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

(11) **EP 4 257 784 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.10.2023 Bulletin 2023/41

(21) Application number: **23166674.4**

(22) Date of filing: **05.04.2023**

(51) International Patent Classification (IPC):
E05B 35/00 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E05B 35/004; E05B 15/04

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **08.04.2022 IT 202200007073**

(71) Applicant: **Iseo Serrature S.p.A.**
25055 Pisogne (Brescia) (IT)

(72) Inventor: **FENINI, Sandro**
25040 Esine (Brescia) (IT)

(74) Representative: **Rapisardi, Mariacristina**
Ufficio Brevetti Rapisardi S.r.l.
Via Serbelloni, 12
20122 Milano (IT)

(54) **KEY FOR LOCK**

(57) The key (1) for a lock (2) comprises a grip (3), a blade (4), at least one lever (9) having a first movement receiving arm (10) for receiving the movement from a sensor (21) formed by a fixed pin and a second actuating arm (11) for actuating an encryption element of the lock (2), the lever (9) being pivoted on the blade (4) of the key (1) with an axis of oscillation thereof that is transverse to the longitudinal axis of the blade (4) of the key (1), the lever (9) being housed in a groove (13) of a main face (5) of the blade (4), the groove (13) having a depth dimension in the direction of the thickness of the blade (4) that is less than the thickness of the blade (4) and extending longitudinally along the blade (4) as far as the end (14) of the blade opposite the grip (3) of the key (1), the lever (9) being positioned entirely inside the groove (13) in an inactive position to interact with the sensor (21), a retaining spring (15) being further provided for retaining the lever (9) in an inactive position.

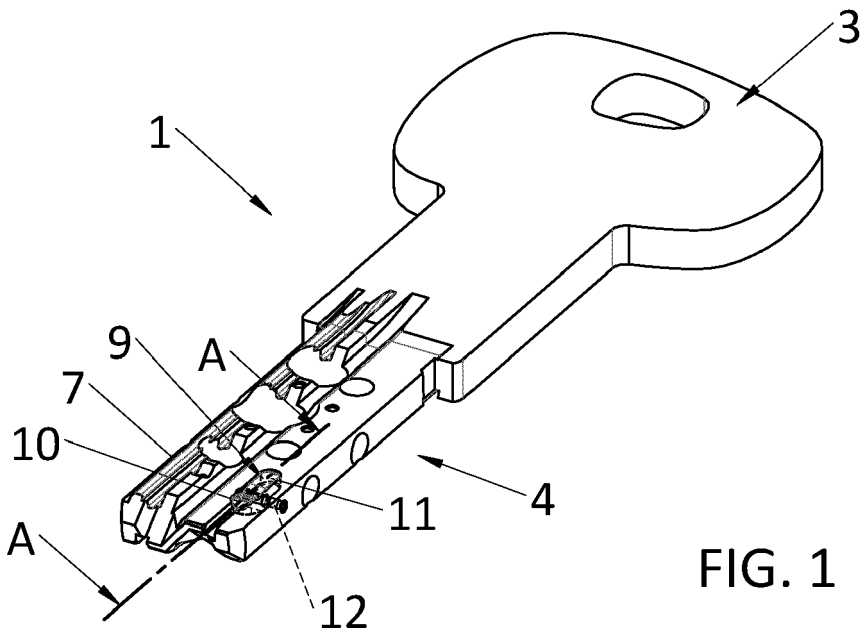

FIG. 1

EP 4 257 784 A1

Description

[0001] The present invention refers to a key for a lock.

[0002] Different kinds of key have been present on the market for some time, of flat or corrugated type that are reversible and not, having a bit that combines teeth, recesses, ridges and movable elements configured and arranged to interact with the encryption elements present in the lock.

[0003] Obviously, it is possible to make the key extremely secure with a suitable design of the combination of the elements that make up the bit.

[0004] In some cases, the key bit elements are fixed crests protruding from the surface of the key that may constitute an obstacle when the key is inserted into specific types of cylinder lock, in which the base of the cylindrical rotor is covered by a special protective disc.

[0005] A key with a simpler bit that is for example devoid of fixed elements protruding from the plane of the key could eliminate the aforesaid drawback but could at the same time be exposed to fraudulent duplication.

[0006] Keys also exist in which the bit has a movable element that for constructional reasons is restricted to a very limited movement that is not always appropriate to ensuring reliable and effective operation.

[0007] The technical task of the present invention is to realise a key for a lock which enables the decried technical drawbacks of the prior art described above to be eliminated. Within the context of this technical task, an object of the invention is to realize a very secure key for a lock.

[0008] Another object of the invention is to realise a key for a lock that is practical and convenient to use.

[0009] Another object of the invention is to realise a key for a lock that is difficult to duplicate. Another object of the invention is to realise a key for a lock that is reliable and resistant. The technical task, as well as these and other objects, according to the present invention, are achieved by a key for a lock, comprising a grip, a blade, at least one lever having a first movement receiving arm for receiving the movement from a sensor formed by a fixed pin and a second actuating arm for actuating an encryption element of the lock, said lever being pivoted on the blade with an axis of oscillation thereof that is transverse to the longitudinal axis of the blade, said lever being housed in a groove of a main face of the blade, said groove having a depth dimension in the direction of the thickness of said blade that is less than the thickness of said blade and extending longitudinally along said blade as far as the end of said blade opposite said grip, said lever being positioned entirely inside said groove in an inactive position to interact with said sensor, being characterized in that a retaining spring of said lever is further provided in an inactive position, said spring being configured and arranged to return said lever automatically to an inactive position after each oscillation.

[0010] In a preferred embodiment of the invention said spring protrudes from a seat obtained in said groove.

[0011] In a preferred embodiment of the invention said spring has a base with a form matching said seat.

[0012] In a preferred embodiment of the invention, said seat is formed by a print in a bottom of said groove.

[0013] In a preferred embodiment of the invention, said spring is interlocked between said seat and said first arm of said lever

[0014] In one embodiment of the invention, said spring is helical.

[0015] In one embodiment of the invention, said helical spring is tapered.

[0016] In another embodiment of the invention, said spring is plate-shaped and has the base and a tilted arm projecting from the base.

[0017] In a preferred embodiment of the invention, said spring is in a first compression state between said seat and said first arm of said lever when said lever is in said inactive position, and in a second state of greater compression between said seat and said first arm of said lever when said lever is in an active position in which said second arm protrudes outside said groove.

[0018] The key according to the invention, owing to the provision of the spring, has secure, precise and reproducible lever movements that improve the performance of the key even over the long term.

[0019] The spring can be advantageously returned by hand to position simply and easily during the key assembly step without particular operations like welding, gluing, fixing with screws, etc., that, during miniaturisation of the components, can be particularly tricky. In practice, it is sufficient to position the spring between the spring seat and the lever and only subsequently fit the rotation pin of the lever.

[0020] In addition to long-term operating reliability, the key thus has benefits from a simplified manufacturing process.

[0021] In this connection, creating the seat for the spring requires a milling processing that is moreover already envisaged for the realisation of the groove.

[0022] With a single milling processing, the groove can then be obtained in which the seat of the spring is already arranged inside the groove.

[0023] In addition, the spring can be made of material, for example harmonic steel, which is perfectly resistant to atmospheric agents without counting that the position thereof proximal to the free end of the blade makes cleaning with a single jet of air possible to remove a possible accumulation of powder.

[0024] The key according to the invention does not moreover have fixed elements protruding from the plane of the key and is usable without prejudice in applications using cylinder locks with the cylindrical rotor protected by a protective disk.

[0025] Providing an oscillating lever moreover makes fraudulent duplication of the key extremely complicated.

[0026] The lever has a rocker movement that increases the stroke of the second lever arm and thus the grip of the encryption element of the lock.

[0027] In this manner, the lever acts with extreme efficacy and reliability for actuating the encryption element of the lock.

[0028] Further features and advantages of the invention will become more apparent from the description of a preferred, but not exclusive, embodiment of the key for a lock according to the invention, which is illustrated by way of approximate and non-limiting example in the appended drawings, in which:

figure 1 shows a perspective view of a flat reversible key, according to a preferred embodiment of the invention;
figure 2 shows the two levers provided on the two opposite main faces of the blade of the flat key of figure 1;
figure 2A shows the key of figure 1 sectioned along a plane A-A that extends in the longitudinal direction of the blade;
figure 3 shows an exploded view of the key of figure 1;
figure 4a shows the flat reversible key of figure 1 inserted into a cylinder lock;
figure 4b shows the cylinder lock of figure 4a with the key removed;
figure 5 shows a combination of a flat reversible key and a cylinder lock conforming to a second embodiment of the invention;
figure 6 shows a corrugated key conforming to another manner of realising the invention;
figure 7 shows an exploded view of a key conforming to a second preferred embodiment of the of the invention; and
figure 8 shows the blade of the key of figure 7 in a longitudinal section.

[0029] Equivalent parts in the following description will be indicated with the same numerical reference.

[0030] With reference to the cited figures, a key 1 for a lock 2 is shown.

[0031] In figures 1 to 5, 7 and 8 we shall refer to a preferred solution that has a flat reversible key and a cylinder lock.

[0032] The scope of the invention can however be extended to a key of a different type, for example a corrugated key 1 illustrated in figure 6, or to a non-reversible key.

[0033] The key 1 comprises a grip 3 and a blade 4 bearing the bit of the key 1 adapted to interact with the encryption elements present in the lock 2.

[0034] In the case of the flat key illustrated in figures 1 from 1 to 5, 7 and 8 the bit of the key 1 comprises in a known manner on each of the two opposite main faces 5 of the blade 4 of the key 1 one or more rows of recesses 6 aligned according to the longitudinal axis of the blade 4. Possibly, as shown, the bit can comprise in a known manner also on each of the two opposite secondary side faces 7 of the blade 4 one or more rows of recesses 8 aligned according to the longitudinal axis of the blade 4.

[0035] In the case of the corrugated key 1 illustrated in figure 6, the bit of the key 1 comprises in a known manner recesses 6 of various shape and depth along the lower secondary face 7 of the blade 4 of the key 1.

[0036] Advantageously, on each main face 5 of the blade 4 of the flat reversible key illustrated in figures 1 to 5, 7 and 8, and on a main face 5 of the blade 4 of the corrugated key illustrated in figure 6, a lever 9 is fitted having a first movement receiving arm 10 and a second arm 11 actuating an encryption element of the lock 2.

[0037] It remains understood that in any other case in which the key is not reversible, there is just one lever 8 fitted selectively to one of the two main faces 5 of the blade 4 of the key 1.

[0038] Alternatively, the lever 9, in a different embodiment of the invention, can be fitted to a secondary face 7 of the blade 4 of the key 1.

[0039] Each lever 9 is pivoted by a pin 12 on the blade 4 of the key 1.

[0040] The axis of oscillation of the lever 9 is transverse to the longitudinal axis of the blade 4 of the key 1.

[0041] The first lever arm 10 and the second lever arm 11 are exposed on the main face 5 of the blade 4 of the key 1.

[0042] The lever 9 is housed in a groove 13 of the main face 5 of the blade 4 of the key 1.

[0043] The groove 13 extends longitudinally along the blade 4 of the key 1.

[0044] In particular the groove 13 extends as far as the end 14 of the blade 4 of the key 1 opposite the grip 3 of the key 1.

[0045] The groove 13 has a width, length and depth that are such as to house entirely therein the lever 9 when the latter adopts an inactive position illustrated for example in figure 1.

[0046] The lever 9 also has an active position in which the second arm 11 thereof protrudes outside the groove 13.

[0047] The key 1 has suitable releasable retaining means of the lever 9 in the inactive position. The retaining means comprises a spring 15 configured and arranged to return the lever 9 automatically to the inactive position after each oscillation.

[0048] The spring 15 protrudes from a seat 16 obtained in the groove 13.

[0049] The spring 15 has a base 15A with a form matching the seat 16.

[0050] The base 15A of the spring 15 is preferably flat.

[0051] The seat 16 is formed by a print 16A in the bottom 13A of the groove 13.

[0052] The spring 15 is interposed between the seat 16 and the lever 9, in particular between the seat 16 and the first arm 10 of the lever 9.

[0053] The spring 15 is more precisely simply interlocked between the seat 16 and the first arm 10 of the lever 9.

[0054] The spring 15 can be helical, and in particular tapered, as illustrated in figures 1 - 6, and be more pre-

cisely arranged with the axis M thereof orthogonal to the rotation pin 12.

[0055] Alternatively, the spring 15 can be plate-shaped as illustrated in figures 7 and 8, and have in particular the base 15A and a tilted arm 15B projecting from the base 15A.

[0056] The tapered or plate-shaped conformation of the spring 15 results in a significant saving in overall dimensions that is particularly useful for a construction in which the groove 13 has the minimum possible dimensions in order not to weaken the blade 4 of the key 1 structurally.

[0057] The base 15A of the spring 15, the larger base 15A in the case of the tapered helical spring 15 illustrated in figures 1 - 6, is positioned exactly in the seat 16.

[0058] The spring 15 is in a first compression state between the seat 16 and the first arm 10 of the lever 9 when the lever 9 is in the inactive position: in this inactive position of the lever 9 the second lever arm 11 is intercepted by a limit stop 40 of the lever 9 formed by an inner step of the groove 13.

[0059] The spring 15 is in a second state of greater compression between the seat 16 and the first arm 10 of the lever 9 when the lever 9, appropriately stressed by the sensor 21, is in the active position in which the second arm 11 protrudes outside the groove 13.

[0060] Advantageously, when the force acting on the first arm 10 is released, the lever 9 can return automatically and precisely to the inactive position by effect of the strain of the spring 15 that terminates when the second lever arm 11 is intercepted by the limit stop 40 of the lever 9.

[0061] Advantageously, the second arm 11 of the lever 9 has a greater length than the first arm 10 of the lever 9 so as to increase the movement of the encryption element.

[0062] In other embodiments of the invention, the length of the two lever arms can be the same or the second lever arm 11 can be of a shorter length than the first lever arm 10.

[0063] The key 1 works in combination with a cylinder lock having a stator 22 that houses a cylindrical rotor 17 provided with a slot 23 for inserting the key 1.

[0064] The cylindrical rotor 17 of the lock 2 houses a series of encryption elements formed by pins 18, 19, 19', 20 of different type and a sensor 21 adapted to interact with the first lever arm 10.

[0065] The encryption pins 18, 19, 19', 20 and the sensor 21 are aligned along the axis of the cylindrical rotor 17 and in particular they are positioned at the same diameter plane as the cylindrical rotor 17 on the same side as the insertion slot 23 of the key 1.

[0066] The encryption pins 18, 19, 19', 20 are movable along radial channels of the cylindrical rotor 17 that on one end open onto the annular part 22a of the stator 22 and on the other end open onto the slot 23 for the key 1.

[0067] The encryption pin 18 is a passive pin consisting of a single piece with frustoconical ends.

[0068] When the key 1 is inserted into the slot 23 (figures 4a, 5), by effect of the interaction of the pin 18 with the bit of the key 1, the pin 18 is free to translate and release the end thereof from the relative engagement seat 29 provided on the inner side of the annular part 22a of the stator 22. This condition thus enables the rotation of the cylindrical rotor 17.

[0069] The encryption pin 19 comprises a male part 19a and a female part 19b engaged with the male part 19a with interposition of an elastic element 19c. The female part 19b has a frustoconical end adapted to interact with the bit of the key 1 and an insertion end of the male part 19a. The male part 19a has an end inside the female part 19b and a frustoconical end outside the female part 19b and engageable in a seat 24 of matching shape present on the inner side of the annular part 22a of the stator 22. The male part 19a moreover has a perimeter recess 19a'. When the key 1 is not inserted into the slot 23 (figure 4b) the frustoconical end of the male part 19a is engaged in the seat 24 thereof and the female part 19b by effect of the action of the elastic element 19c is extended from the male part 19a and assumes a position in which the insertion end thereof of the male part 19a is aligned with the recess 19a' of the male part 19a. In this position, if an attempt is made to rotate the cylindrical rotor 17, the male part 19a is free to rotate angularly so as to wedge between the cylindrical rotor 17 and the stator 22 and prevent rotation of the cylindrical rotor 17. On the other hand, when the key 1 is inserted into the slot 23 (figures 4a, 5), the frustoconical end of the male part 19a is engaged 24 in the seat thereof but the female part 19b by effect of the interaction with the bit of the key 1 is retracted towards the male part 19a, assuming a position in which the insertion end of the male part 19a is staggered by the recess 19a' of the male part 19a. In this position, the female part 19b acts as a translation guide for the male part 19a. Thus if an attempt is made to rotate the cylindrical rotor 17, the male part 19a is guided to translate in the female part 19b until the frustoconical end of the male part 19a exits the seat 24 thereof and is retracted into the radial channel of the cylindrical rotor 17. In this case, the rotation of the cylindrical rotor 17 can take place.

[0070] The solution illustrated in figures 4a and 4b provides an encryption pin 20 consisting of a single piece adapted to interact with a lock nut 25 movable in contrast and by action of an elastic element 26 in a seat 27 obtained on the inner side of the annular part 22a of the stator 22. When the key 1 is not inserted into the slot 23 (figure 4b) the lock nut 25 by effect of the action of the elastic element 26 is protracted partially into the radial channel that houses the pin 20. In this position, if an attempt is made to rotate the cylindrical rotor 17, the lock nut 25 arranged straddling the cylindrical rotor 17 and the stator 22 prevents the rotation of the cylindrical rotor 17. On the other hand, when the key 1 is inserted into the slot 23 (figure 4a), by effect of the interaction of the pin 20 with the bit of the key 1 the point of contact between

the pin 20 and the lock pin 25 is positioned at the cylindrical interface surface between the annular part 22a of the stator 22 and the cylindrical rotor 17. In this case, the rotation of the cylindrical rotor 17 can take place.

[0071] The solution illustrated in figure 5 has on the other hand an encryption element 19' that is equivalent in operation to the encryption element 19 from which it differs structurally in the flat rather than frustoconical shape of one end of the female part.

[0072] Encryption of the lock can comprise encryption elements that are also different in arrangement, number and type from those that have just been disclosed.

[0073] In the lock illustrated in figures 4a and 4b the sensor 21 is formed by a fixed pin positioned above the last encryption element on the side of the cylindrical rotor 17 opposite the side from which the key 1 is inserted.

[0074] In this case, the lever 9 has the first lever arm 10 in a position proximal to the end 14 of the blade 4 of the key 1 and the second lever arm in a position distal from the end 14 of the blade 4 of the key 1.

[0075] Also the sensor 21 can however be different in arrangement and type and the key 1 has to be anyway conformed in a congruent manner.

[0076] With reference on the other hand to the solution illustrated in figure 5, the lever 9 has the first lever arm 10 in a position that is distal from the end 14 of the blade 4 of the key 1 and the second lever arm in a position that is proximal 14 to the blade 4 of the key 1, because the sensor 21 is now positioned before the last encryption element 19'.

[0077] In the solution illustrated in figure 5, also the structure of the sensor 21 is different. The sensor 21 has in this case a pin 21a that is movable in a radial channel 30 of the cylindrical rotor 17 in contrast and by action of an elastic element 21b interposed between the movable pin 21a and a housing 21c fixed in said radial channel 30.

[0078] The lever 9 operates in the following manner.

[0079] Before the key 1 is inserted into the slot 23 of the cylindrical rotor 17 the spring 15 retains the lever 9 in an inactive position completely inside the groove 13.

[0080] When the key 1 is inserted into the slot 23 of the cylindrical rotor 17, the first lever arm 10 interacts with the sensor 21 from which it receives a force that overcomes the elastic force exerted by the spring 15 to retain the lever 9 in an inactive position and generates on the lever 9 a rotation moment owing to which the lever 9 moves to the active position.

[0081] By effect of the rotation of the lever 9 the second lever arm 11 actuates an encryption element, in particular, the encryption element 20 in the solution illustrated in figures 4a and 4b and the encryption element 19' in the solution illustrated in figure 5.

[0082] The encryption element actuated by the lever 9 moves from the rotation locking position of the cylindrical rotor 17 to the position that enables the rotation of the cylindrical rotor 17.

[0083] More in general, by effect of the interaction with the bit of the key 1, also all the other encryption elements move to the position that enables the rotation of the cylindrical rotor 17.

[0084] The encryption pin actuated by the lever 9 can naturally also be a pin with the structure of the pin 19, or yet another pin.

[0085] The key for a lock thus conceived is susceptible to numerous modifications and variations, all falling within the scope of the inventive concept, as defined by the claims.

[0086] In practice, the materials used, as well as the dimensions, can be any depending on the needs and the state of the art.

Claims

1. A key (1) for a lock (2), comprising a grip (3), a blade (4), at least one oscillating lever (9) having a first movement receiving arm (10) for receiving the movement from a sensor (21) formed by a fixed pin and a second actuating arm (11) for actuating an encryption element of the lock (2), said lever (9) being pivoted on said blade (4) with an axis of oscillation thereof that is transverse to the longitudinal axis of said blade (4), said lever (9) being housed in a groove (13) of a main face (5) of the blade (4), said groove (13) having a depth dimension in the direction of the thickness of said blade (4) that is less than the thickness of said blade (4) and extending longitudinally along said blade (4) as far as the end (14) of said blade (4) opposite said grip (3), said lever (9) being positioned entirely inside said groove (13) in an inactive position to interact with said sensor (21), a retaining spring (15) of said lever (9) being further provided in an inactive position, said spring (15) being configured and arranged to return said lever (9) automatically to an inactive position after each oscillation.

2. The key (1) for a lock (2) according to claim 1, **characterised in that** said spring (15) protrudes from a seat (16) obtained in said groove (13).

3. The key (1) for a lock (2) according to the preceding claim, **characterised in that** said spring (15) has a base (15A) with a form matching said seat (16).

4. The key (1) for a lock (2) according to the preceding claim, **characterised in that** said base (15A) is flat.

5. The key (1) for a lock (2) according to any one of claims 2 to 4, **characterised in that** said seat (16) is formed by a print (16A) in a bottom (13A) of said groove (13).

6. The key (1) for a lock (2) according to any one of claims 2 to 5, **characterised in that** said spring (15) is interposed between said seat (16) and said first

arm (10) of said lever (9).

7. The key (1) for a lock (2) according to any one of claims 2 to 6, **characterised in that** said spring (15) is interlocked between said seat (16) and said first arm (10) of said lever (9).

8. The key (1) for a lock (2) according to any one of claims 2 to 7, **characterised in that** said spring (15) is helical.

9. The key (1) for a lock (2) according to the preceding claim, **characterised in that** said helical spring (15) is tapered.

10. The key (1) for a lock (2) according to any one of claims 2 to 7, **characterised in that** said spring (15) is plate-shaped.

11. The key (1) for a lock (2) according to any one of claims 6 to 10, **characterised in that** said spring (15) is in a first compression state between said seat (16) and said first arm (10) of said lever (9) when said lever (9) is in said inactive position, and in a second state of greater compression between said seat (16) and said first arm (10) of said lever (9) when said lever (9) is in an active position in which said second arm (11) protrudes outside said groove (13).

12. A combination of a cylinder lock (2) and a key (1) compliant with any preceding claim, wherein said encryption element is an encryption pin placed in the cylindrical rotor (17) of the lock (2).

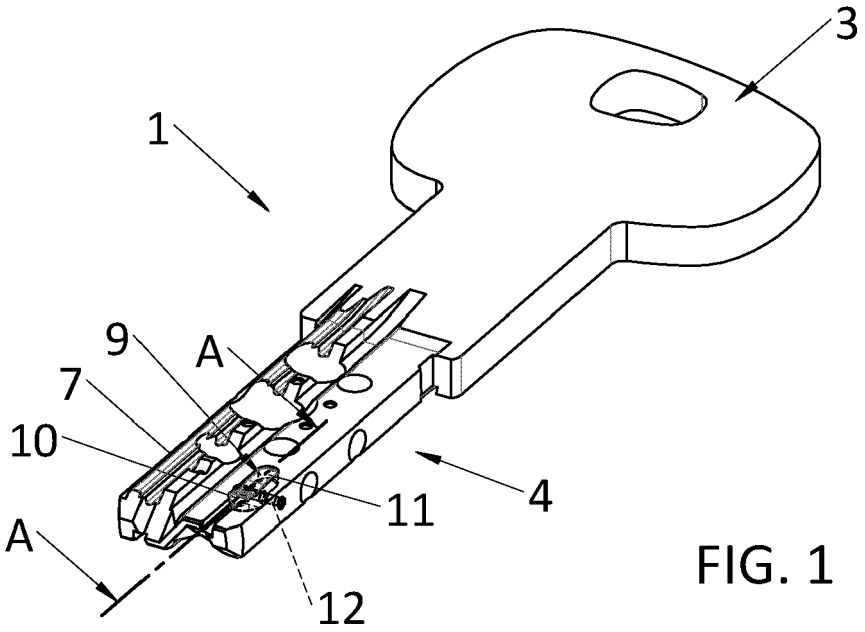

FIG. 1

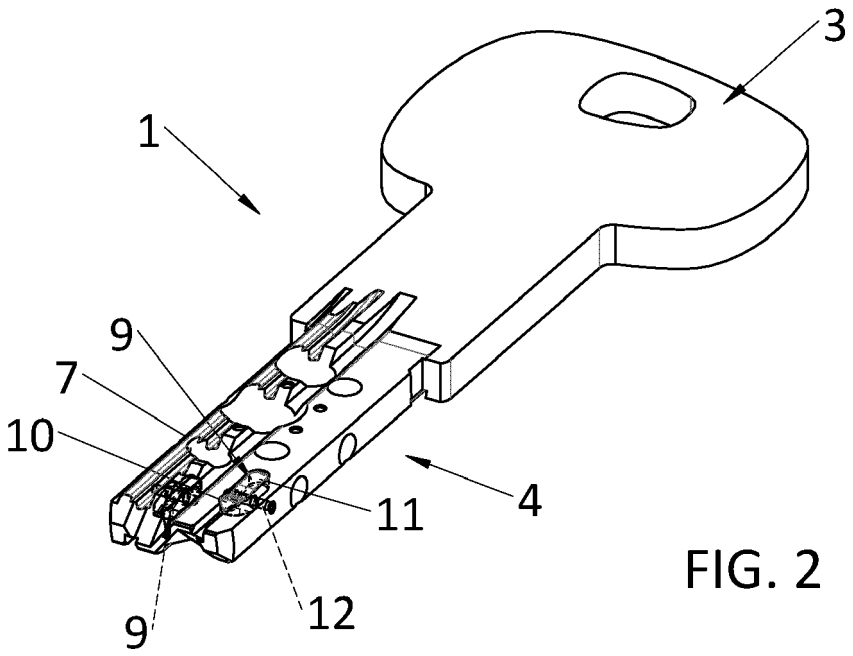

FIG. 2

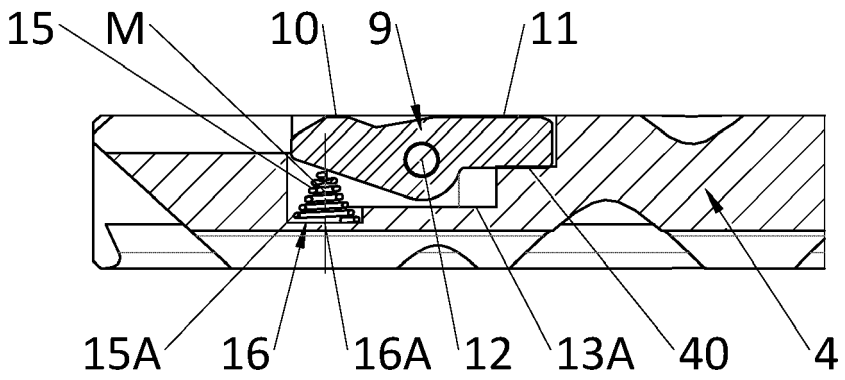

FIG. 2A

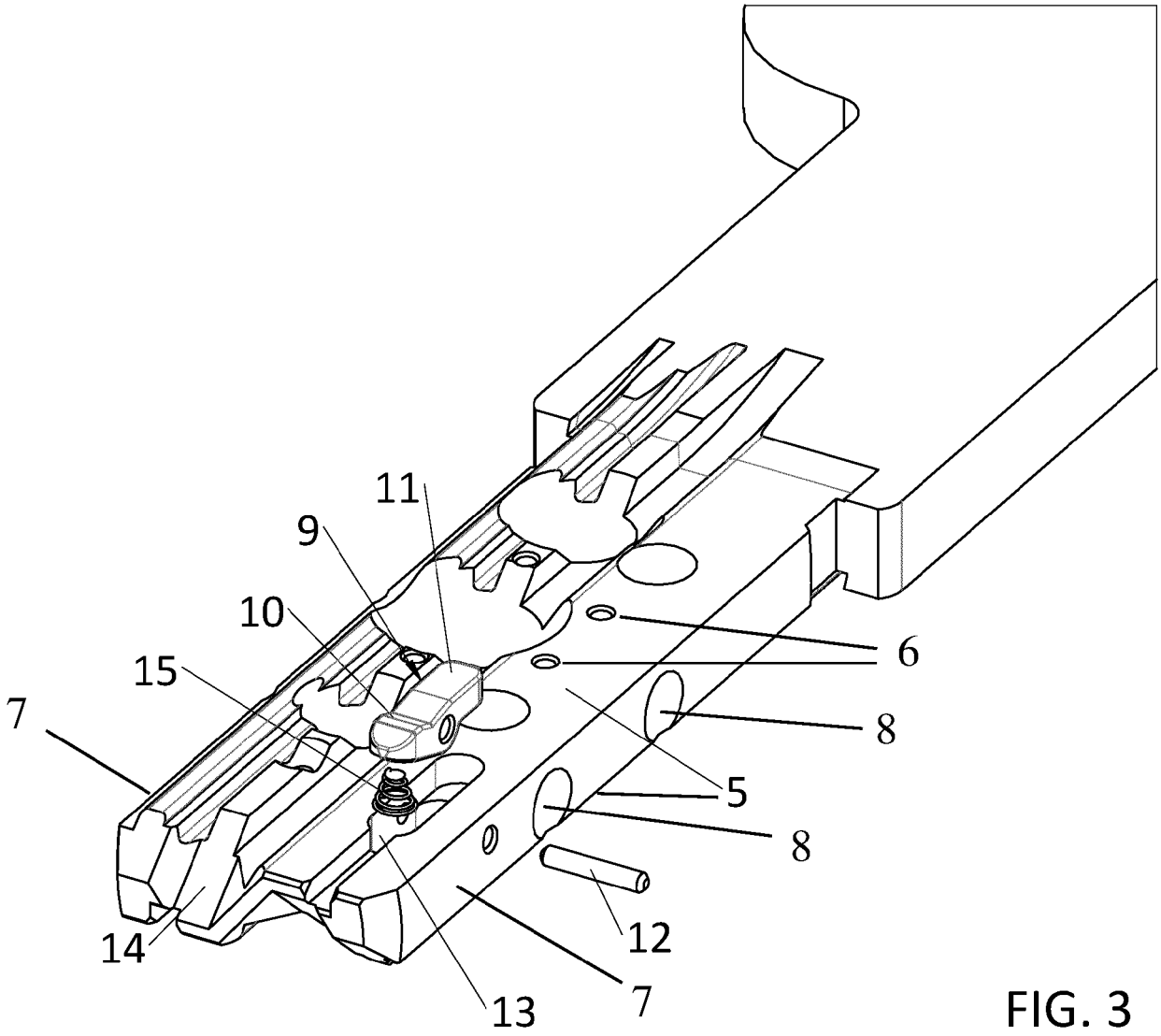

FIG. 3

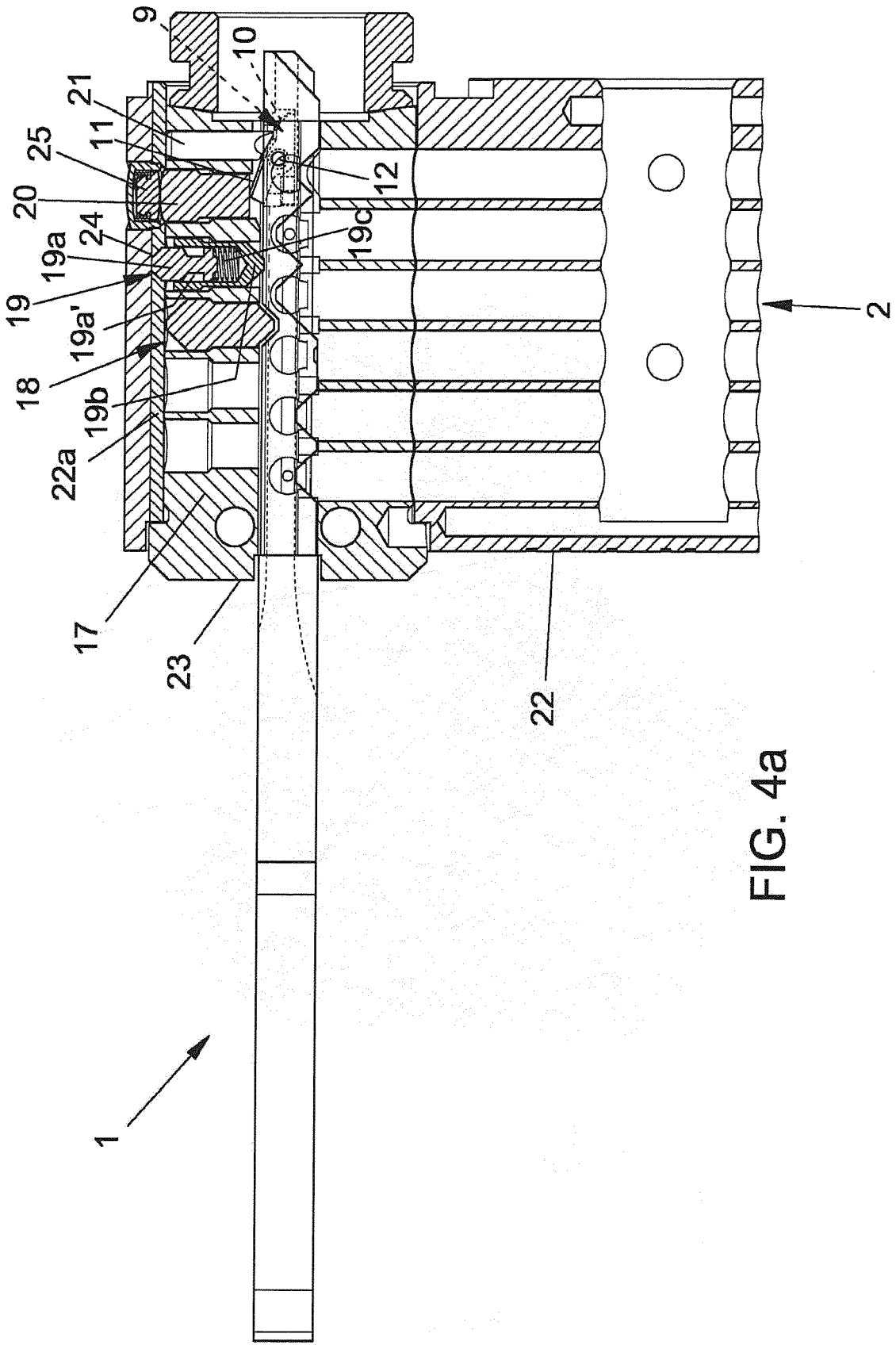

FIG. 4a

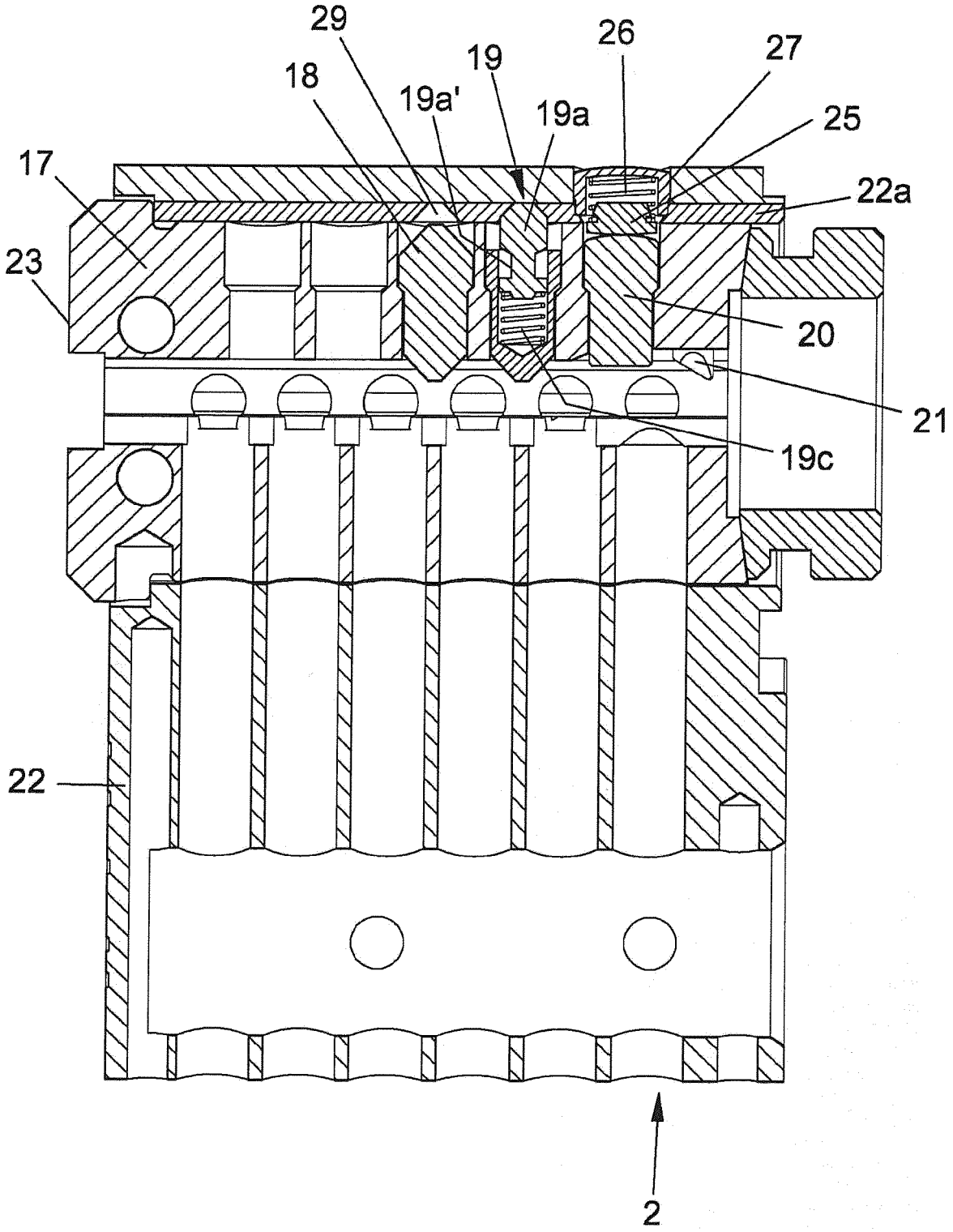

FIG. 4b

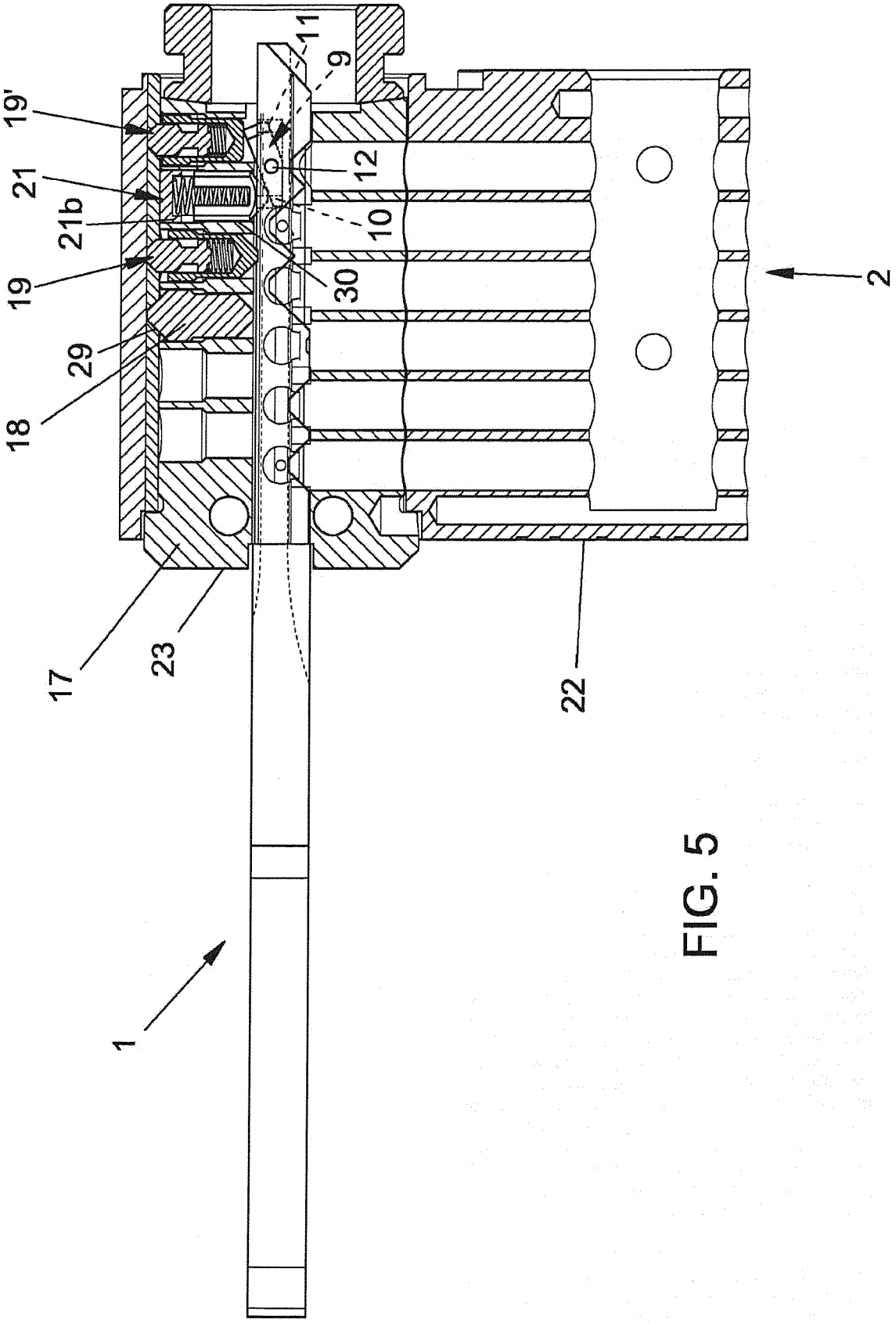

FIG. 5

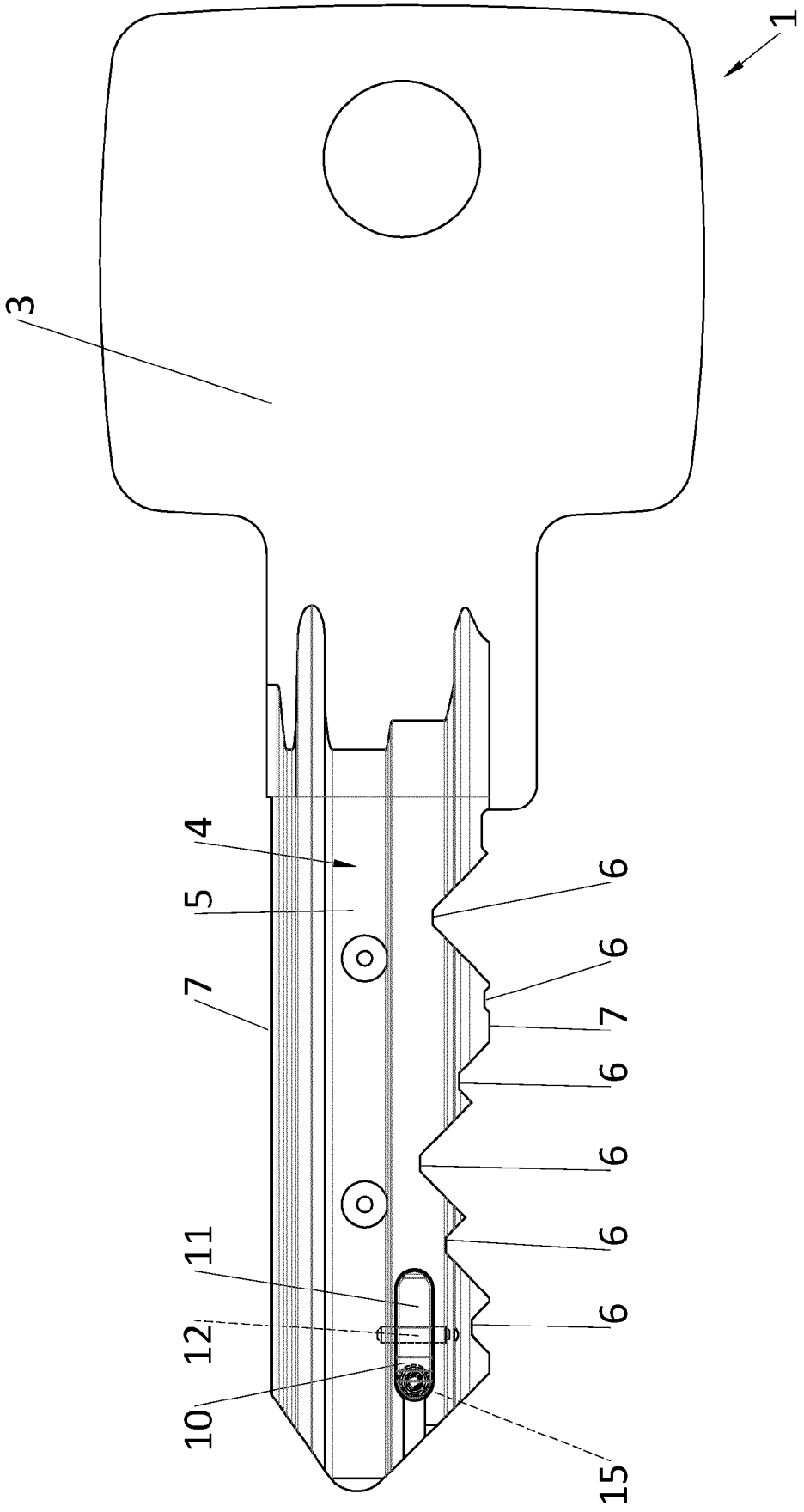

FIG. 6

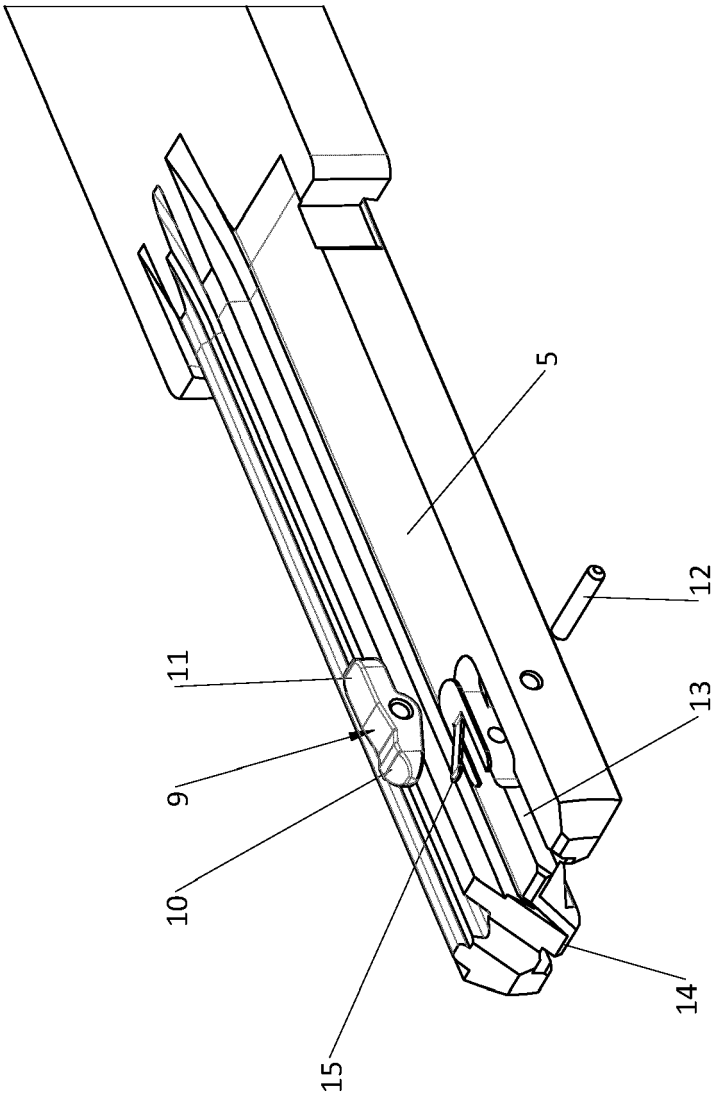

FIG. 7

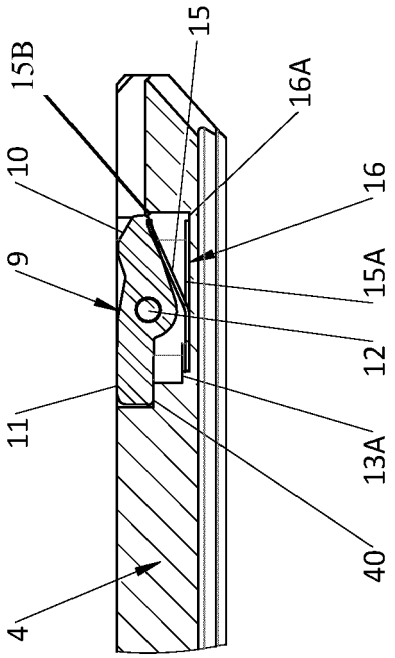

FIG.8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 16 6674

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 449 073 A1 (ISEO SERRATURE SPA) 6 March 2019 (2019-03-06) * the whole document *	1-12	INV. E05B35/00
A	WO 00/57006 A1 (HAMAFTEAH HAMISTOVEV LTD) 28 September 2000 (2000-09-28) * figures *	1,8,10	
A	WO 2005/095738 A2 (MUL T LOCK TECHNOLOGIES LTD) 13 October 2005 (2005-10-13) * figures 1,2,3a,3b,5 *	1,12	
A	DE 10 93 253 B (WILHELM GELLER DR) 17 November 1960 (1960-11-17) * figure 8 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			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 August 2023	Van Beurden, Jason

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)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 16 6674

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-08-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3449073 A1	06-03-2019	CN 110621835 A	27-12-2019
		EP 3449073 A1	06-03-2019
		ES 2796608 T3	27-11-2020
		HR P20200713 T1	24-07-2020
		HU E049320 T2	28-09-2020
		KR 20190126396 A	11-11-2019
		LT 3449073 T	25-05-2020
		PL 3449073 T3	10-08-2020
		PT 3449073 T	16-06-2020
		RU 2019129601 A	22-03-2021
		SA 519410135 B1	19-09-2022
		SG 11201908435V A	30-10-2019
		SI 3449073 T1	31-07-2020
		US 2020032549 A1	30-01-2020
		WO 2018166662 A1	20-09-2018
		ZA 201906284 B	26-08-2020
WO 0057006 A1	28-09-2000	AU 3320400 A	09-10-2000
		IL 129097 A	23-05-2002
		WO 0057006 A1	28-09-2000
WO 2005095738 A2	13-10-2005	AP 2013 A	22-07-2009
		AT 415534 T	15-12-2008
		AU 2005229301 A1	13-10-2005
		BR PI0509357 A	11-09-2007
		CA 2559702 A1	13-10-2005
		CN 1961127 A	09-05-2007
		CR 8681 A	17-11-2006
		DK 1738044 T3	23-03-2009
		EA 200601549 A1	27-02-2007
		EC SP066926 A	20-12-2006
		EP 1738044 A2	03-01-2007
		ES 2317210 T3	16-04-2009
		GB 2412689 A	05-10-2005
		HK 1101420 A1	18-10-2007
		HR P20090025 T3	28-02-2009
		IL 178364 A	22-09-2009
		JP 4592745 B2	08-12-2010
		JP 2007530840 A	01-11-2007
		KR 20070042913 A	24-04-2007
		MA 28552 B1	03-04-2007
		NZ 549930 A	27-10-2006
		PL 1738044 T3	29-05-2009
		PT 1738044 E	09-02-2009
		SI 1738044 T1	30-04-2009
		UA 88159 C2	25-09-2009

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 16 6674

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-08-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2008236223 A1	02-10-2008
		WO 2005095738 A2	13-10-2005
		ZA 200608031 B	30-07-2008
DE 1093253 B	17-11-1960	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82