



(11) **EP 4 063 594 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.09.2022 Bulletin 2022/39

(51) International Patent Classification (IPC):
E05B 19/00 (2006.01) E05B 27/00 (2006.01)
E05B 35/00 (2006.01)

(21) Application number: **22157955.0**

(52) Cooperative Patent Classification (CPC):
E05B 35/003; E05B 19/0023; E05B 19/0035;
E05B 19/0058; E05B 27/0017; E05B 27/0021

(22) Date of filing: **22.02.2022**

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **MG Serrature S.p.A.**
20824 Lazzate (Monza Brianza) (IT)

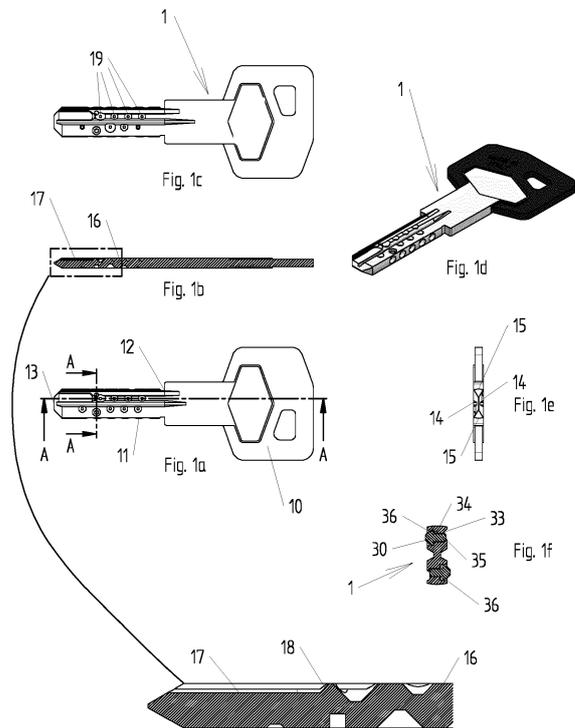
(72) Inventor: **MONTI, Enzo Giovanni**
Lazzate (Monza Brianza) (IT)

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

(30) Priority: **24.03.2021 IT 202100007208**

(54) **REVERSIBLE FLAT KEY AND CYLINDER LOCK WITH REVERSIBLE FLAT KEY**

(57) Reversible flat key for a cylinder lock (2), where the lock (2) comprises a cylindrical stator (3) that has a plurality of counter pins (7), a cylindrical rotor (4) that has a plurality of pins (6), each pin (6) being configured and arranged to interact with a corresponding counter pin (7) to enable the rotation of the rotor (4), where the lance (11) of the key (1) has in each primary face thereof (14) a first flat longitudinal wall (16) and a second flat longitudinal wall (17) that is parallel and lowered with respect to the first wall (16), the first wall (16) having a series of encryption elements (19) that follow in the longitudinal direction of the lance (11), the encryption elements (19) being configured and arranged to interact with corresponding pins (6) of the rotor (4) to enable the rotation of the rotor (4), the second wall (17) being configured and arranged to cooperate with a corresponding special pin (20) of the rotor (4) to enable the rotation of the rotor (4) or to enable the complete insertion of the key (1) into the slit (8) of the rotor (4).



EP 4 063 594 A1

Description

[0001] The present invention relates to a reversible flat key and to a cylinder lock with a reversible flat key.

[0002] At present locks comprise a stator provided with a cylindrical hole in which a rotor is rotatably inserted, which rotor has a slit for insertion of the key.

[0003] The stator and the rotor have a plurality of transverse holes where, respectively, counter pins and pins which collaborate with the key to open or close the lock are housed.

[0004] The key is provided with a mechanical encryption, defined by projections or recesses of the profile thereof.

[0005] In a particular example, the key has mechanical encryption defined by a plurality of craters made on its flat part, so that the pins when inserting into these craters bring the lock into the opening or closing configuration.

[0006] However, the devices of the traditional type have numerous drawbacks, mainly due to the fact that the key blanks (i.e. the key without the encryption) can be made in a substantially simple way.

[0007] Thereafter, with the blanks available, it is possible to copy the key by creating the encryption thereon in a substantially simple way, using apparatuses that are currently available on the market.

[0008] Further, the locks and the keys of traditional type have a limited possible number of combinations.

[0009] Therefore, for the number of possible combinations to be increased, it is necessary to increase the number of pins (and therefore of counter pins and holes in the stator and in the rotor) and consequently the number of key recesses, considerably increasing the complexity of the lock and of the key itself.

[0010] Further, traditional locks can in some cases be brought into the opening configuration even though the encryption of the key is not correct.

[0011] This occurs, in particular, when using a passive type lock.

[0012] A passive type lock has a stator and rotor having the same structure as those used in active type locks, with the difference in that the transverse holes of the stator do not contain counter pins, but they are left empty.

[0013] It is evident that a lock of this type is opened even when a key with deeper craters than those of the correct key is inserted into the slit of the rotor, due to the lack of counter pins which should prevent the rotation of the cylinder in this case.

[0014] The technical task which is proposed for the present invention is, therefore, to realise a reversible flat key and a cylinder lock with a reversible flat key which allow eliminating the technical drawbacks of the prior art.

[0015] Within the context of this technical task an object of the invention is to realise a reversible flat key and a cylinder lock with a reversible flat key, in which the reproduction of the key is very difficult, so as to limit the risk of illegal duplication.

[0016] Another object of the invention is to realise a

reversible flat key and a cylinder lock with a reversible flat key, wherein the lock and the key have a very high number of possible combinations, without it being necessary to increase the number of pins and, hence, the complexity of the lock and the key.

[0017] The technical task, as well as these and other objects, according to the present invention are achieved by realising a reversible flat key for a cylinder lock, where said lock comprises a cylindrical stator that has a plurality of counter pins that are movable in a radial direction of the stator, a cylindrical rotor that has a plurality of pins that are movable in a radial direction of the rotor, said rotor having an axial slit for inserting said key, each pin being configured and arranged to interact with a corresponding counter pin to enable the rotation of the rotor, and where said key comprises a longitudinal lance having a tapered free end and two opposite primary longitudinal faces, characterized in that each primary longitudinal face has in succession in the longitudinal direction of the lance a first flat longitudinal wall extending as far as the end of the lance that is proximate to said grip and a second flat longitudinal wall that is distal from said grip, a connecting wall being further provided between said first wall and said second wall, said second wall being parallel and lowered with respect to said first wall and extending as far as said tapered free end of said lance, said first wall having a series of encryption craters that follow in the longitudinal direction of the lance, said encryption craters being configured and arranged to interact with corresponding pins of said rotor to enable the rotation of said rotor, said second wall being configured and arranged to cooperate with a corresponding special pin of said rotor to enable the rotation of said rotor or to enable the complete insertion of said key into said slit, said connecting wall being configured and arranged to raise said pins from said second wall to said first wall during the insertion of said key into said axial slit.

[0018] The present invention also relates to the reversible flat key in combination with a cylinder lock.

[0019] Preferably said encryption elements comprise a plurality of craters.

[0020] Preferably said encryption elements also comprise a movable pin orthogonally to said first flat longitudinal wall.

[0021] According to one aspect of the invention said special pin is the innermost pin in an axial direction of the rotor.

[0022] According to one aspect of the invention, said connecting wall is oblique.

[0023] Other characteristics of the present invention are also defined in the other claims.

[0024] Further characteristics and advantages of the invention will more fully emerge from the description of preferred but not exclusive embodiments of the reversible flat key and cylinder lock according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, in which:

figure 1a shows a plan view of a reversible flat key according to a first embodiment of the invention; figure 1b shows the key of figure 1a sectioned along the line A-A; figure 1c shows a plan view from the opposite side of the flat key of figure 1a; figure 1d shows a perspective view of the key of figure 1a; figure 1e shows a front view of the key of figure 1a; figure 1f shows a sectional view along the line A - A of the key of figure 1a; figure 2a shows a cross-sectional view of the cylinder lock used in combination with the key of figures 1a-1e, with the key completely inserted; figure 2b shows a cross-sectional view of the cylinder lock used in combination with the key of figures 1a-1e, with the key not completely inserted; figure 3a shows a longitudinal sectional view of the cylinder lock used in combination with the key of figures 1a-1e, with the key completely inserted; figure 3b shows a longitudinal sectional view of the cylinder lock used in combination with the key of figures 1a-1e, with the key not completely inserted; figure 4a shows a plan view of a reversible flat key in a second embodiment of the invention; figure 4b shows the key of figure 4a sectioned along the line A-A; figure 4c shows a plan view from the opposite side of the flat key of figure 4a; figure 4d shows a perspective view of the key of figure 4a; figure 4e shows a front view of the key of figure 4a; figure 4f shows a sectional view along the line A - A of the key of figure 4a; figure 5a shows a cross-sectional view of the cylinder lock used in combination with the key of figures 4a-4e, with the key completely inserted; figure 5b shows a cross-sectional view of the cylinder lock used in combination with the key of figures 4a-4e, with the key not completely inserted; figure 6a shows a longitudinal sectional view of the cylinder lock used in combination with the key of figures 4a-4e, with the key completely inserted; figure 6b shows a longitudinal sectional view of the cylinder lock used in combination with the key of figures 4a-4e, with the key not completely inserted; figure 7 shows a cross section of the lock with the key completely inserted. Equivalent parts are indicated in the various embodiments using the same reference number.

[0025] With reference to the aforementioned figures, a reversible flat key 1 and a cylinder lock 2 for the reversible flat key 1 are shown.

[0026] The lock 2 comprises a cylindrical stator 3 and a cylindrical rotor 4 coaxially housed in the cylindrical stator 3.

[0027] The cylindrical stator 3 has an inner cylindrical

wall which mates with an outer cylindrical wall of the cylindrical rotor 4 at a cylindrical interface surface 5.

[0028] The cylindrical rotor 4 has a plurality of pins 6 movable along radial channels 6a of the cylindrical rotor 4 arranged in succession along the axis of the cylindrical rotor 4.

[0029] The radial channels 6a lie in a plane that contains the axis of the cylindrical rotor 4. Similarly, the cylindrical stator 3 has a plurality of counter pins 7 that are movable along radial channels 7a of the cylindrical stator 3 arranged in succession along the axis of the cylindrical stator 3.

[0030] The radial channels 7a lie in a plane that contains the axis of the cylindrical stator 3.

[0031] The counter pins 7 are movable along the radial channels 7a in contrast and by the action of springs 9.

[0032] The cylindrical rotor 4 has an axial slit 8 for inserting the key 1.

[0033] The axial slit 8 communicates with the radial channels 6a of the cylindrical rotor 4. The pins 6 can be aligned with the counter pins 7 in an opening configuration of the lock.

[0034] The key 1 comprises a grip 10 and a longitudinal lance 11 having an end 12 that is proximate to the grip 10 and a tapered end 13 that is distal from the grip 10.

[0035] The lance 11 has a pair of opposite primary longitudinal faces 14, 14 and a pair of opposite secondary longitudinal faces 15, 15.

[0036] Advantageously, each primary longitudinal face 14 has a first flat longitudinal wall 16 which extends between the proximal end 12 of the lance 11 and a connecting wall 18 in a longitudinally intermediate position of the lance 11, and a second flat longitudinal wall 17 which extends between the connecting wall 18 and the tapered distal end 13 of the lance 11.

[0037] The second wall 17 is parallel and lowered with respect to the first wall 16.

[0038] The connecting wall 18 is oblique.

[0039] The first wall 16 has a series of encryption elements 19 that follow in the longitudinal direction of the lance 11.

[0040] The encryption elements 19 are configured and arranged to interact with corresponding pins 6 of the rotor 4 to enable the rotation of the rotor 4.

[0041] The second wall 17 is configured and arranged to cooperate with a corresponding special pin 20 of the rotor 4 to enable the rotation of the rotor 4 or to enable the complete insertion of the key 1 into the slit 8.

[0042] The encryption elements 19 comprise a plurality of craters of various depths.

[0043] The special pin 20 is the innermost pin in the axial direction of the rotor 4.

[0044] With reference to the solution illustrated in figures 1a - 3b, the special pin 20 has a flat end wall 21 configured and arranged to interact frontally with the second wall to enable the rotation of the rotor 4.

[0045] The special pin 20 is further configured and arranged to interact with a special counter pin 26 of the

stator 3.

[0046] The special counter pin 26 in particular is movable along a radial channel 7a' in contrast and by the action of a spring 9'.

[0047] With reference to the solution illustrated in figures 4a - 6b, the special pin 20 is a dual-action pin having a bush 22 and a stem 23 slidable in the bush 22.

[0048] In this solution the second wall 17 has a further encryption element 24.

[0049] The bush 22 is configured and arranged to cooperate with the second wall 17 to enable the complete insertion of the key 1 into the slit 8.

[0050] The stem 23 is configured and arranged to interact with the further encryption element 24 to enable the rotation of the rotor 4.

[0051] The stem 23 has a tapered end 25 and the further encryption element 24 comprises a further crater configured and arranged to interact with the tapered end 25 of the stem 23.

[0052] The stem 23 is further configured and arranged to interact with a special counter pin 26 of the stator 3 and the bush 22 is configured and arranged to interact with the inner cylindrical wall of the stator 3.

[0053] The special counter pin 26 in particular is movable along a radial channel 7a' in contrast and by the action of a spring 9'.

[0054] The operation of the lock 2 is briefly as follows.

[0055] With reference to the solution illustrated in figures 1a - 3b, during the insertion into the slit 8, each pin 6 is aligned with the corresponding counter pin 7 and the springs 9 keep the counter pins 7 in contact with the corresponding pins 6.

[0056] Each pin 6 of the rotor 4 sequentially performs a lifting movement in contrast to the spring 9 while sliding along the tapered tip 13 of the lance 11, then it remains at a fixed height while sliding along the second wall 17, then it performs a further lifting movement in contrast to the spring 9 while sliding along the oblique connecting wall 18, then it remains at a fixed height while sliding along the first wall 16, then it performs a final downward movement into the corresponding crater by effect of the spring 9.

[0057] The final height achieved by each pin 6 housed in the corresponding crater is such as to bring the contact surface between the pin 6 and the corresponding counter pin 7 into alignment with the cylindrical interface surface 5.

[0058] The special pin 20, in the final step of inserting the key 1 into the slit 8, is first lifted by the tapered end 13 of the lance 11, then it remains stationary at the same height while sliding along the second wall 17.

[0059] Once the key 1 has been inserted into the slit 8, the flat end wall 21 of the special pin 20 is still resting flat against the second wall 17.

[0060] The height difference of the second wall 17 with respect to the first wall 16 is calibrated in such a way that when the flat end wall 21 of the special pin 20 is resting flat against the second wall 17, the contact surface be-

tween the special pin 20 and the corresponding special counter pin 26 is aligned with the cylindrical interface surface 5.

[0061] In this configuration of the lock 2 the rotation of the rotor 4 is enabled.

[0062] With reference to the solution illustrated in figures 3a - 6b, during the insertion into the slit 8, each pin 6 is aligned with the corresponding counter pin 7 and the springs 9 keep the counter pins 7 in contact with the corresponding pins 6.

[0063] Each pin 6 of the rotor 4 sequentially performs a lifting movement in contrast to the spring 9 while sliding along the tapered tip 13 of the lance 11, then it remains at a fixed height while sliding along the second wall 17, then it enters and exits the special crater provided on the second wall 17, then it performs a further lifting movement in contrast to the spring 9 while sliding along the oblique connecting wall 18, then it remains at a fixed height while sliding along the first wall 16, then it performs a final downward movement into the corresponding crater by effect of the spring 9.

[0064] The final height achieved by each pin 6 housed in the corresponding crater is such as to bring the contact surface between the pin 6 and the corresponding counter pin 7 into alignment with the cylindrical interface surface 5.

[0065] The special pin 20, in the conclusive step of inserting the key 1 into the slit 8, is first lifted by the tapered end 13 of the lance 11 until the bush 22 and the stem 23 rest against the second wall 17.

[0066] It should be noted that the provision of the second wall 17 lowered with respect to the first wall 16 allows the complete insertion of the key 1 into the slit 8.

[0067] Thanks to the second lowered wall 17, the lifting of the bush 22 is in fact minimal, and at best could even be zero, in any case by an amount insufficient to bring the bush 22 into mechanical interference with the inner cylindrical wall of the stator 3. A key without the second lowered wall 17, on the contrary, would bring the bush 22 into mechanical interference with the inner cylindrical wall of the stator 3 so that the bush 22, being no longer able to raise further, would prevent in the slit 8 a passage from being formed that is suitable for the transit of the lance 11 and consequently would prevent the further insertion of the key 1 into the slit 8.

[0068] At the end of the insertion of the key 1 into the slit 8, the tapered end 25 of the stem 23 fits into the further crater defining the further encryption element 24, and the contact surface between the stem 23 and the special counter pin 26 aligns with the cylindrical interface surface 5.

[0069] In this configuration of the lock 2 the rotation of the rotor 4 is enabled.

[0070] From the production point of view, the second lowered wall 17 can be made with a linear milling processing of the lance 11.

[0071] To increase the encryption combinations, it is possible to implement among the encryption elements

on the first wall 16 also a pin 30 that is movable orthogonally to the first wall 16 between a retracted portion and a protruding position, as shown in figures 4f, 4g and 7.

[0072] The rotor 4 consequently has at least one safety pin 31 which collaborates with the pin 30 of the key 1 so that, when the pin 30 is in a protruding position, at least the safety pin 31 is in the opening configuration to allow rotation of the rotor 4 with respect to the stator 3.

[0073] Advantageously, moreover, the rotor 4 comprises an actuation means 32 for actuating the pin 30 between the retracted position and the protruding position.

[0074] The actuation means 32 comprises an element of the rotor 4 which protrudes inside the slit 8; correspondingly, the key 1 has a groove 33 connected to a seat 34 of the pin 30, for the actuation of the pin 30 when the protruding element 32 is inserted inside the groove 33.

[0075] Conveniently, the seat 34 is connected to the groove 33 at a portion of its bottom; another portion 35 of the bottom of the seat 34, on the other hand, is blind.

[0076] In a different embodiment of the key 1, the blind portion 35 of the seat 34 is absent.

[0077] The seat 34 also has a radial portion 36 in relief, which partially closes its front opening.

[0078] This annular portion is made, for example, by deforming the front edge of the seat 34 or, in another embodiment, by connecting an annular element to the end of the seat 34.

[0079] The pin 30 has an enlarged head inserted in an enlarged portion of the seat 34 and preferably the enlarged head has a substantially truncated conical shape. Advantageously, moreover, the pin 30 is misaligned with respect to the traditional pins 6 to allow the insertion of the key 1 inside the slit 8.

[0080] The safety pin 31 is aligned with the traditional pins 6, so as to be able to use the traditional locks and, since the pin 30 is misaligned with respect to the traditional pins 6, the safety pin 31 has a flattened terminal portion to collaborate with the pin 30.

[0081] In particular, the terminal portion of the safety pin 31 is cylindrical with an end adapted to collaborate, coming into contact at its own peripheral portion, with the pin 30.

[0082] For the release, the pin 30 is made to exit from the slit 8 of the key 1, by pressing it against the safety pin 31, so as to bring the safety pin 31 into the opening position to allow the rotation of a rotor with respect to a stator of the lock.

[0083] When the key 1 is inserted, the pin 30 is in the retracted position and does not interfere with the traditional pins 6 since the pin 30 is misaligned with respect to the traditional pins 6 which have conical ends.

[0084] When the pin 30 is brought at the safety pin 31, the pin 30, which is in the extracted position, makes the safety pin 30 slide along the truncated conical side wall, making it slide as indicated by the arrow F, making the end of the safety pin 31 align with the surface of the rotor 4 and the end of the counter pin associated therewith with the surface of the stator 3 and bringing the lock into the

opening position.

[0085] By extracting the key 1, instead, the safety pin 30 and the counter pin associated therewith translate in the opposite direction to that indicated by the arrow F and the aforesaid counter pin is inserted between the rotor and the stator, preventing reciprocal rotation.

[0086] Obviously, the pin 30 can also be arranged at the back of the key; in this case the safety pin is housed in the vertical seats.

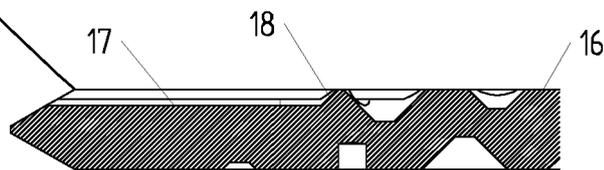
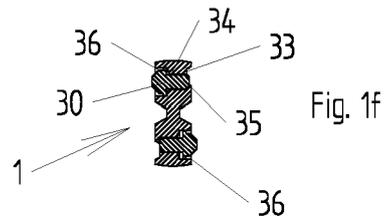
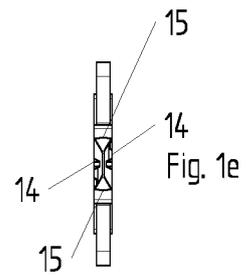
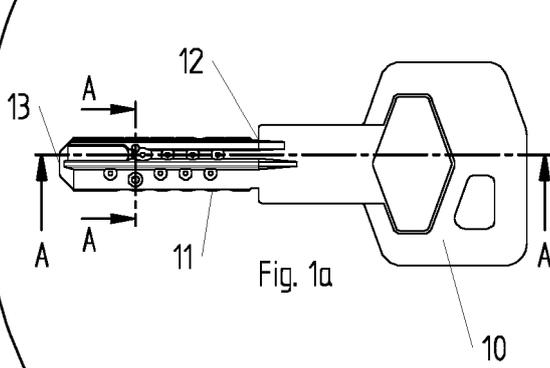
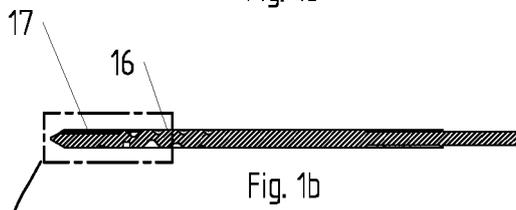
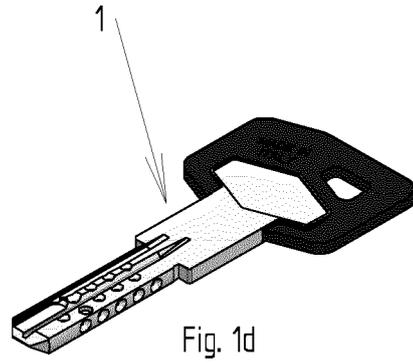
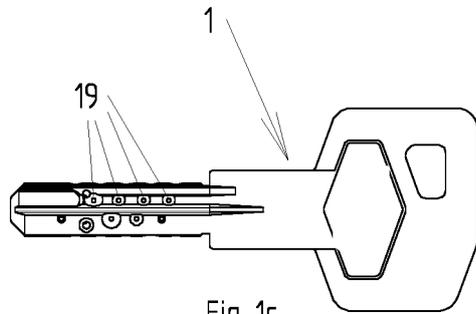
[0087] In practice it has been found that the cylinder lock and the reversible flat key according to the invention are particularly advantageous, since the keys are extremely difficult to copy and, at the same time, the locks have a very high number of combinations, even without excessively increasing the number of pins. The cylinder lock with reversible flat key as conceived herein is susceptible to many modifications and variations, all falling within the scope of the inventive concept; furthermore, all the details are replaceable by technically equivalent elements.

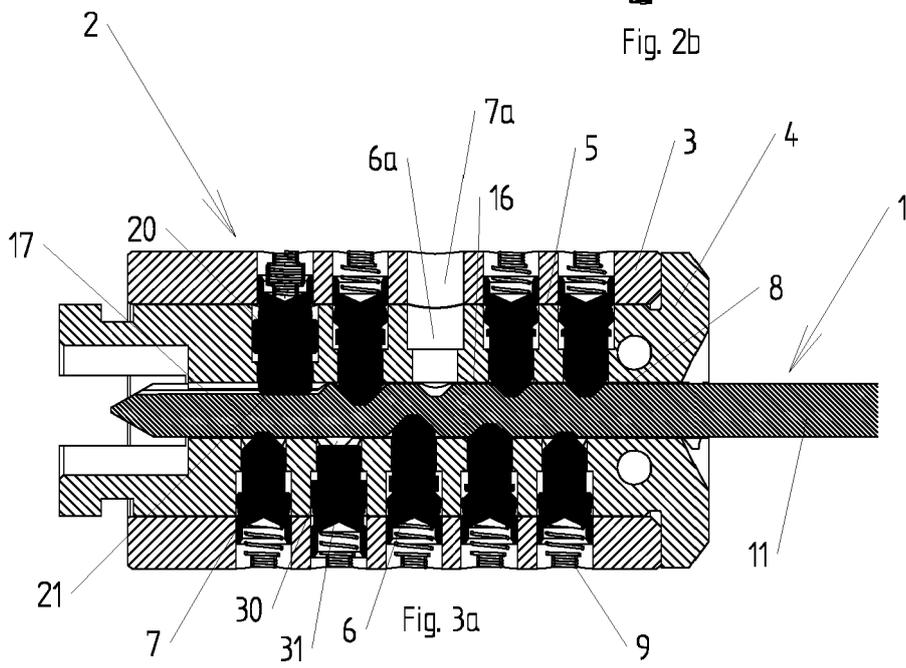
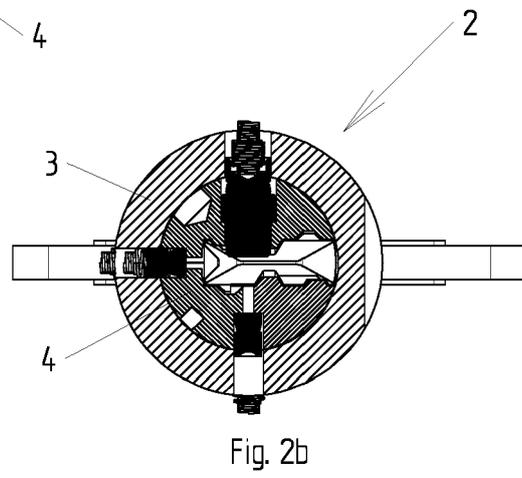
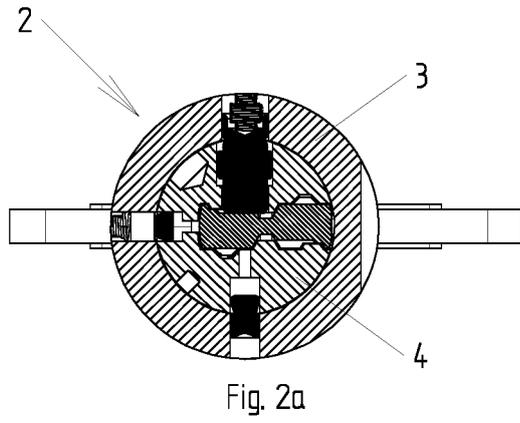
[0088] In practice, the materials used, as well as the dimensions, can be any according to the needs and the state of the art.

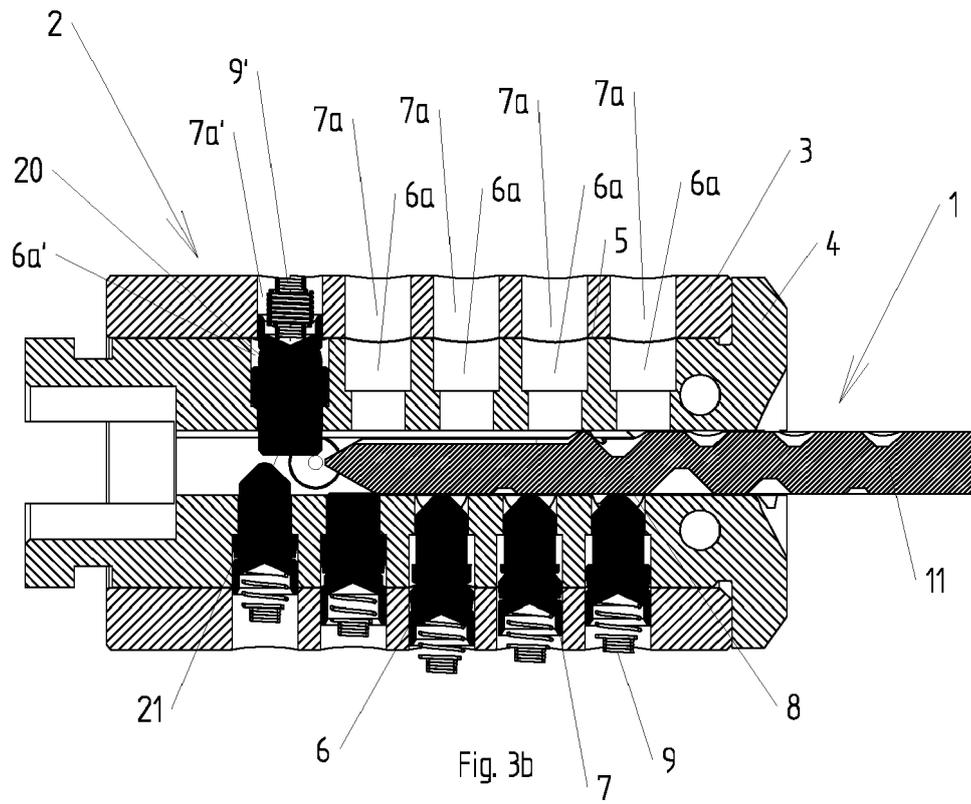
Claims

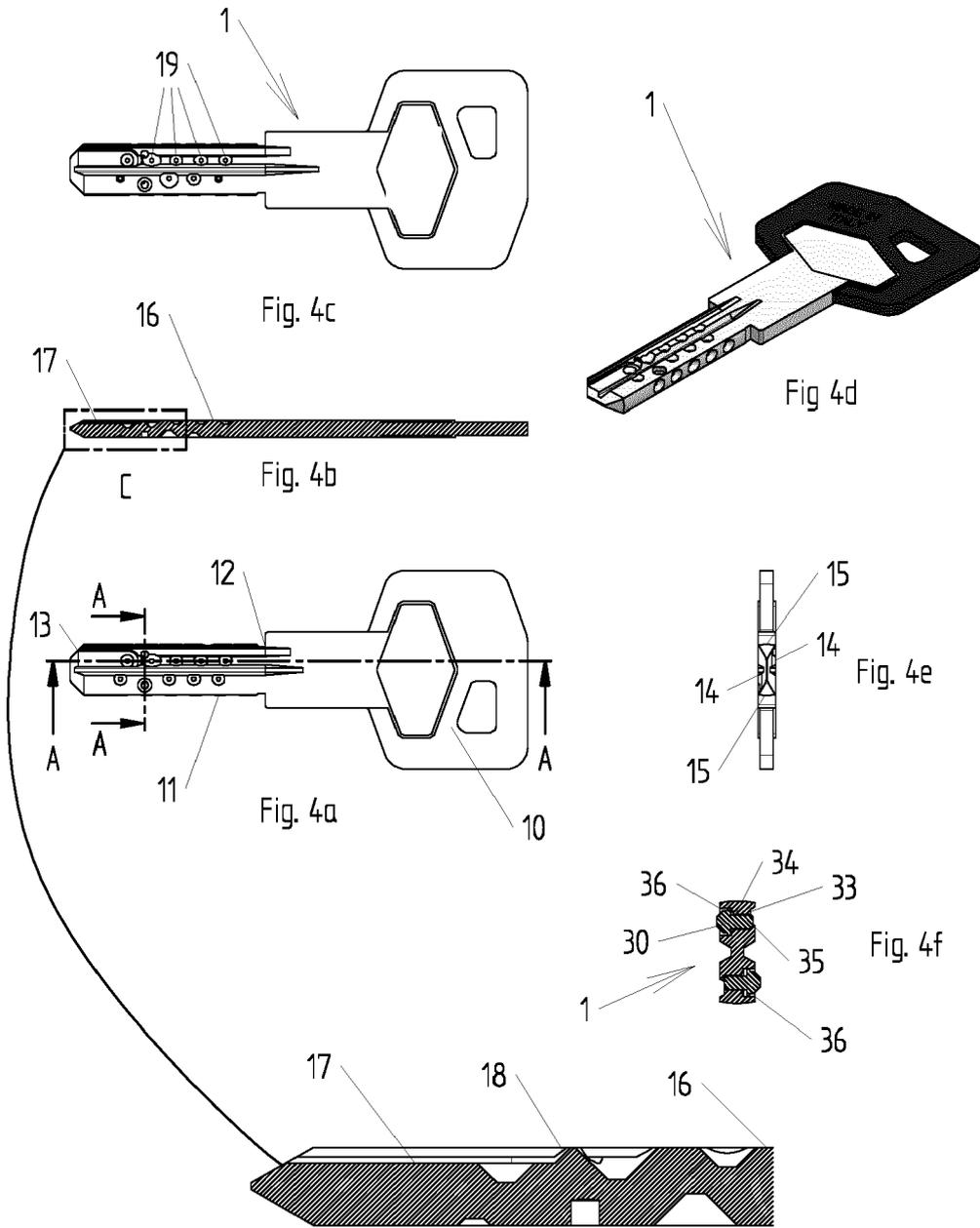
1. A reversible flat key (1) for a cylinder lock (2), where said lock (2) comprises a cylindrical stator (3) that has a plurality of counter pins (7) that are movable in a radial direction of the stator (3), a cylindrical rotor (4) that has a plurality of pins (6) movable in a radial direction of the rotor (4), said rotor (4) having an axial slit (8) for inserting said key (1), each pin (6) being configured and arranged to interact with a corresponding counter pin (7) to enable the rotation of the rotor (4), and where said key (1) comprises a longitudinal lance (11) having a tapered free end (13) and two opposite primary longitudinal faces (14, 14), **characterized in that** each primary longitudinal face (14, 14) has in succession in the longitudinal direction of the lance (11) a first flat longitudinal wall (16) extending as far as the end of the lance (11) that is proximate to said grip (10) and a second flat longitudinal wall (17) that is distal from said grip (10), a connecting wall (18) being further provided between said first wall (16) and said second wall (17), said second wall (17) being parallel and lowered with respect to said first wall (16) and extending as far as said tapered free end (13) of said lance (11), said first wall (16) having a series of encryption craters (19) that follow in the longitudinal direction of the lance (11), said encryption craters (19) being configured and arranged to interact with corresponding pins (6) of said rotor (4) to enable the rotation of said rotor (4), said second wall (17) being configured and arranged to cooperate with a corresponding special pin (20) of said rotor (4) to enable the rotation of said

- rotor (4) or to enable the complete insertion of said key (1) into said slit (8), said connecting wall (18) being configured and arranged to raise said pins (6) from said second wall (17) to said first wall (16) during the insertion of said key (1) into said axial slit (8). 5
2. A cylinder lock (2) with a reversible flat key (1), where said lock (2) comprises a cylindrical stator (3) that has a plurality of counter pins (7) that are movable in a radial direction of the stator (3), a cylindrical rotor (4) that has a plurality of pins (6) that are movable in a radial direction of the rotor (4), said rotor (4) having an axial slit (8) for inserting said key (1), each pin (6) being configured and arranged to interact with a corresponding counter pin (7) to enable the rotation of the rotor (4), and where said key (1) comprises a longitudinal lance (11) having a tapered free end (13) and two opposite primary longitudinal faces, **characterized in that** each primary longitudinal face (14, 14) has in succession in the longitudinal direction of the lance (11) a first flat longitudinal wall (16) extending as far as the end of the lance (11) that is proximate to said grip (10) and a second flat longitudinal wall (17) that is distal from said grip (10), a connecting wall (18) being further provided between said first wall (16) and said second wall (17), said second wall (17) being parallel and lowered with respect to said first wall (16) and extending as far as said tapered free end (13) of said lance (11), said first wall (16) having a series of encryption craters (19) that follow in the longitudinal direction of the lance (11), said encryption craters (19) being configured and arranged to interact with corresponding pins (6) of said rotor (4) to enable the rotation of said rotor (4), said second wall (17) being configured and arranged to cooperate with a corresponding special pin (20) of said rotor (4) to enable the rotation of said rotor (4) or to enable the complete insertion of said key (1) into said slit (8), said connecting wall (18) being configured and arranged to raise said pins (6) from said second wall (17) to said first wall (16) during the insertion of said key (1) into said axial slit (8). 10 15 20 25 30 35 40
3. The cylinder lock (2) according to the preceding claim, **characterized in that** said special pin (20) is the innermost pin in an axial direction of said rotor (4). 45
4. The cylinder lock (2) according to any one of claims 2 to 3, **characterized in that** said connecting wall (18) is oblique. 50
5. The cylinder lock (2) according to any one of claims 2 to 4, **characterized in that** said special pin (20) has a flat end wall (21) configured and arranged to interact frontally with said second wall (17) to enable the rotation of said rotor (4). 55
6. The cylinder lock (2) according to any one of claims 2 to 4, **characterized in that** said special pin (20) is a dual-action pin having a bush (22) and a stem (23) slidable in the bush (22), and said second wall (17) has a further encryption element (24), where the bush (22) is configured and arranged to cooperate with said second wall (17) to enable said key (1) to be inserted completely into said slit (8) and said stem (23) is configured and arranged to interact with said further encryption element (24) to enable rotation of said rotor (4).
7. The cylinder lock (2) according to the preceding claim, **characterized in that** said stem (23) has a tapered end and said further encryption element (24) is formed by a further crater configured and arranged to interact with said tapered end of said stem (23).
8. The cylinder lock (2) according to the preceding claim, **characterized in that** said stem (23) is configured and arranged to interact with a special counter pin (26) of said stator (3) and said bush (22) is configured and arranged to interact with an inner cylindrical wall of said stator (3) interfacing with an outer cylindrical wall of said rotor (4).
9. The cylinder lock (4) according to any one of claims 2 to 9, **characterized in that** said encryption elements further comprise a pin (30) movable orthogonally to said first flat longitudinal wall (16).









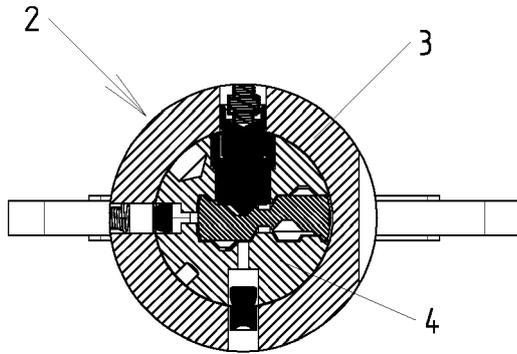


Fig. 5a

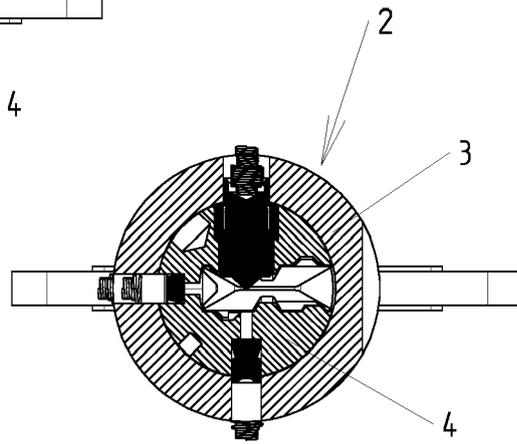


Fig. 5b

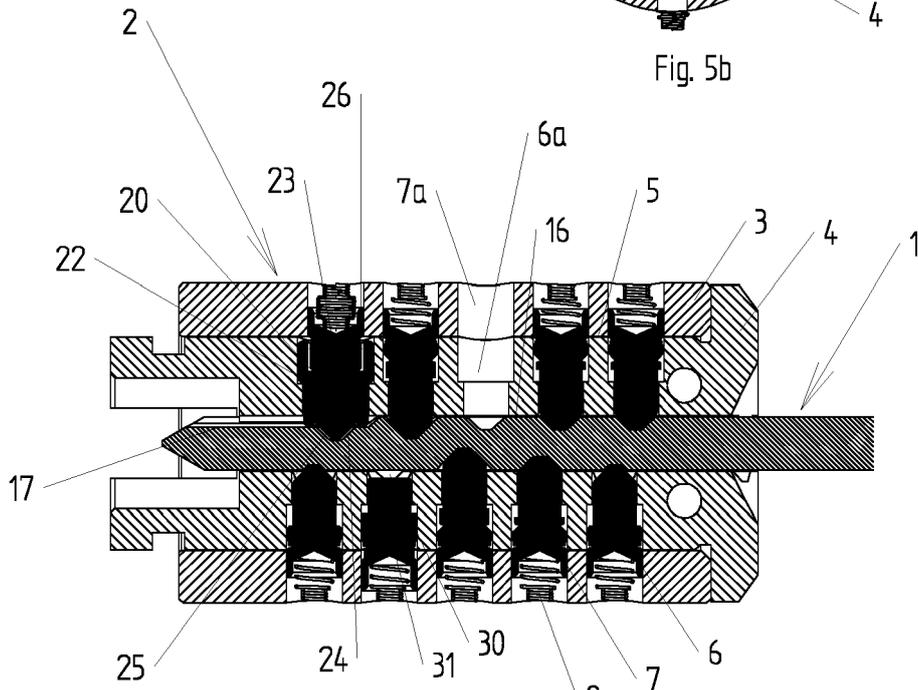


Fig. 6a

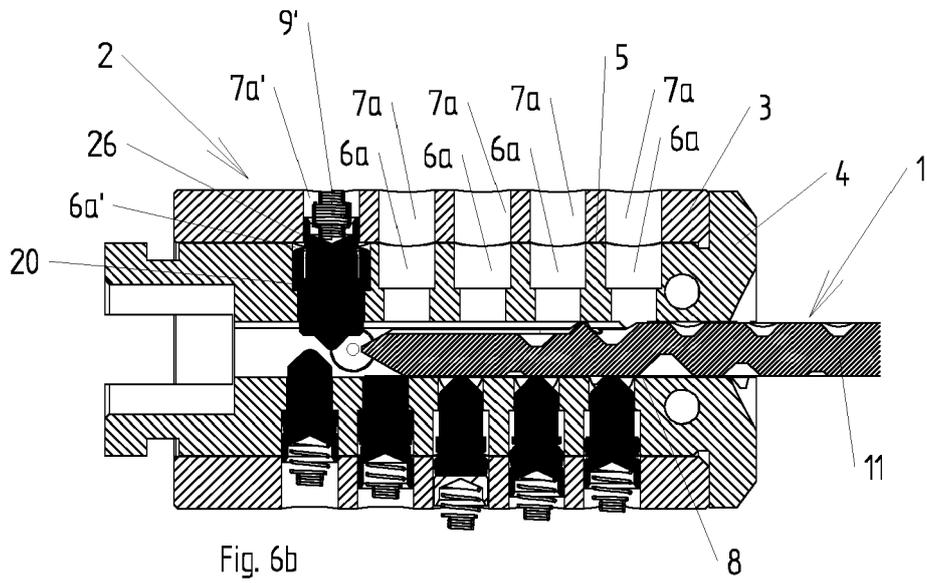


Fig. 6b

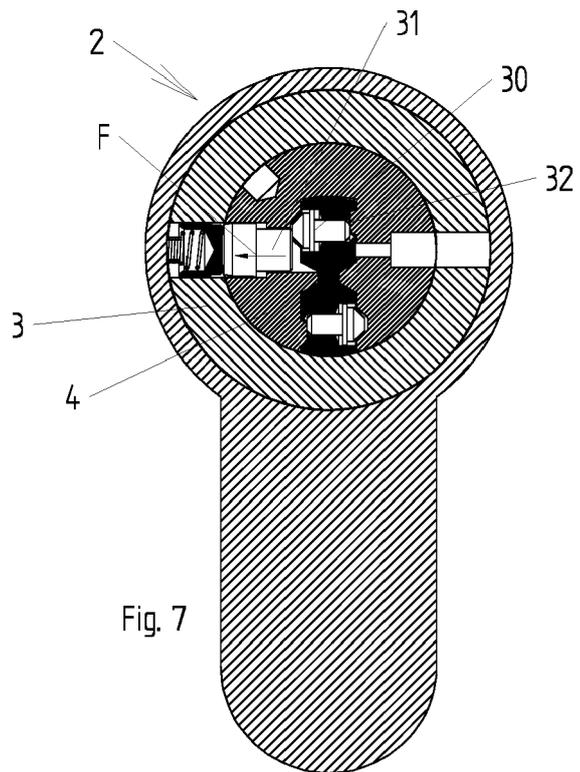


Fig. 7



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 7955

5

10

15

20

25

30

35

40

45

50

55

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|---|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
| X | WO 01/77466 A1 (KABA SCHLIESSYSTEME AG [CH]; KLEINHAENI ARNO [CH] ET AL.) 18 October 2001 (2001-10-18) | 1-5 | INV. E05B19/00 E05B27/00 E05B35/00 |
| Y | * figures 2, 9a, 14 * | 6-9 | |
| Y | WO 2006/092779 A2 (HAMAFTEACH HAMISTOVEV LTD [IL]; WEINBERGER YOAV [IL]) 8 September 2006 (2006-09-08) | 6-9 | |
| A | * figure 8 * | 1-5 | |
| X | WO 2018/166662 A1 (ISEO SERRATURE SPA [IT]) 20 September 2018 (2018-09-20) | 1-6 | |
| A | * figures 4b, 5 * | 7-9 | |
| A | EP 2 317 040 A1 (DOM SICHERHEITSTECHNIK [DE]) 4 May 2011 (2011-05-04) * figure 15 * | 1-9 | TECHNICAL FIELDS SEARCHED (IPC) E05B |
| A | EP 2 314 807 A2 (ABUS PFAFFENHAIN GMBH [DE]) 27 April 2011 (2011-04-27) * figure 6 * | 1-9 | |
| The present search report has been drawn up for all claims | | | |
| Place of search The Hague | | Date of completion of the search 14 July 2022 | Examiner Cruyplant, Lieve |
| 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 | |

2
EPO FORM 1503 03:82 (P04C01)

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

EP 22 15 7955

5 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.

14-07-2022

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|------------------------------|
| WO 0177466 | A1 | 18-10-2001 | AT 270370 T 15-07-2004 |
| | | | AU 784184 B2 16-02-2006 |
| | | | AU 6411200 A 18-10-2001 |
| | | | CA 2372313 A1 18-10-2001 |
| | | | CN 1366571 A 28-08-2002 |
| | | | CZ 20014179 A3 17-04-2002 |
| | | | DK 1185755 T3 01-11-2004 |
| | | | EP 1185755 A1 13-03-2002 |
| | | | ES 2223808 T3 01-03-2005 |
| | | | HK 1049361 A1 09-05-2003 |
| | | | HU 0201583 A2 28-10-2002 |
| | | | JP 4358471 B2 04-11-2009 |
| | | | JP 4864956 B2 01-02-2012 |
| | | | JP 2003535238 A 25-11-2003 |
| | | | JP 2009036018 A 19-02-2009 |
| | | | MY 122538 A 29-04-2006 |
| | | | NO 336386 B1 10-08-2015 |
| | | | NZ 515825 A 28-11-2003 |
| | | | PL 352630 A1 25-08-2003 |
| | | | PT 1185755 E 30-11-2004 |
| SK 17132001 A3 08-10-2002 | | | |
| US 2003101783 A1 05-06-2003 | | | |
| WO 0177466 A1 18-10-2001 | | | |
| ZA 200109663 B 25-11-2002 | | | |
| ----- | | | |
| WO 2006092779 | A2 | 08-09-2006 | AU 2006219549 A1 08-09-2006 |
| | | | BR PI0609054 A2 17-02-2010 |
| | | | CA 2599790 A1 08-09-2006 |
| | | | CN 101160218 A 09-04-2008 |
| | | | EP 1858713 A2 28-11-2007 |
| | | | JP 2008531889 A 14-08-2008 |
| | | | US 2009113965 A1 07-05-2009 |
| | | | WO 2006092779 A2 08-09-2006 |
| ----- | | | |
| WO 2018166662 | A1 | 20-09-2018 | 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 |
| | | | SG 11201908435V A 30-10-2019 |
| SI 3449073 T1 31-07-2020 | | | |

EPC FORM P0459

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

55

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

EP 22 15 7955

5 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.

14-07-2022

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|-------------------------|------------------|
| | | US 2020032549 A1 | 30-01-2020 |
| | | WO 2018166662 A1 | 20-09-2018 |
| | | ZA 201906284 B | 26-08-2020 |
| ----- | | | |
| EP 2317040 | A1 04-05-2011 | AT 515614 T | 15-07-2011 |
| | | DE 102005024003 A1 | 30-11-2006 |
| | | EP 1726749 A2 | 29-11-2006 |
| | | EP 2317040 A1 | 04-05-2011 |
| | | ES 2365806 T3 | 11-10-2011 |
| | | ES 2387380 T3 | 21-09-2012 |
| ----- | | | |
| EP 2314807 | A2 27-04-2011 | AU 2010235953 A1 | 12-05-2011 |
| | | AU 2016201029 A1 | 10-03-2016 |
| | | CA 2718108 A1 | 21-04-2011 |
| | | CN 102041924 A | 04-05-2011 |
| | | CN 105909066 A | 31-08-2016 |
| | | DE 102009050129 A1 | 28-04-2011 |
| | | DK 2314807 T3 | 06-03-2017 |
| | | EP 2314807 A2 | 27-04-2011 |
| | | EP 2826937 A2 | 21-01-2015 |
| | | ES 2612933 T3 | 19-05-2017 |
| | | HU E032244 T2 | 28-09-2017 |
| | | NZ 588702 A | 24-02-2012 |
| | | PL 2314807 T3 | 30-06-2017 |
| | | PL 2826937 T3 | 30-06-2017 |
| | | PT 2314807 T | 10-02-2017 |
| | | US 2011252846 A1 | 20-10-2011 |
| | | US 2014352375 A1 | 04-12-2014 |
| | | ZA 201007532 B | 31-08-2011 |
| ----- | | | |

EPC FORM P0459

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