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(54) **Lock and associated key**

(57) A lock (1) with associated key (6) of the type that comprises a stator (2) provided with a substantially cylindrical longitudinal cavity (3) for accommodating a rotor (4) with a longitudinal recess (5) for the insertion of a coded key (6). The rotor (4) and the stator (2) comprise a plurality of channels (7), which are substantially aligned and face each other when the cylinder (1) is in the closed configuration: the containment channels (7) accommodate respective primary pins (8), secondary pins (9) and any elastic means (7a) designed to prevent the rotation of the rotor (4) within the stator (2) in the absence of the key (6) in the longitudinal recess (5). The stator (2) and the rotor (3) have at least one transverse duct (10), which is oblique with respect to the channels (7), for slidably accommodating a respective stud (11) whose head (12) protrudes into the longitudinal recess (5). The key (6) is provided with at least one front bevel (13), which in the configuration for the insertion of the key (6) in the recess (5) faces, and is aligned with, the head (12) of the stud (11), for the retraction of the stud (11) into the respective duct (10).

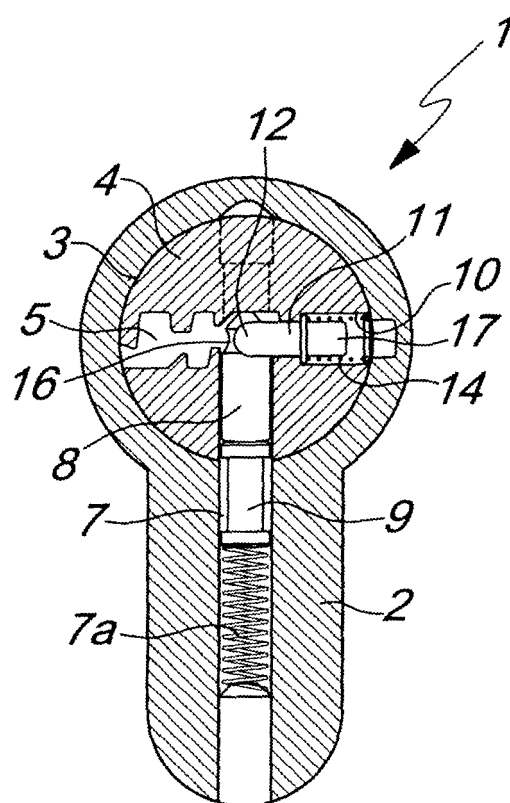


Fig. 2

Description

[0001] The present invention relates to a lock with an associated key suitable for installation in doors, main entrance doors and in all applications in which a key-operated closure is provided.

[0002] There are various types of locks with respective keys which perform the task of closing securely a door by using a variety of different solutions against any break-in attempt.

[0003] Among cylinder locks, those that have a substantially flat seat for the insertion of the key (and therefore also a substantially flat corresponding key) with the pins intended to detect the key acting substantially transversely with respect to the seat (therefore acting on flat portions of the key), are the subject of widespread interest.

[0004] These locks are normally identified by the type of key associated with them and are termed flat-key locks.

[0005] The risk of break-in is avoided by the complex coding of the lock and key: particular break-in actions allow to actuate the pins to open the lock even in the absence of the original key.

[0006] In view of the small size of a lock of the type being considered, it is substantially not possible to increase the number of pins in order to ensure greater security against break-ins. Like any lock, moreover, it is necessary to deter break-in actions performed with a picking tool intended to lower the pins sequentially, allowing to release the rotor with respect to the stator and therefore to open the lock.

[0007] The aim of the present invention is to provide a lock with an associated key having traditional dimensions and provided with portions adapted to increase the complexity of any break-in actions.

[0008] Within this aim, an object of the present invention is to provide a lock with a corresponding key which has a low cost, is relatively simple to provide in practice and is safe in application.

[0009] This aim and these and other objects, which will become better apparent hereinafter, are achieved by the present lock with associated key of the type that comprises a stator provided with a substantially cylindrical longitudinal cavity for accommodating a rotor with a longitudinal recess for the insertion of a coded key, said rotor and said stator comprising a plurality of channels, which are substantially aligned and face each other when the cylinder is in the closed configuration, and channels for accommodating respective primary pins, secondary pins and any elastic means designed to prevent the rotation of the rotor within the stator in the absence of the key in said longitudinal recess, characterized in that said stator and said rotor have at least one transverse duct, which is oblique with respect to said channels, for slidably accommodating a respective stud whose head protrudes into said longitudinal recess, said key being provided with at least one front bevel, which in the configuration for the insertion of said key in said recess faces,

and is aligned with, said head of said stud, for the retraction of said stud into the respective duct.

[0010] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a lock with a corresponding key, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a sectional top view, taken along a longitudinal horizontal plane, of a lock with a corresponding key according to the invention in a first embodiment in which the key and the lock are separated;

Figure 2 is a sectional front view, taken along the line II-II of Figure 1, of a lock according to the invention;

Figure 3 is a sectional top view, taken along a longitudinal horizontal plane, of a lock with a corresponding key according to the invention, in a second embodiment in which the tip of the key faces the recess of the lock;

Figure 4 is a sectional front view, taken along the line IV-IV of Figure 3, of a lock according to the invention;

Figure 5 is a sectional top view, taken along a longitudinal horizontal plane, of a lock with a corresponding key according to the invention, in a third embodiment, in which the tip of the key is partially inserted in the recess of the lock;

Figure 6 is a sectional front view, taken along the line VI-VI of Figure 5, of a lock according to the invention;

Figure 7 is a sectional top view, taken along a longitudinal horizontal plane, of a lock with a corresponding key according to the invention, in a fourth embodiment, in which the key is inserted in the recess of the lock;

Figure 8 is a sectional top view, taken along a longitudinal horizontal plane, of a lock with a corresponding key according to the invention in a fourth embodiment, in which a wrong key is inserted in the recess of the lock.

[0011] With reference to the figures, the reference numeral 1 generally designates a lock with a corresponding key.

[0012] The lock 1 comprises a stator 2, which is provided with a substantially cylindrical longitudinal cavity 3 for accommodating a rotor 4 with a longitudinal recess 5 for the insertion of a coded key 6.

[0013] The rotor 4 and the stator 2 comprise a plurality of channels 7, which are substantially aligned and face each other when the cylinder 1 is in the closed configuration.

[0014] The containment channels 7 are designed to accommodate respective primary pins 8, secondary pins 9 and optional elastic means 7a: the purpose of the pri-

mary pins 8 and of the secondary pins 9 is to prevent the rotation of the rotor 4 within the stator 2 if the key 6 is not present inside the longitudinal recess 5.

[0015] The stator 2 and the rotor 3 have at least one transverse duct 10: the duct 10 is oblique with respect to the channels 7; according to a configuration of particular practical interest, the longitudinal axis of symmetry of the duct 10 is perpendicular to the longitudinal axis of symmetry of the channels 7, but lies on a plane which is parallel to the one that contains the channels 7. In this way, the axes cannot intersect, predefining said condition of oblique axes.

[0016] The duct 10 is designed to accommodate, so that it can slide longitudinally with respect to the longitudinal direction of the duct 10, a respective stud 11, whose head 12 protrudes into the longitudinal recess 5.

[0017] In turn, the key 6 has at least one front bevel 13 (generally two symmetrical and mutually opposite bevels 13), which in the configuration for inserting the key 6 in the recess 5, faces and is aligned with the head 12 of the stud 11: in this manner, during the insertion of the key 6 in the recess 5, the bevels 13 behave like inclined planes which (during the advancement of the key 6) force the retraction of the stud 11 into the respective duct 10.

[0018] The inactive position of the stud 11 is indeed the one in which the head 12 protrudes into the recess 5, because an elastic means 14 (in particular a helical spring 14) is interposed between the walls of the transverse duct 10 and the respective stud 11 and is intended to keep the stud 11 in the protruding configuration, in which the head 12 therefore protrudes into the recess 5.

[0019] In order to ensure correct association of the spring 14 with the respective stud 11, said stud has a perimetric collar 15 for supporting at least one portion of the respective spring 14 (the opposite end of which rests against the bottom of the portion comprised in the rotor 4 of the duct 10).

[0020] Proximate to each transverse duct 10 (any number of ducts 10 accommodating the respective stud 11 can be provided in a same lock 1) there is a respective channel 7 for accommodating a corresponding primary pin 8, a corresponding secondary pin 9, and corresponding elastic means 7a. The pin 8 has an annular end groove 16, which is designed to accommodate the head 12 of the stud 11.

[0021] The stud 11 and the respective primary pin 8 interfere with each other: the head 12 of the stud 11 is accommodated within the groove 16 of the primary pin 8, within the recess 5.

[0022] In this manner, the primary pin 8 cannot retract when the stud 11 is accommodated within the respective groove 16: this deters break-in attempts performed by means of picking tools, by means of which it would be possible to lower the primary pins 8 if the stud 11 were absent.

[0023] In order to ensure the opening of the lock 1 it is necessary first of all to force the retraction of the stud 11,

in order to release the primary pin 8, which at this point can be lowered in order to disengage the stator 2 and the rotor 4.

[0024] When the head 12 of the stud 11 is accommodated within the annular groove 15, the respective primary pin 8 is locked.

[0025] The primary pin 8 can perform freely a translational motion in the respective channel 7 only when the head 12 of the stud 11 is in the retracted configuration, within the respective duct 10, and the annular groove 15 does not accommodate any portion of the head 12. The presence of the head 12 in the groove 15 ensures that when the key 6 is inserted the stud 11 rests on the bottom of the groove 16, without tilting with respect to its inactive configuration due to the thrust of the key 6. The groove 16 therefore constitutes a guide, which ensures the correct alignment of the stud 11 with respect to the duct 10 when the bevel 13 comes into contact with the head 12 during the insertion of the key 6.

[0026] A shank 17 of the stud 11, when the head 12 is completely accommodated within the portion of the rotor 4 of the respective duct 10, is inserted within the portion of the stator 2 of the respective duct 10: in this configuration, the stud 11 mutually couples the stator 2 and the rotor 4.

[0027] The key 6 has at least one notch 18, at the at least one stud 11 (when said key is completely inserted in the recess 5) on its lateral edge 19, for accommodating the head 12 of the stud 11.

[0028] According to an embodiment which is complicated but extremely difficult to break into, the ducts 10 and the respective studs 11 are a plurality.

[0029] In particular, it is possible to provide a lock 1 in which, at each channel 7 and at each respective primary pin 8, there is a corresponding transverse duct 10, the stud 11 of which has a head 12 accommodated in the annular groove 16 of the primary pin 8 that faces it. Of course, according to this embodiment the key 6 must have, on its lateral edge 19, a plurality of notches 18 intended to accommodate the head 12 of the respective studs 11.

[0030] It has thus been found that the invention achieves the intended aim and objects.

[0031] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0032] All the details may further be replaced with other technically equivalent ones.

[0033] In the exemplary embodiments shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0034] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

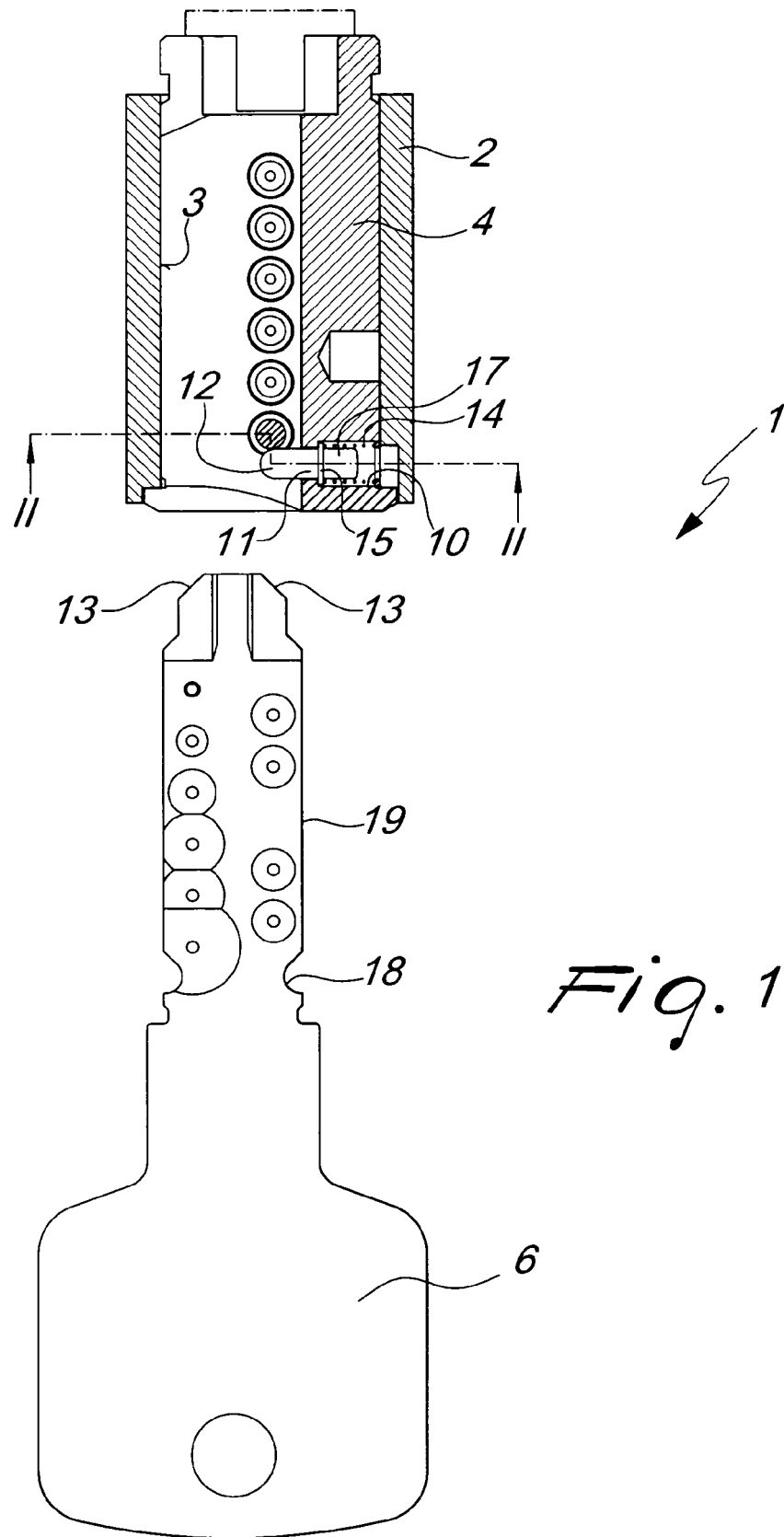
[0035] In practice, the materials used, as well as the shapes and the dimensions, may be any according to

requirements without thereby abandoning the scope of the protection of the appended claims.

[0036] 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 interpretation of each element identified by way of example by such reference signs.

Claims

1. A lock with associated key of the type that comprises a stator (2) provided with a substantially cylindrical longitudinal cavity (3) for accommodating a rotor (4) with a longitudinal recess (5) for the insertion of a coded key (6), said rotor (4) and said stator (2) comprising a plurality of channels (7), which are substantially aligned and face each other when the cylinder (1) is in the closed configuration, and channels (7) for accommodating respective primary pins (8), secondary pins (9) and any elastic means (7a) designed to prevent the rotation of the rotor (4) within the stator (2) in the absence of the key (6) in said longitudinal recess (5), **characterized in that** said stator (2) and said rotor (3) have at least one transverse duct (10), which is oblique with respect to said channels (7), for slidably accommodating a respective stud (11) whose head (12) protrudes into said longitudinal recess (5), said key (6) being provided with at least one front bevel (13), which in the configuration for the insertion of said key (6) in said recess (5) faces, and is aligned with, said head (12) of said stud (11), for the retraction of said stud (11) into the respective duct (10).
2. The lock according to claim 1, **characterized in that** at least one elastic means is provided and interposed between the walls of said transverse duct (10) and the respective stud (11) and is intended to keep said stud (11) in the protruding configuration, in which the head (12) protrudes into said recess (5).
3. The lock according to claim 2, **characterized in that** said stud (11) has a perimetric collar (15) for supporting at least one portion of the respective elastic means (14).
4. The lock according to claim 1, **characterized in that** proximate to each of said transverse ducts (10) there is a respective channel (7) for accommodating a corresponding primary pin (8), a corresponding secondary pin (9) and elastic means (7a), said primary pin (8) having an annular end groove (16) for accommodating the head (12) of said stud (11), said stud (11) and said respective primary pin (8) interfering with each other, the head of the stud (11) being accommodated in said groove (16) of the primary pin (8), in the space inside said recess (5).
5. The lock according to claim 4, **characterized in that** when said head (12) of the stud (11) is accommodated within said annular groove (16), the respective primary pin (8) is locked, said primary pin (8) being able to move freely in the respective channel (7) only when said head (12) of said stud (11) is in the retracted configuration, within the respective duct (10), and said annular groove (16) accommodates no part of said head (12).
6. The lock according to one or more of the preceding claims, **characterized in that** the shank (17) of said stud (11), when the head (12) is completely accommodated within the portion of the rotor (4) of the respective duct (10), is inserted within the portion of the stator (2) of the respective duct (10), said stud (11), in said configuration, mutually coupling the stator (2) and the rotor (4).
7. The lock according to one or more of the preceding claims, **characterized in that** said key (6) has at least one notch (18), at the at least one stud (11) when said key is completely inserted in the recess (5), on its lateral edge (19), for accommodating the head (12) of said stud (11).
8. The lock according to one or more of the preceding claims, **characterized in that** said ducts (10) and respective studs (11) are a plurality.
9. The lock according to claim 8, **characterized in that** a corresponding transverse duct (10) is provided at each channel (7) and at each respective primary pin (8), the head (12) of the stud (11) contained therein being accommodated in the annular groove (16) of the primary pin (8) that faces it.



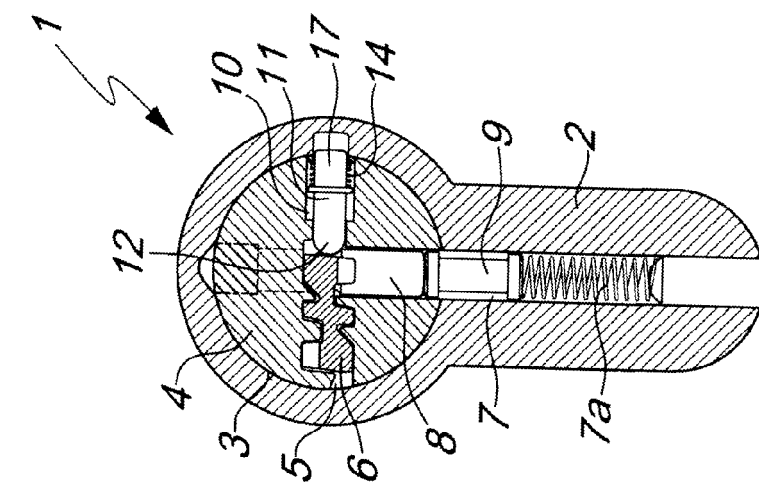


Fig. 6

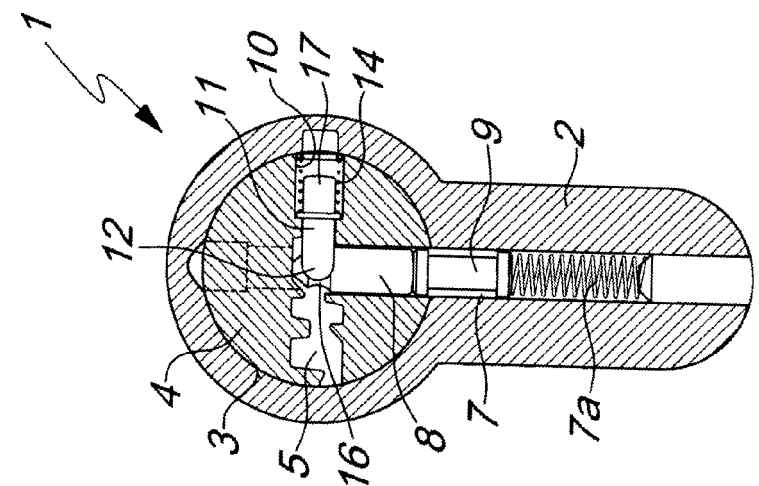


Fig. 4

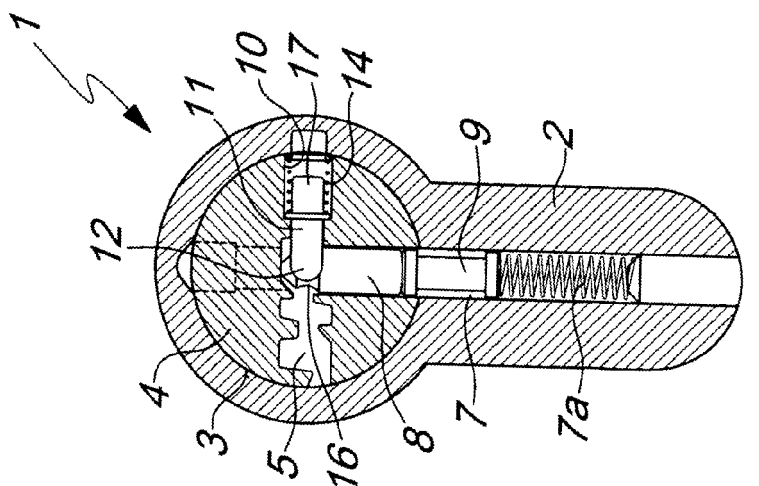


Fig. 2

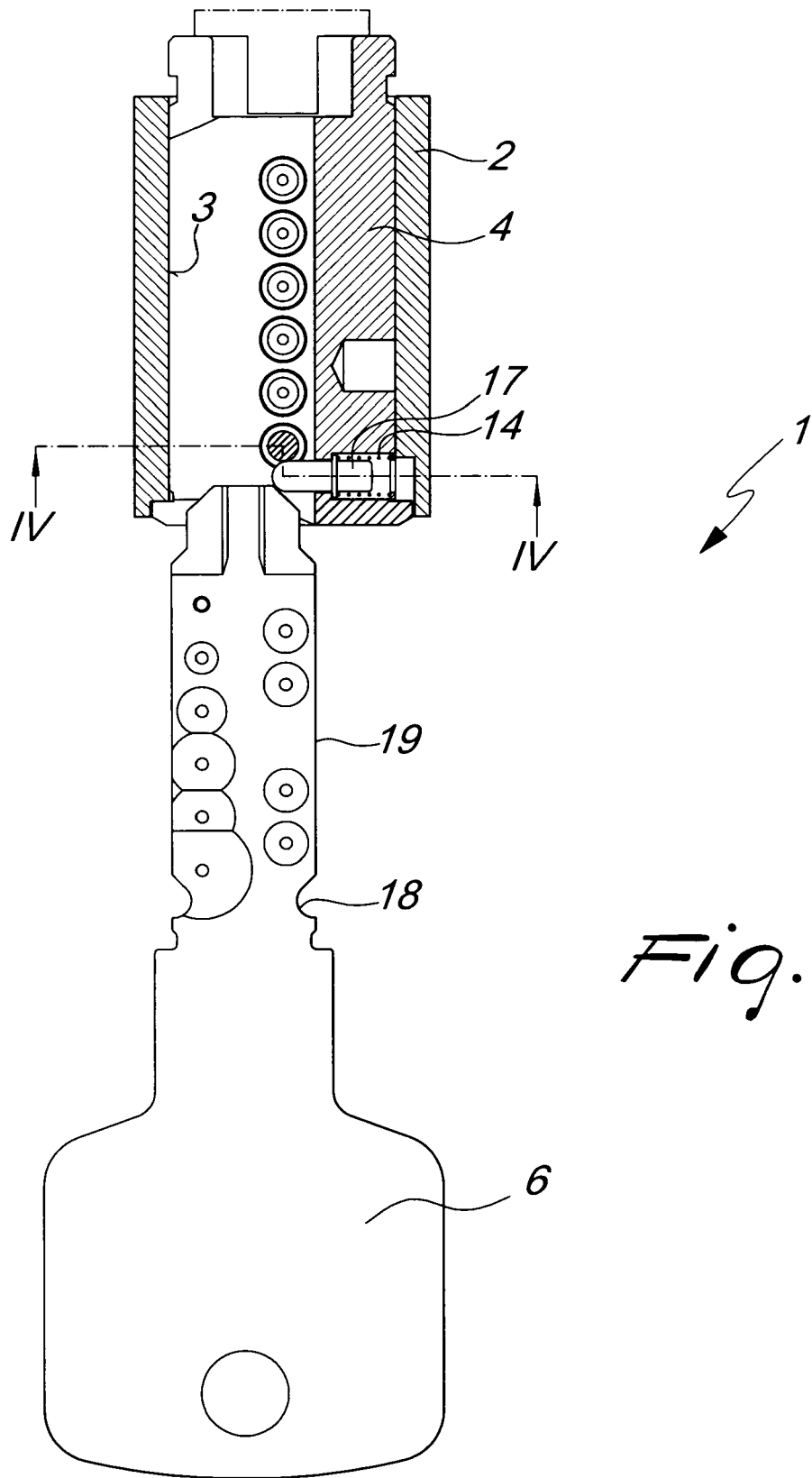


Fig. 3

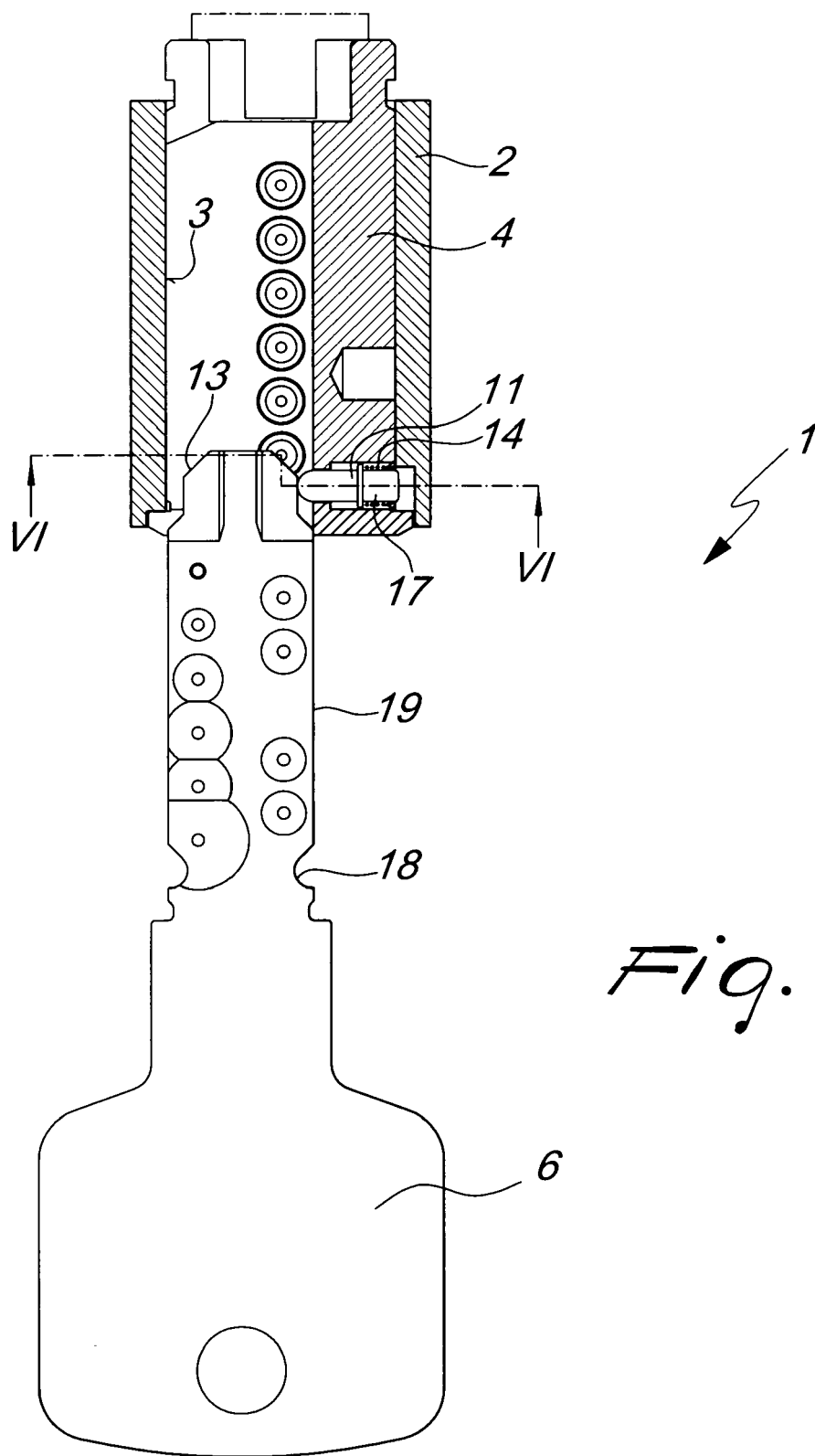
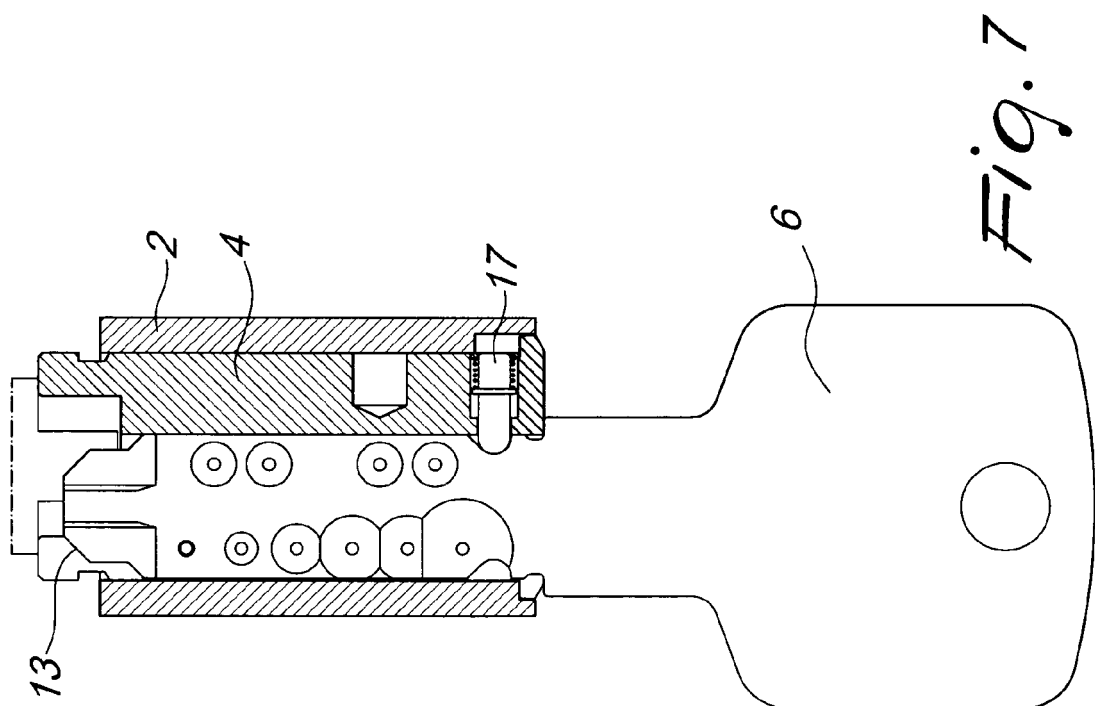
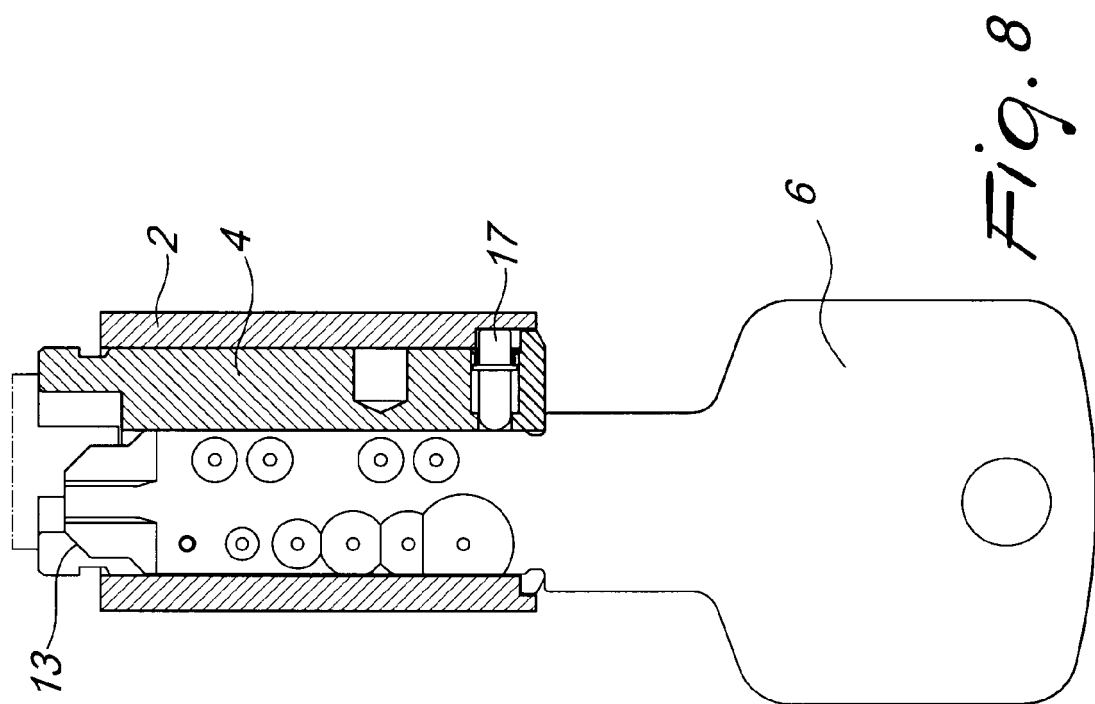


Fig. 5





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5420

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A	DE 100 00 528 A1 (WILKA SCHLIESTECHNIK GMBH [DE]) 12 July 2001 (2001-07-12) * the whole document *	1-3,6-9	TECHNICAL FIELDS SEARCHED (IPC) E05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 November 2006	Examiner Geerts, Arnold
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	

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EPO FORM 1503 03.92 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 42 5420

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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22-11-2006

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