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

(11) Publication number: **0 536 653 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **92116893.6**

(51) Int. Cl.5: **E05B 9/10**

(22) Date of filing: **02.10.92**

(30) Priority: **11.10.91 IT BO910182 U**

(43) Date of publication of application:
14.04.93 Bulletin 93/15

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE LI NL PT SE

(71) Applicant: **Costruzioni Italiane Serrature Affini C.I.S.A. S.p.A.**
Via Oberdan 42
I-48018 Faenza (Province of Ravenna)(IT)

(72) Inventor: **Errani, Deo**
Via Cavour, 46
I-48018 Faenza (Ravenna)(IT)

(74) Representative: **Modiano, Guido et al**
MODIANO, JOSIF, PISANTY & STAUB, Via Meravigli 16
I-20123 Milan (IT)

(54) Improved cylinder lock.

(57) The cylinder lock has a pair of coaxial bushes (23a, 23b), accommodated in seats (20) provided with external teeth (24a, 24b). The bushes are rotationally coupled to plugs (5a,5b) and slide axially to engage an opening (18) of the bit (14) to define a rotary coupling therewith. A tube (33) is arranged coaxially in said bushes (23a, 23b), a pair of mushroom-shaped elements (29a, 29b) whose stems (30a, 30b) are guided in the opposite ends of said tube (33) and whose circular plates (31a, 31b) are guided in said bushes, said bushes having, in their adjacent ends, internal rings slideable on said tube and, in their opposite ends, diametrical notches and internal collars (27a, 27b) for the abutment of said circular plates (31a, 31b), a spring (32a, 32b) being arranged in each bush, said spring acting between each ring and the related circular plate (31a, 31b), a further spring (34) being arranged inside said tube (33) and acting between the mushroom-like elements (29a, 29b), shoulders being provided on the tube for the abutment of said rings which stop said bushes (23a, 23b) at a distance that at least one of them is rotationally coupled in the opening (18) of the bit.

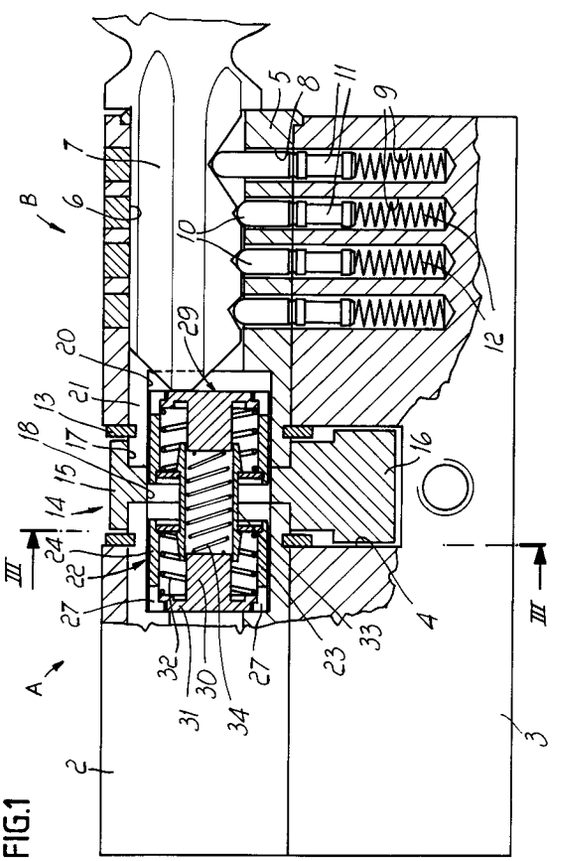


FIG.1

EP 0 536 653 A1

The present invention relates to a cylinder lock of the type which allows the insertion and rotation of a key on one side even when a key is inserted on the other side.

Locks of the indicated type are described in the following patents: DE-OS 1553535, 3535426, 3828354, DE-AS 1150903, 1194287, 1261010, DE-PS 1930739 and EP-A-264923. As is known, a cylinder lock of the indicated type comprises a coupling element which provides the rotational connection between a plug and the bit, regardless of whether a second key is present or not in the lock on the side opposite to the one in which the key is inserted.

Said coupling element, in particular the one described in DE-PS 1930739, has proved itself to be reliable in operation but difficult to manufacture due to the large number of parts and very complicated assembly, which can be performed only with special equipment. On the contrary, the coupling element according to DE-OS 3535426 does not offer sufficient assurances of safety, due to the fact that when the key is removed none of its parts engages the bit, which can thus turn freely.

The aim of the present invention is to provide a coupling element which has a simplified structure and can be assembled more easily than the conventional ones, so that it is more economical to manufacture.

Within the scope of this aim, an object of the present invention is to provide a coupling element whose parts can be assembled more easily with automatic machines.

A further object of the present invention is to provide a coupling element which is miniaturizable so that it can also be applied to cylinder locks having a small-diameter plug.

This aim and these objects are achieved with a cylinder lock whose characteristics are defined in the appended claims.

The details of the invention will become apparent from the detailed description of a preferred embodiment of the cylinder lock, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a longitudinal sectional view of a cylinder lock according to the invention;

figure 2 is a longitudinal sectional view of the coupling element of the lock of figure 1; and finally

figure 3 is a sectional view, taken along the plane III-III of figure 1.

With reference to the above figures, the reference numeral 1 designates a cylinder lock conventionally composed of two identical parts A and B. The description which follows is given with regard to only one of said parts, and when it is necessary to make a distinction among the elements of one part or the other, the related reference numerals are accompanied by the letter a or b depending on whether the elements belong to part A or respectively to part B.

The lock comprises a shell which is composed of two coaxial tubular bodies 2 connected by a bridge-like elongated body 3 having, in a median position, a recess 4 which separates the tubular bodies 2.

Two plugs 5 can rotate in the tubular bodies 2 and are axially crossed by the keyway 6 for the insertion of the key 7. The reference numerals 8 and 9 designate the holes for the accommodation of the tumblers composed of the pin-tumblers 10, the counter-pins 11 and the springs 12. The tumblers conventionally prevent the rotation of the plugs when the key is not inserted or allow their rotation when the key is inserted.

The opposite ends of the plugs 5 protrude into the recess 4. Rings 13 which are recessed around said ends axially fix said plugs but allow their rotation.

The bit 14 of the lock is rotatably mounted on the opposite ends of the plugs 5. The bit 14 comprises a ring 15 from which a radial wing 16 extends; said ring being able to pass through the recess 4.

Cylindrical seats 17 are defined on opposite sides in the ring 15, and the adjacent ends of the plugs 5 engage therein; said seats are separated by a partition in which a circular through opening 18 is defined. A longitudinal groove 19 is defined in the wall which surrounds the opening 18 (see figure 3).

The opening 18 is aligned with cylindrical seats 20 which have the same diameter and are defined in the opposite ends of the plugs. The seats 20 also have longitudinal grooves 21 whose cross-section is equal to that of the groove 19.

A coupling element, generally designated by the reference numeral 22, is accommodated in the seats 20 and passes through the opening 18.

The element 22 is formed by two cylindrical bushes 23 whose length is equal to, or slightly less than, the length of the seats 20 in which they are guided. The bushes 23 are externally provided with an axial tooth 24 which slidingly engages in respective grooves of the seats 20, so that the bushes are rotationally coupled to the plugs but are axially movable in the seats 20.

An internal indent 25 is defined inside the ends of the bushes 23 contiguous to the bit 14, forming a seat for a washer or ring 26 which is locked by a fold of the edge of the indent. The opposite end of the bushes 23 has an internal collar 27 and two diametrical notches 28 whose width is the same as the thickness of the key. The notches 28 are located on the plane of the keyway 6 and, as shown

by figure 3, are offset by 90° with respect to the position of the teeth 24, but it is possible to provide for a different angle between the teeth 24 and the notches 28.

Respective mushroom-like elements 29 are accommodated in the bushes 23 and comprise a cylindrical stem 30 and a circular plate 31.

The edge of the circular plates 31 has an L-shaped cross-section so as to form a surface coplanar to the surface of the collars 27. The mushroom-like elements 29 are kept in abutment against the collars 27 by springs 32 which act between the rings 26 and the circular plates 31.

The stems 30 of the mushroom-like elements 29 are guided in a tube 33 which passes through the opening 18 of the bit and on which the rings 26 of the two bushes 23 can slide.

A spring 34 is arranged in the tube 33 between the stems 30 and, by acting on the mushroom-like elements 29, moves the bushes 23 to a mutual spacing position defined by the abutment of the rings 26 against annular shoulders 35 formed on the outside of the tube 33. The shoulders 35 (which may also be constituted by rings recessed in the tube 33) have such a mutual distance that the coupling element 22 is shorter than the accommodation formed by the seats 20 and by the opening 18 and it can thus perform axial movements which allow the bushes 23, if orientated correctly, to alternately engage the opening 18 and define a rotary coupling with the bit 14 by means of the teeth 24.

The described coupling element operates as follows.

Assume a situation in which a key 7 is inserted in the keyway 6b of the plug 5b and the bush 23b is partially engaged in the opening 18 of the bit, so that said bush is rotationally associated with the bit by virtue of the tooth 24b which is partially inserted in the respective groove of the seat 20 and partially inserted in the groove 19. In this situation, since the points of contact between the pins 10 and the counter-pins 11 are aligned on the outer surface of the plug 5b, it is possible to rotate the key and thus the bit.

If the key 7 is left inserted in the keyway 6b and a second key is inserted in the plug 5a, initially the key enters the notches 28a of the bush 23a and the circular plate 31a moves in contrast with the return action of the spring 34. Since the spring 32a keeps the collar 27a in abutment against the circular plate 31a, the bush 23a moves toward the bit. If said bit is rotated with respect to the plug, so that the tooth 24a cannot enter the groove 19 of the bit, then if one continues to act on the second key, the circular plate 31a is moved axially within the bush 23a and the spring 32a is compressed, allowing the key to enter the plug 5a completely; said plug can thus be rotated with respect to the bit. The bush 23a, too, by being rotationally coupled to the plug 5a, is rotated until the tooth 24a is aligned with the groove 19. At this point, the spring 32a, having been pre-loaded by the circular plate 31a, pushes the bush 23a into the opening 18 and thus pushes the tooth 24a into the groove 19, providing a rotational coupling which allows the rotation of the bit. If no key is present in the plug 5b, the insertion of the bush 23a is accompanied by the simultaneous expulsion of the bush 23b from the bit 14 due to the spring 34, which keeps the bushes 23a, 23b spaced in the position in which the rings 26a and 26b abut against the shoulders 35a and 35b.

It should be noted that in any case the bit 14 is never free on the plugs but is always rotationally coupled to one of them; since said plugs are locked by the tumblers, they thus offer maximum resistance to effraction attempts performed in the attempt to make the spring-latch or the bolt retract into the lock by rotating only the bit and not the plug.

A considerable advantage of the invention resides in the simplified structure of the coupling element 22 which, by constituting a single element, is easy to fit during the assembly of the lock.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Cylinder lock of the so-called friction-coupling type, comprising a shell (2, 3), two coaxial plugs (5a, 5b) which can rotate in said shell and have a keyway (6) for the insertion of a key (7), pins (10) and counter-pins (11) which are arranged in said plugs and in said shell and can be actuated by the key between a plug locking position and a plug rotation position, a bit (14) which is rotatably supported between said plugs and can be coupled to said plugs by means of a coupling element, characterized in that said coupling element comprises a pair of coaxial bushes (23a, 23b) which are accommodated in opposite seats (20) of said plugs (5a, 5b) and are provided with external teeth (24a, 24b) such that said bushes are rotationally coupled to said plugs but can slide axially to engage in an opening (18) of the bit (14) and define a rotary coupling therewith, a tube (33) which is arranged co-

axially in said bushes (23a, 23b), a pair of mushroom-shaped elements (29a, 29b) whose stems (30a, 30b) are guided in the opposite ends of said tube (33) and whose circular plates (31a, 31b) are guided in said bushes, said bushes having, in their adjacent ends, internal rings (26a, 26b) slideable on said tube and, in their opposite ends, diametrical notches (28a, 28b) and internal collars (27a, 27b) for the abutment of said circular plates (31a, 31b), a spring (32a, 32b) being arranged in each bush, said spring acting between each ring (26a, 26b) and the related circular plate (31a, 31b), a further spring (34) being arranged inside said tube (33) and acting between said mushroom-like elements (29a, 29b), shoulders (35a, 35b) being provided on said tube for the abutment of said rings (26a, 26b) which are suitable to stop said bushes (23a, 23b) at such a distance that at least one of them is rotationally coupled in the opening (18) of the bit.

2. Lock according to claim 1, characterized in that said rings (26a, 26b) are recessed in seats (25a, 25b) of said bushes and are retained by folds of the edge of said seats.

3. Lock according to claim 1 or 2, characterized in that said circular plates (31a, 31b) have a shaped edge in order to receive said collars (27a, 27b) and form a surface which is coplanar to said collars.

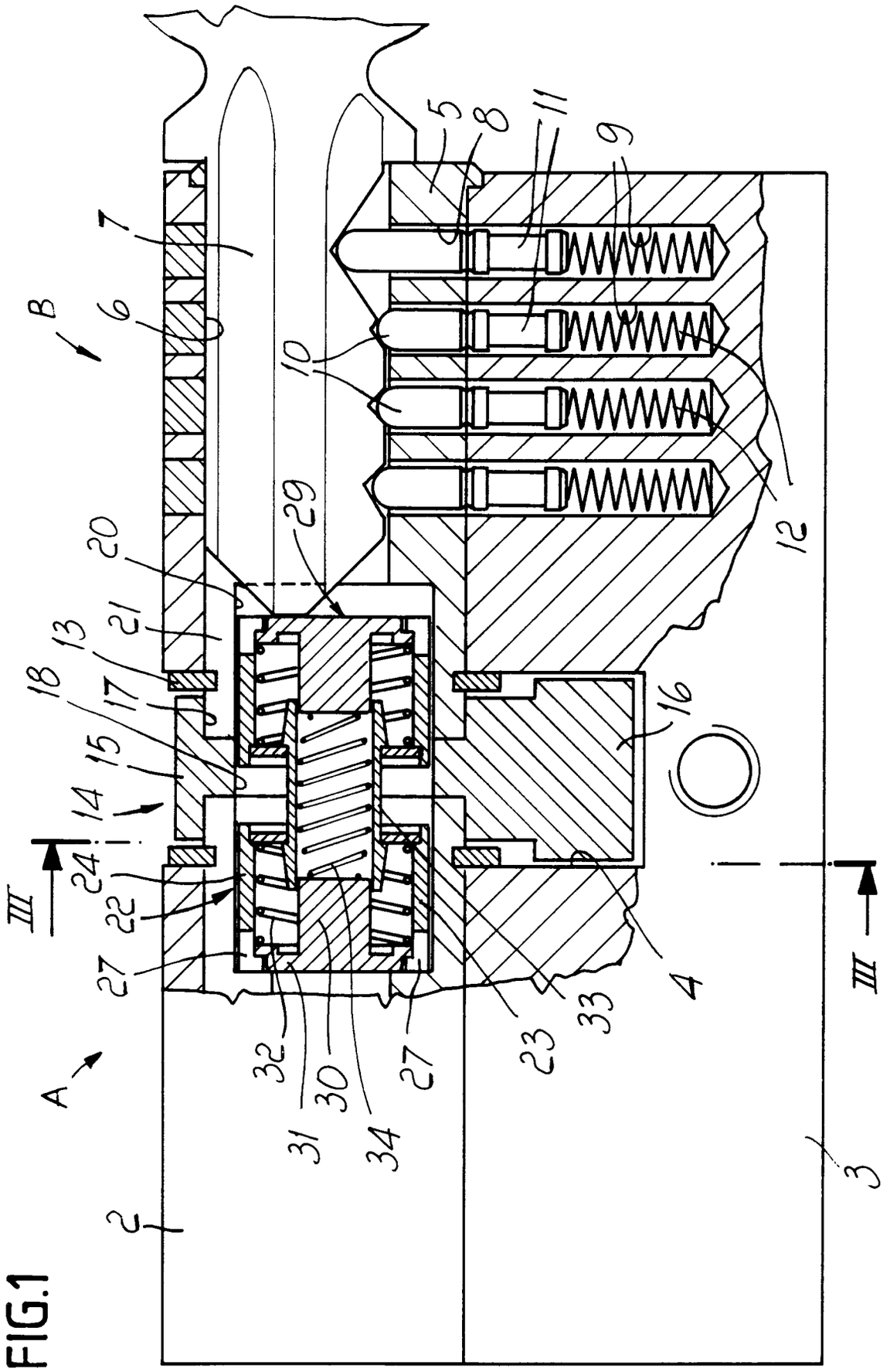

B
A
III
III
I
I
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
20
21
22
23
24
27
29
30
31
32
33
34

FIG.1

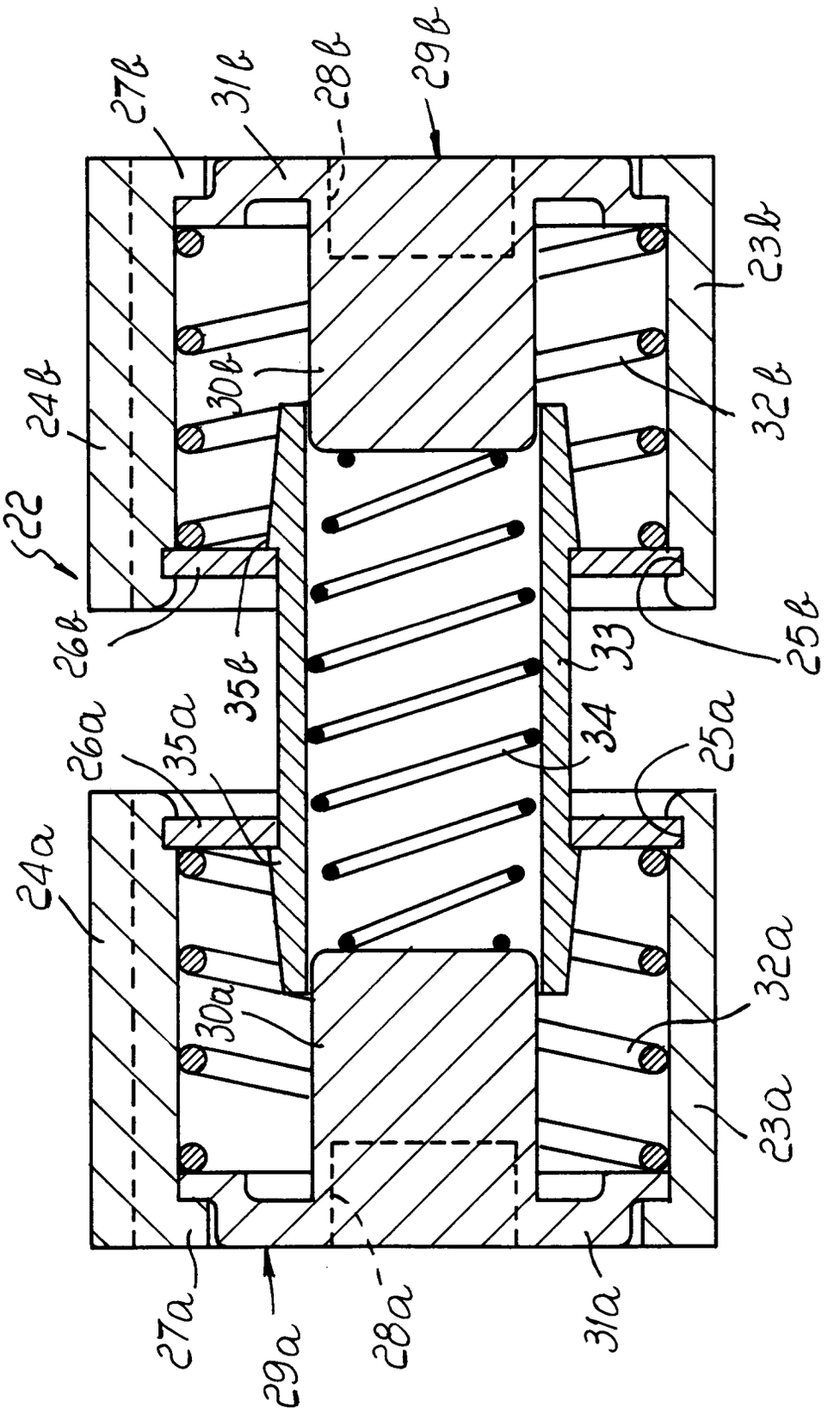
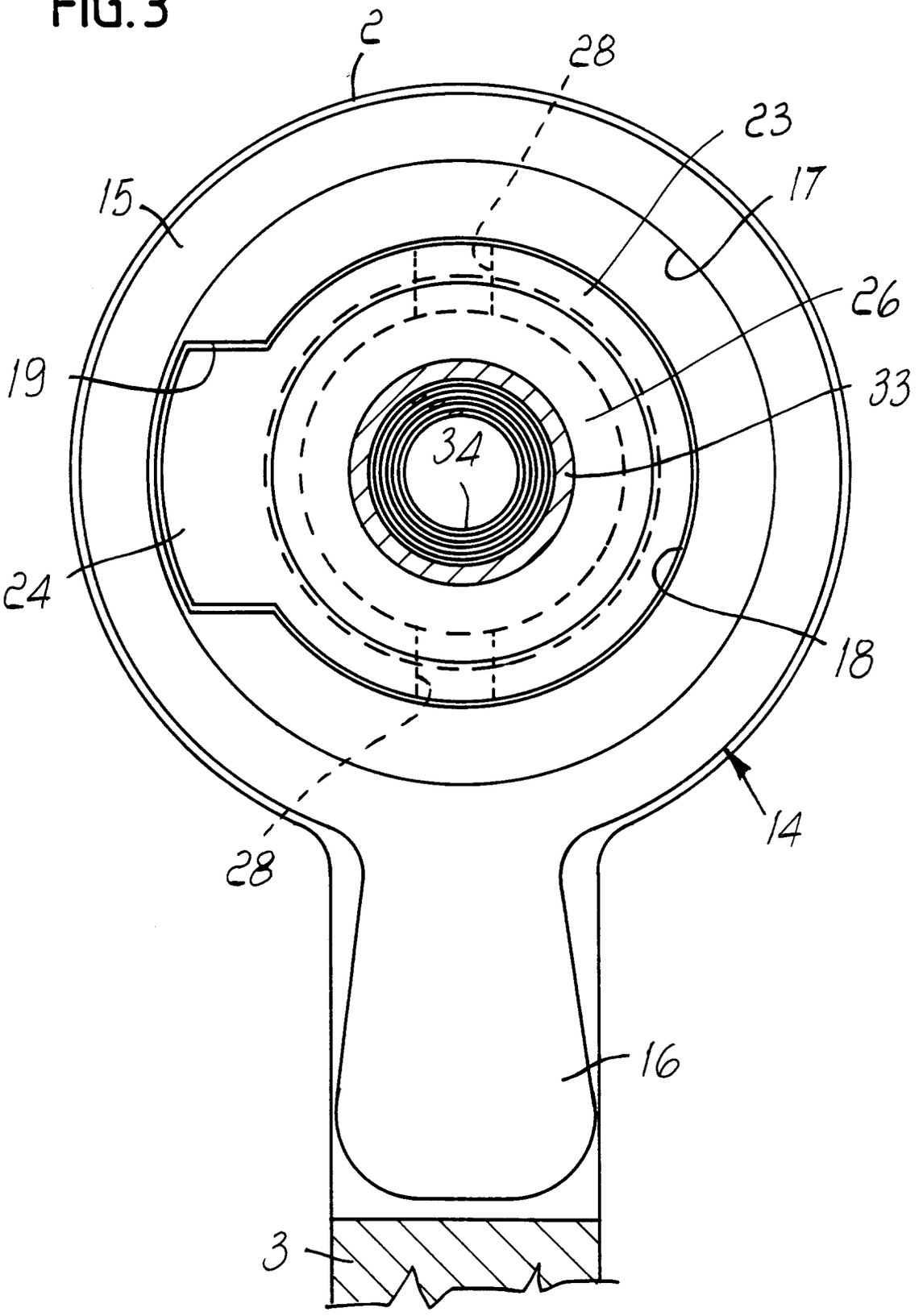

27b
31b
28b
29b
23b
24b
30b
32b
22
26b
35b
33
25b
26a
35a
34
25a
24a
32a
30a
23a
27a
29a
28a
31a

FIG.2

FIG. 3



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 11 6893

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.5)
A	DE-U-8 706 875 (DOM SICHERHEITSTECHNIK GMBH.) * page 11, paragraph 3 * ---	1	E05B9/10
D,A	DE-A-3 535 426 (BKS GMBH.) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 DECEMBER 1992	GERARD B.

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 (P0401)