place the master key employed is longer than the normal key in order to fit the particular combination of pins that allows the master key to move the plug into the second angular position. To have to make keys of different lengths is decidedly inconvenient from the manufacturing point of view.

Moreover it should be observed that because of the particular internal connections of the lock, the normal key moves in one direction to withdraw the bolt, while the master key moves in the opposite direction both to withdraw the bolt and to disable the lock. This will obviously tend to create confusion about the direction in which to turn the keys.

It is an object of the present invention to provide a lock that overcomes the abovementioned disadvantages and at the same time is simple and reliable.

This object is achieved by means of a lock as described at the outset, characterized in that it comprises a stop piece fixed in the cylinder and projecting into the keyway of the plug with a connection such as to allow the plug to be turned, against which stop piece the normal key is stopped while turning the plug from the first angular position to the second and when inserting the normal key into the keyway in the second angular position before it reaches the end of the keyway, the master key having a cut corresponding to the stop piece so that it can pass it while turning the plug from the first angular position to the second and can be inserted all the way into the keyway of the plug in the second angular position.

In order to explain the invention more fully, a description will now be given of a non-limiting example of an embodiment thereof. This is illustrated in the accompanying drawings, in which:

Fig. 1 is an exploded perspective view in longitudinal section of a lock according to the invention with a normal key and the master key;

Figs. 2, 3 and 4 are longitudinal sectional views of the lock shown in Fig. 1 with the normal key and master key inserted, in different operating positions;

Figs. 5, 6, 7 and 8 are front views of the lock in different operating positions.

The lock illustrated in Fig. 1 comprises a cylindrical body 10 in which an axial hole 11 houses a rotatable cylindrical plug 12.

The cylinder 10 contains a first series of radial holes 13 opening into the hole 11, and diametrically opposite these a second series of radial through holes 14 which also open into the hole 11. Formed in corresponding positions in the plug 12 is a series of radial holes 15 designed to be lined up with the holes 13 when the plug 12 is in a first angular position and with the holes 14 when a plug 12 is in a second angular position. A longitudinal keyway 16 is also formed in the plug 12 and the holes 15 lead into it.

The aligned holes 13 and 15 house three superimposed series of cylindrical pins 17, 18 and 19. A corresponding series of springs 20 act on these pins and react on a series of caps 21 that close off the holes 13. The pins 19 are hollow and each accomodates a respective spring 20. The holes 14 house a series of pins 22, identical to the series of pins 19, on which act a series of springs 23 that react on a series of caps 24 closing off the holes 14.

Inside the cylinder 10, after the holes 13, is formed another radial hole 25, and in the plug 12, in a position corresponding to the hole 25, is formed a slot 26 in the shape of a 180° degree arc of a circle that extends through the keyway 16. Inserted in the hole 25, integrally with the cylinder 10, is a peg 27 which enters the slot 26. The slot 26 consequently limits the rotation of the plug to 180° degrees between a first angular position and a second.

Lastly, there is formed in the cylinder 10, in a position corresponding to the end of the plug 12, a diametrical cylindrical seat 28 housing a cylindrical bolt 29. A spring 30 acts radially on the bolt 29 and reacts on the end wall of the seat. The bolt 29 is recessed 31 to house a protruding portion 32 of the plug 12. The spring 30 keeps the bolt 29 elastically in the out, i.e. closed, position, in opposition to the protruding portion 32 of the plug 12.

Housed in the end of the keyway 16 of the plug 12

is a shaped insert 33.

The lock described above can be operated by means of a normal key, marked C, or a master key marked M. The normal key C has teeth 34 different from the teeth 35 of the master key M and the master key M also has a cut 36 in its end on the opposite side from the teeth 35.

The lock described above and illustrated works in the following manner.

While there is no key in the keyway 16 the pins 19 are in positions that prevent the plug 12 from being turned inside the cylinder 10, because they sit between them.

With reference to Fig. 2, when the normal key C is inserted in the keyway 16, the pins 17,18,19 are pushed up by the teeth 34 of the key C in opposition to the springs 20, with the result that the pins 17,18 are fully in the holes 15 and the pins 19 fully in the holes 13. Consequently the plug 12 is free to turn inside the body 10. Turning the normal key C 90° clockwise produces an equal rotation of the plug 12 and, as shown in Figs. 5 and 6, the protruding portion 32 of the plug 12 pushes the bolt 29 into the retracted i.e. open, position in opposition to the spring 30.

With reference to Fig. 3, when the master key M is inserted in the keyway 16, the pins 17,18,19 are pushed up by the teeth 35 of the key M in opposition to the springs 20, with the result that, in contrast to the effect of the normal key C, the pins 17 are fully in the holes 15 while the pins 18,19 are fully in the holes 13. In this way, however, the plug 12 is free as before to turn inside the cylinder 10 and hence turning the master key M 90° clockwise moves the bolt 29 into the open position.

With reference to Figs. 4 and 7, it is also possible for the master key M to turn 180° clockwise, with respect to the initial angular position, until the plug 12 with the pins 17 is brought over the holes 14. In this position the bolt 29 moves back into the out or closed position under the action of the spring 30 when released by the protruding portion 32 of the plug 12. In this position, if the master key M is inserted, the pins 17 are fully in the holes 15 while the pins 22 are fully in the holes 14 and it is therefore possible to turn the plug 12.

With reference to Fig. 8 the 180° turn of the normal key C is prevented by the presence of the peg 27 against which the end portion of the key on the opposite side of the teeth strikes and by which it is stopped; with the key stopped in this position the bolt 29 remains open. This portion is absent in the master key M because of the cut 36, which means that the master key M can be moved into the abovementioned position 180° away.

In the second angular position 180° away, i.e. that illustrated in Fig. 4, it is impossible to insert the normal key C all the way into the keyway 16 because of the presence of the peg 27 against which the abovementioned end portion of the key on the opposite side from the teeth strikes and by which it is stopped. The master key M, however, is cut away at 36 and can thus be inserted all the way into the keyway 16.

From the above, it can be seen that both the common key C and the master key M can be used to open and close the bolt 29.

The master key M also, when rotated through 180°, puts the lock in a disabled condition with the bolt closed, because in this position the normal key C is unable to enter the keyway 16 of the plug 12. If a person tried to make a cut in the common key C like the cut 36 of the master key M, it would admittedly be possible to insert the key C all the way into the keyway 16, but since the key C has different teeth from the master key M it will not be able to push the pins 17 and 22 into alignment in the way described above, and instead their misalignment will not allow the plug 12 to be turned.

The lock described and illustrated herein has many advantages.

The master key M is the same length as the normal key C, which means that key manufacture can be standardized.

The common key C and the master key M both turn in the same direction, clockwise in the present instance, so there will be no confusion over which way they should be turned.

The lock offers a twofold security in the disabled position (the 180° position) because, as already seen, the common key C will not fit all the way into the keyway and, if illicitly modified by cutting the cut as in the master key, it still cannot release the plug because the pins will still trap it, and hence the lock cannot be re-enabled.

The insert 33 prevents communication between the keyway 16 and the bolt 29 so that the bolt cannot be accessed through the keyway with a tool designed to operate the bolt without authorization. That is an additional security.

All this is achieved with a simple, reliable structure.

Clearly, variations and/or additions to what has been described and illustrated are possible.

A simplified version may dispense with one of the two series of pins 17,18 and thus have a single combination, with the same teeth for both the common and master keys C,M. It is clear that in this form there is only a single security represented by the peg 27, for if an unauthorized modification is made to the common key C, as seen above, it will be able to re-enable the lock.

The configuration, arrangement and number of components of the lock may differ from that illustrated. For example, the configuration and number of pins and the configuration of the stop peg and of the bolt may be altered. The peg may be replaced with stop pieces of any configuration providing an equivalent function to the peg.

The lock described and illustrated herein may be used in many applications as outlined in the introduction.

Claims

1. Cylinder lock that can be disabled by means of a master key, comprising a cylinder (10) containing a rotatable plug (12) that operates a bolt (29) and comprising spring-activated pins, housed in the cylinder (10) and in the plug (12), that immobilize the plug (12) inside the cylinder (10) and can be moved into a release position by a normal key (C) or by the master key (M) in order to allow the plug (12) to be turned and the bolt (29) operated, the master key (M) being able to turn the plug (12) from a first angular position, in which the bolt (29) is closed but the plug (12) can be released and the bolt (29) withdrawn either with the normal key (C) or with the master key (M), to a second angular position, in which the bolt (29) is closed but the plug can be released and the bolt (29) withdrawn only with the master key (M), the lock being characterized in that it comprises a stop piece (27) fixed in the cylinder (10) and projecting into the keyway (16) of the plug (12) with a connection such as to allow the plug (12) to be turned, against which stop piece (27) the normal key (C) is stopped while turning the plug (12) from the first angular position to the second and when inserting the normal key (C) into the keyway in the second angular position before it reaches the end of the keyway (16), the master key (M) having a cut (36) corresponding to the stop piece (27) so that it can pass it while turning the plug (12) from the first angular position to the second and can be inserted all the way into the keyway (16) of the plug (12) in the second angular position.

2. Lock according to Claim 1, wherein in the first angular position it has a first combination of pins (18,19) that can be aligned in the release position by the normal key (C) and a second combination of pins (17,18) that can be aligned in the release position only by the master key (M), the second angular position presenting a combination of pins corresponding to said second combination of pins (17,22).

3. Lock according to Claim 1 or 2, wherein the stop piece consists of a radial peg (27) fixed in the cylinder (10) and housed in a slot (26) formed in the plug (12).

4. Lock according to Claim 1 or 3, wherein the stop piece (27) is located in the end of the keyway (16) and correspondingly the cut (36) of the master key (M) is formed at the end of the key.

5. Lock according to Claim 3 or 4 wherein the slot (26) extends in an arc of a circle that defines the rotation of the plug (12) between the first and second angular positions.

6. Lock according to any one of the previous claims, wherein the bolt (29) is housed in a seat (28) formed in the cylinder (10) and communicating with the keyway (16), and in which a shaped insert (33) is housed at the end of the keyway (16) to prevent communication between the keyway (16) and said seat (28).

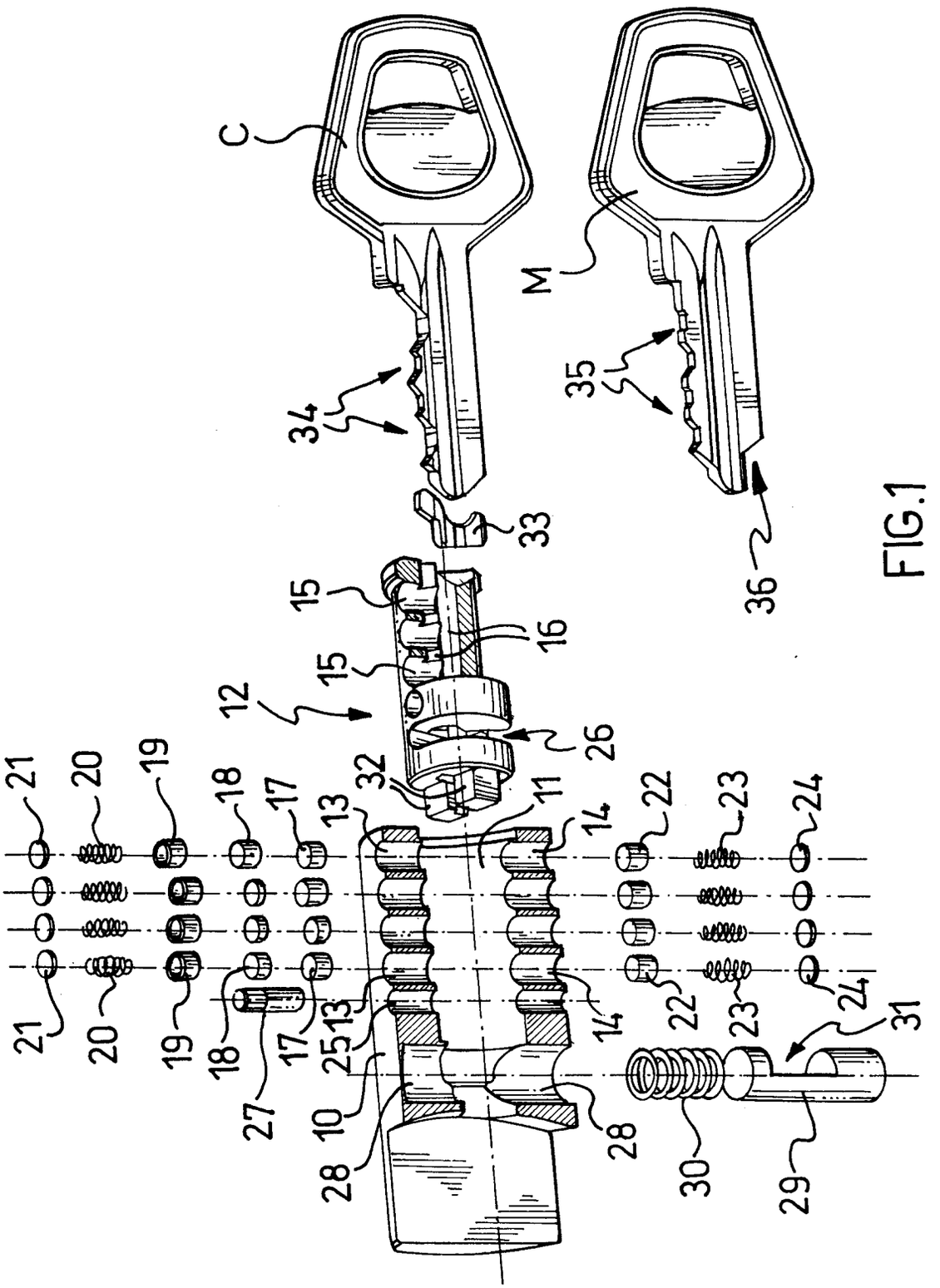

C
M
34
35
33
36
15
16
12
26
32
11
13
14
17
18
19
20
21
22
23
24
25
27
10
28
31
30
29

FIG.1

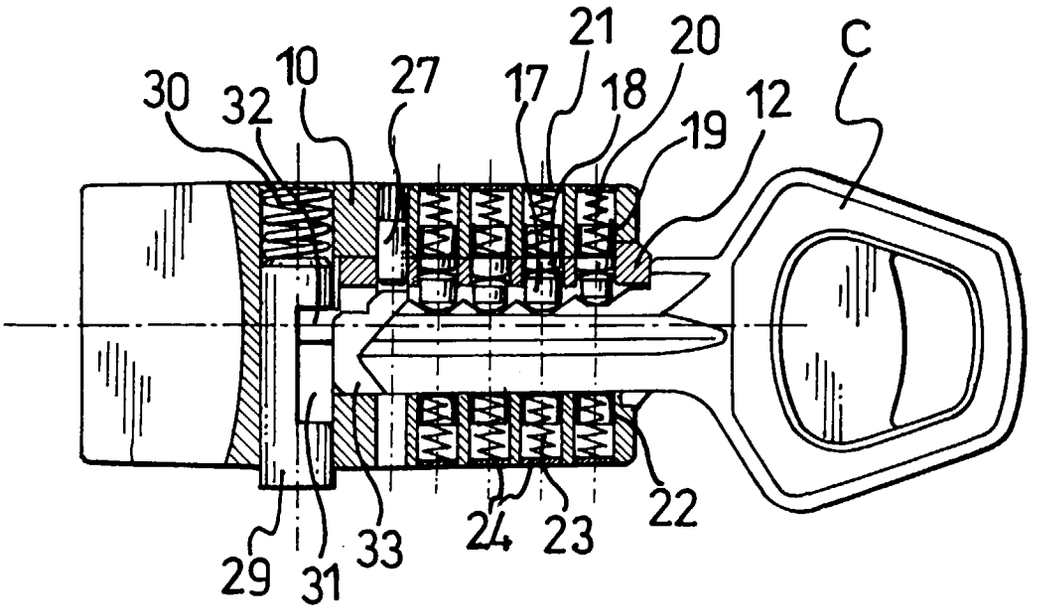

30
32
10
27
17
21
18
20
19
12
C
29
31
33
24
23
22

FIG.2

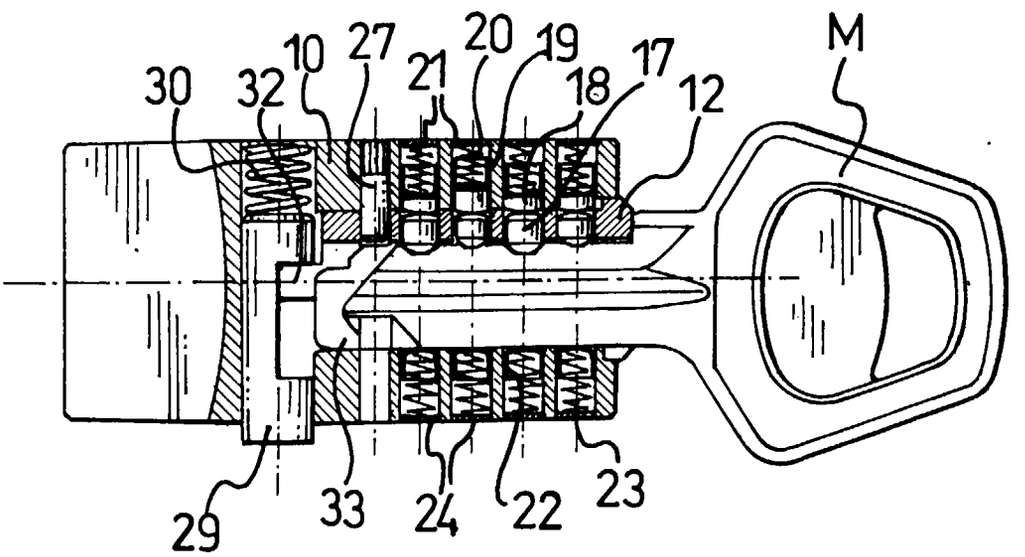

30
32
10
27
21
20
19
18
17
12
M
29
33
24
22
23

FIG.3

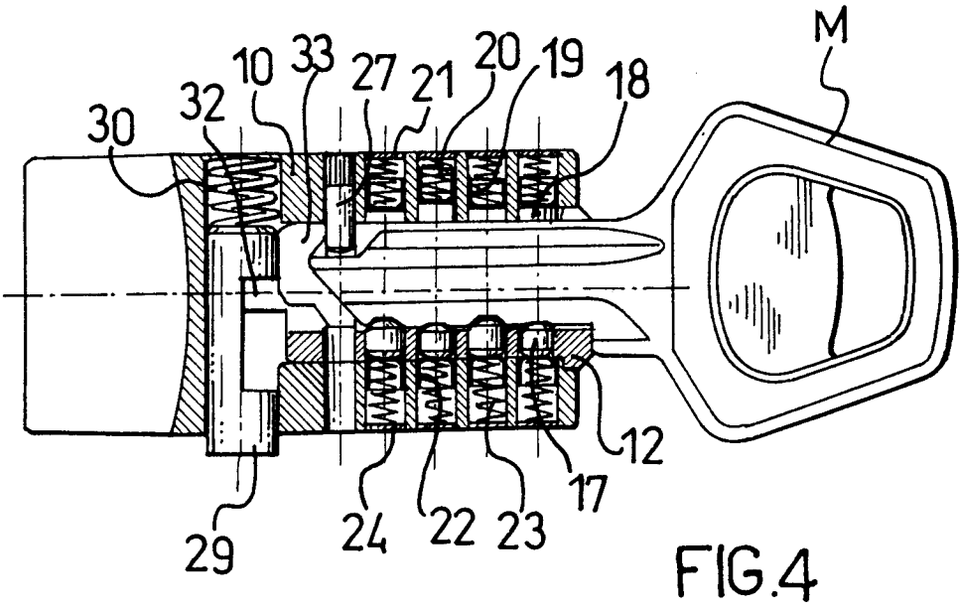


FIG.4

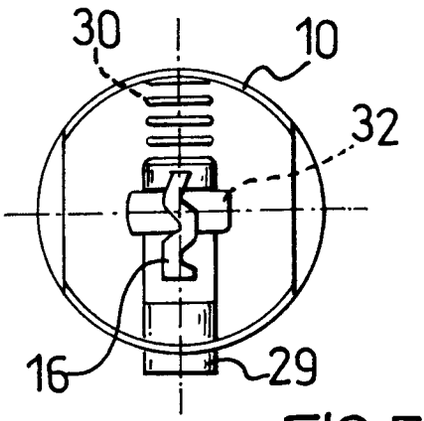


FIG.5

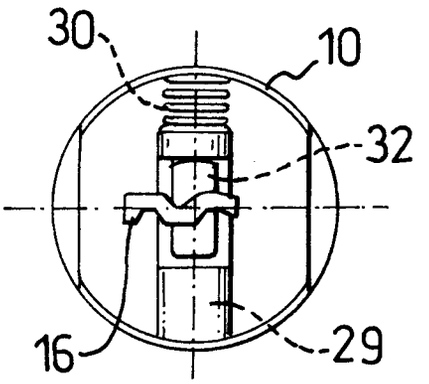


FIG.6

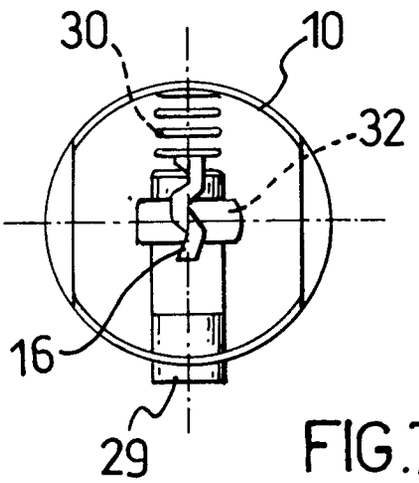


FIG.7

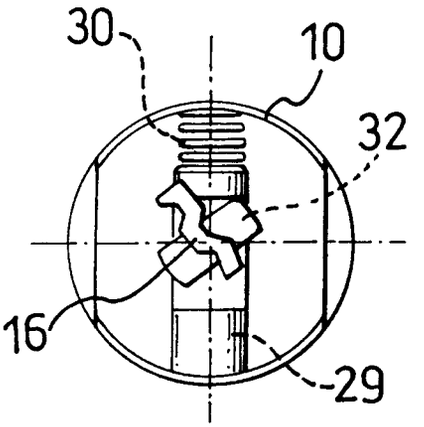


FIG.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0373

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE-A-39 29 860 (WOLTER) * the whole document *	1	E05B27/00 E05B35/10
A	US-A-2 422 600 (SWANSON) * the whole document *	1	
A	US-A-4 107 966 (SCHLAGE) * the whole document *	1	
A	EP-A-0 147 377 (GKN-STENMAN) * the whole document *	1	
A	US-A-1 922 438 (HURD) * the whole document *	1	
A	WO-A-89 08761 (ASSA AB) * the whole document *	1	
A	FR-A-2 470 835 (ELKEM A/S) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 December 1996	Westin, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)