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(54) **KEY-CYLINDER SYSTEM FOR ANTI-PICK LOCKS**

(57) The present invention is based on the conventional structure of a key-cylinder system in which a tubular key (1) is used and in which a fixed core (6) and a movable core (7) are used in the cylinder, said cores being linked via guard (14)/pusher (12)/spring (13) assemblies that can be moved axially by respective longitudinal milled elements (3) provided on the key (1) until the rear edge of the guards (14) is flush with the rear edge of the movable core (7), in which position said core is unlocked and can

rotate. The invention is centred around the inclusion of an anti-pick plate (16) comprising a central opening (17) having a cross-section that allows the key to pass there-through, but also having a series of protrusions (18), complementary to additional channels (15) provided on the key, such that the protrusions (18) form elements that obstruct the movable flat bars (19) of lock picks (20), thereby producing an incorrect opening combination.

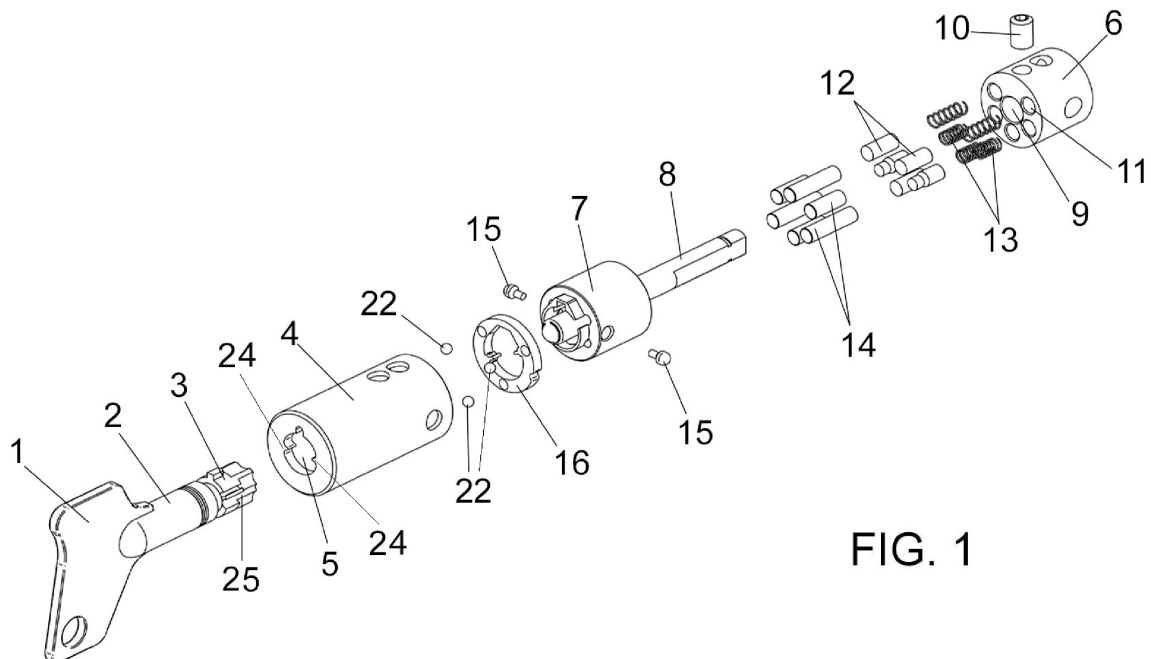


FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a key-cylinder system for anti-pick locks, of the type in which the key has a tubular structure with longitudinal milled elements and diametrical recesses that determine an opening code for the key and which fit into a cylinder in which a plurality of guards, of different sizes, are established, which adapt to the machining that the key may have, such that the core has a fixed core and a movable core which are locked relative to said core by means of a series of pushers, which can move against the stress of respective springs by means of the aforementioned guards upon insertion of the key until a position in which the movable core is released with respect to the fixed core, being able to rotate by turning the key.

[0002] The subject matter of the invention relates to providing a new key-cylinder system that prevents the use of tubular key picks, of the type that include movable flat bars that are arranged over the guards until the unlocking position is reached, which is the position said guards must move to in order to rotate the movable core, thereby creating a negative image of the original key.

[0003] The invention also relates to the development of a new master key system and key profiles, that is, enable cylinders with different key codes from one another to be made, whilst providing a specific key that opens all the cylinders.

[0004] The invention therefore falls within the field of locksmithing.

BACKGROUND OF THE INVENTION

[0005] In the practical application of the invention—namely, locks with cylinders for tubular keys—although these cylinders may come in different shapes, mechanically they all function in the same way in terms of their internal structure.

[0006] More specifically, the current key profile consists of a tubular key with longitudinal milled elements and a diametric recess made from stainless steel.

[0007] To code the key, a series of random machinings are performed thereon, which are generated by software.

[0008] Conventionally, the key profile has six machinings per key, such that these machinings can range from 0 mm to 5.5 mm in depth in 0.5 mm increments, thus providing 12 different depths.

[0009] With regard to the way in which the key acts on the cylinder, which is assembled based on the key, the cylinder contains a set of guards of different measurements that adapt to the machinings that the key may have.

[0010] The cylinder consists of a fixed core and a movable core, such that, without a key inserted, said core is in a locked position that prevents it from rotating. This is achieved due to the fact that elements referred to

as pushers, assisted by respective springs, protrude from the fixed core, partially engaging with the movable core, thereby preventing said movable core from rotating, the guards being responsible for moving the pushers against the stress of the corresponding springs.

[0011] The guards are of the dimensions indicated by the six machinings performed on the key.

[0012] When the key is fully inserted, the key pushes the guards to the position indicated by the different machinings on the key. In this position, the guards and pushers are flush with the edge of the inner face of the fixed core, thereby allowing the movable core to rotate and thus actuate the mechanism to which the cylinder is attached.

[0013] There are lock picks on the market that work by creating a negative of the key when used in a cylinder of the type described above.

[0014] This type of lock pick has a head equipped with six axially moving flat bars, which find the unlocking position that the guards must be in to allow the movable core to rotate.

DESCRIPTION OF THE INVENTION

[0015] The key-cylinder system for anti-pick locks proposed by the invention fully solves the problem described above, effectively preventing the use of such lock picks by ensuring that they cannot reach the specific combination required to release the movable core with respect to the fixed core.

[0016] To this end, the system of the invention is based on the structure described above, in which a movable core is used that is linked to a fixed core by means of a series of guards that axially move respective pushers against the stress of the corresponding springs, these guards having different lengths according to the machinings provided in the key, such that each guard must be moved a pre-set distance determined by the machinings of the tubular key so that the rear end thereof, as well as the front end of the pushers, are flush with the facing edge of the fixed core with respect to the movable core.

[0017] This structure, as is also conventional, is inserted inside a protective casing or sleeve that is screwed at its rear end to the fixed core and which includes an opening at the front end thereof to allow the corresponding key to pass through.

[0018] In accordance with the essence of the invention, it is envisaged that the key includes a series of additional channels, which may involve up to five in number, arranged aligned with the machinings of the key associated with the guards.

[0019] At the same time, it is envisaged that an anti-pick plate is fitted on the front face of the movable core, concealed and protected by the sleeve, said anti-pick plate including a central window with a cross-section matching the cross section of the key, and having one or more, up to five, protrusions which are intended to be inserted inside the additional channels of the key.

[0020] Thus, the protrusions of the anti-pick plate, which do not affect the operation of inserting the key as they slide through the additional channels as mentioned above, form a prominent element against which the movable flat bars of the lock pick press, preventing them from accessing at least one of the guards of the movable core, which makes it impossible for the lock pick to locate the unlocking position of the movable core and consequently prevents it from opening the lock.

[0021] The system thus described renders any lock pick currently available for this type of lock ineffective, whilst the modifications required to the cylinder are minimal, as it involves fitting an anti-pick plate onto the existing structure, said anti-pick plate being arranged on the front face of the movable core, aligned with the front end of the sleeve of the cylinder, allowing the rest of the elements to remain in place, which results in significant cost savings.

[0022] In accordance with another feature of the invention, it is envisaged that the anti-pick plate includes a series of circular holes into which metal spheres can be inserted, thereby making it difficult to pick the lock using drill bits.

[0023] Lastly, it is worth noting that this new cylinder and key system substantially improves the conventional master key system for locks with tubular key cylinders.

[0024] In said conventional master key system, the sleeve is equipped with a series of up to six protrusions in the front opening of the sleeve, aligned with a series of machined grooves in the profile of the key associated with each lock and its corresponding combination of protrusions, and a master key that is equipped with six grooves. In addition, the movable cylinder uses guards that are shorter in length combined with spheres that define multiple possible unlocking positions of the movable cylinder, depending on whether the sphere is flush with the fixed cylinder or with the movable cylinder. This means that locks can be produced that open with keys having different combinations, yet all of them can be opened with the corresponding master key.

[0025] In this regard, the new cylinder and key system allows for new key profiles with 1, 2, 3, 4 or 5 channels, corresponding to the different combinations of protrusions of the anti-pick plate, due to the use of the anti-pick plate. Thus, each key associated with a sleeve and a movable cylinder has the combination of channels related to the protrusions of its corresponding anti-pick plate, whilst the master key always has five channels to be able to pass through the anti-pick plate of any movable cylinder, which when combined with the conventional master key system creates a multiplier effect on the possible combinations of the new master key system.

DESCRIPTION OF THE DRAWINGS

[0026] As a complement to the description that will be provided herein, and for the purpose of helping to make the features of the invention more readily understand-

able, according to a preferred practical exemplary embodiment thereof, said description is accompanied by a set of drawings constituting an integral part thereof in which, by way of illustration and not limitation, the following is represented:

Figure 1 shows an exploded view of a key-cylinder system for anti-pick locks according to the subject matter of the present invention.

Figure 2 shows a detailed perspective view of the key of the system of the invention passing through the anti-pick plate provided in the cylinder.

Figure 3 shows a detailed perspective view of the anti-pick plate of the previous figure in which an attempt is made to pass therethrough using a lock pick with movable flat bars, it being possible to observe that not all the flat bars are able to pass through the plate, thereby producing an invalid combination.

Figure 4 shows a cross-sectional view of the system of the invention in a position with the key partially inserted, in which the movable cylinder is locked by the pushers.

Figure 5 shows a view similar to that of Figure 4, in which the key is fully inserted into the cylinder, a position that corresponds to the release position of the movable core.

Figure 6 shows a view similar to that of Figure 5, but corresponding to a variant embodiment in which the system is intended to receive different types of keys with different combinations, including a master key capable of opening said family of cylinders.

Figure 7 shows an example of combinations of three protrusions in the front opening of the sleeve and the profile of the corresponding key of the conventional master key system, according to an embodiment in which said protrusions may be arranged in the following angular positions with respect to the vertical axis of the opening of the sleeve: 30°, 90°, 150°, 210°, 270° and 330°.

Figure 8 shows an example of combinations of protrusions of the anti-pick plate, according to an embodiment in which said protrusions may be arranged in the following angular positions with respect to the vertical axis of the opening of the anti-pick plate: 60°, 120°, 180°, 240° and 300°.

Figure 9 shows an example of a key.

PREFERRED EMBODIMENT OF THE INVENTION

[0027] As can be seen from the figures shown, the

invention is based on the conventional structure of tubular key-cylinder systems, wherein the key (1) has a tubular main body (2) in which a series of longitudinal milled elements (3) are established, and a central hole that provides it with its tubular configuration, in which there are six milled elements, ranging from 0 mm to 5.5 mm in length in increments of 0.5 mm, thus providing 12 different depths for each of the six machinings.

[0028] Regarding the cylinder, it consists of a sleeve (4) with an opening (5) at its front end for the corresponding key to pass through, and inside which a fixed core (6) and a movable core (7) are established, said movable core including an arm (8) passing through a central hole (9) provided in the fixed core (6) and which is linked to the mechanism of the lock in question.

[0029] The fixed core (6) is fastened to the sleeve (4) by means of a radial screw (10), said fixed core including a series of chambers (11) in which the respective pushers (12), assisted by respective springs (13), are axially movable and axially exert press against respective guards (14) that are axially movable inside the movable core (7).

[0030] Consequently, depending on the different lengths of the guards (14) used, the key (1) requires longitudinal milled elements (3) of different lengths in order to be able to move the guards (14), during the operation of inserting the key, from the locking position shown in Figure 4 to a release position of the movable core (7), in which the guards (14) and the pushers (12) are flush with the edge defined between the fixed core (6) and the movable core (7), as shown in Figure 5.

[0031] The cylinder, as is also conventional, could include anti-pick pins (15), although this mechanism is already known and does not form part of the subject matter of the present invention.

[0032] In accordance with the essence of the invention, the key (1) is envisaged to include a series of additional channels (15), distributed aligned with the longitudinal milling elements (3), and which number of channels ranges from one to five.

[0033] Regarding the cylinder, it is envisaged that it is fitted with an anti-pick plate (16), concealed and protected by the sleeve (4), as shown in detail in Figure 2, which includes a central window (17) with a cross section that allows the key to pass therethrough, but also having one to five protrusions (18), corresponding to the number of additional channels (15) provided in the key, intended to be inserted inside the additional channels (15) of the key.

[0034] Thus, these protrusions do not affect the operation of inserting the key, as they slide through the additional channels (15); however, they form a prominent element against which some of the movable flat bars (19) of the lock pick (20) press, as shown in Figure 3, preventing the same from accessing at least one of the guards (14) of the movable cylinder (7), which makes it impossible for the lock pick (20) to find the unlocking position of the movable cylinder (7) and consequently

prevents it from opening the lock.

[0035] The anti-pick plate (16) incorporates circular holes (21) into which metal spheres (22) are inserted, which spheres make it difficult to drill the cylinder by rotating said metal spheres (22) when they come into contact with the tip of the bit of the corresponding drill.

[0036] Furthermore, based on the conventional master key system for locks with a cylinder for a tubular key, in which the sleeve (4) is equipped with a series of up to six protrusions (24) in the opening (5) at the front end thereof, aligned with a series of machined grooves (25) in the profile of the key associated with each lock and its corresponding combination of protrusions (24), and a master key that is equipped with six grooves (25). In addition, one or more of the guards (14) -the more of these there are, the greater the number of different cylinder combinations for a single master key- are replaced by shorter guards (14'), the length of which is compensated for by the inclusion of a sphere (23) arranged between the guard and the pusher (12), as shown in Figure 6. Thus, each sphere (23) provides two distinct unlocking positions for the mechanism of the guard associated with said sphere: one in which the sphere (23) is tangentially flush with the fixed core (6), and another in which said sphere is tangentially flush with the movable core (7). This allows locks to be produced with different combinations to be opened by their corresponding specific key, but all of them can nevertheless be opened with the corresponding master key, which is referred to as simple master keying. Likewise, this conventional system allows for what is referred to as a 'grand master key system', in which two or more simple master key systems are combined; each individual master key system has its own master key, and there is a grand master key that can open all the locks of the different simple master key systems that form part of the grand master key system.

[0037] By associating the conventional master key system with the new cylinder and key system, which allows for new key profiles with 1, 2, 3, 4 or 5 channels (15) associated with the different combinations of protrusions (18) of the anti-pick plate (16). Thus, each key associated with a cylinder has the combination of channels (15) related to the protrusions (18) on its corresponding anti-pick plate (16), whilst the master key always has five channels (15) so as to be able to pass through the anti-pick plate (16) of any cylinder.

[0038] This results in a multiplier effect on the possible combinations of the new master key system with respect to the conventional system.

[0039] Lastly, it should be noted that the combinations of protrusions (18) of the anti-pick plate (16) shown in Figure 8 correspond to an embodiment in which there are five possible angular positions for said protrusions (18), but each of these positions may vary by $\pm 15^\circ$ without overlapping with the possible positions of the protrusions (24) of the opening (5) of the sleeve (4) shown in Figure 7. This greatly increases the above-mentioned multiplier effect.

Claims

1. A key-cylinder system for anti-pick locks, which is of the type consisting of a key (1) having a tubular main body (2) in which a series of longitudinal milled elements (3) are established, and a cylinder consisting of a sleeve (4) with an opening (5) at the front end thereof for the corresponding key to pass through, inside which a fixed core (6) and a movable core (7) are established, the movable core including an arm (8) passing through a central hole (9) provided in the fixed core (6) and which is linked to the mechanism of the lock in question, the fixed core (6) being fastened to the sleeve (4) and said fixed core including a series of chambers (11) in which respective pushers (12), assisted by respective springs (13), are axially movable and which axially press against respective guards (14) that are axially movable inside the movable core (7), such that the length of the guards (14) corresponds to the length of the longitudinal milled elements (3) in the key, such that upon inserting the key, the guards (14) and the pushers (12) are flush at their rear end with the edge defined between the fixed core (6) and the movable core (7), **characterised in that** the key (1) includes a series of additional channels (15), which complement the longitudinal milled elements (3), whilst inside the cylinder, an anti-pick plate (16) is established on the front end of the movable core (7), which plate includes a central window (17) with a cross section that allows the key to pass through, but also having a series of protrusions (18) corresponding to the number of additional channels (15) provided in the key, intended to be inserted inside the additional channels (15) of the key.
2. The key-cylinder system for anti-pick locks according to claim 1, wherein there are six longitudinal milled elements (3) in the key (1), whilst there are between one and five additional channels (15), aligned with the protrusions (18) of the anti-pick plate (16) associated with said key.
3. The key-cylinder system for anti-pick locks according to claim 1, wherein the anti-pick plate (16) incorporates circular holes (21) into which metal spheres (22) are inserted, said spheres defining anti-drilling means for the cylinder.
4. The key-cylinder system for anti-pick locks according to claims 1 and 2, wherein the opening (5) of the sleeve (4) has at least one protrusion (24) aligned with the machined grooves (25) in the profile of the key associated with each lock and its corresponding combination of protrusions (24), complemented by a master key that is provided with six grooves (25) and wherein at least one of the guards (14) is replaced by a shorter guard (14') the length of which is compen-

sated for by the inclusion of a sphere (23) arranged between the guard and the pusher (12), such that each sphere (23) provides two distinct unlocking positions for the mechanism of the guard associated with said sphere, one in which the sphere (23) is tangentially flush with the fixed core (6) and another in which said sphere is tangentially flush with the movable core (7), it being envisaged that the positions of the protrusions (18) of the anti-pick plate (16) may vary in their machining by approximately 15° without overlapping with the positions of the protrusions (24) of the opening (5) of the sleeve (4), as well as the fact that the master key includes five additional channels (15).

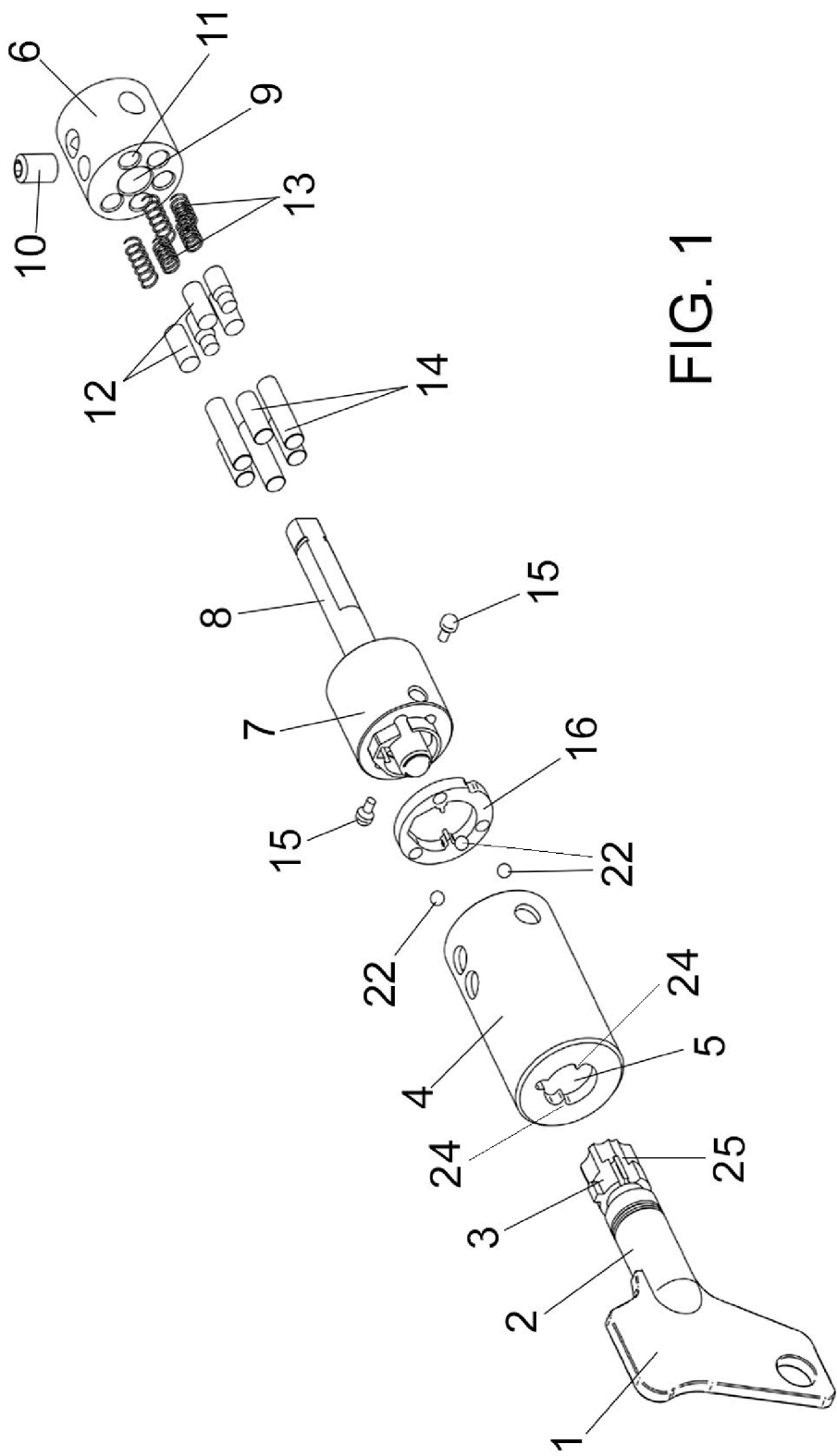


FIG. 1

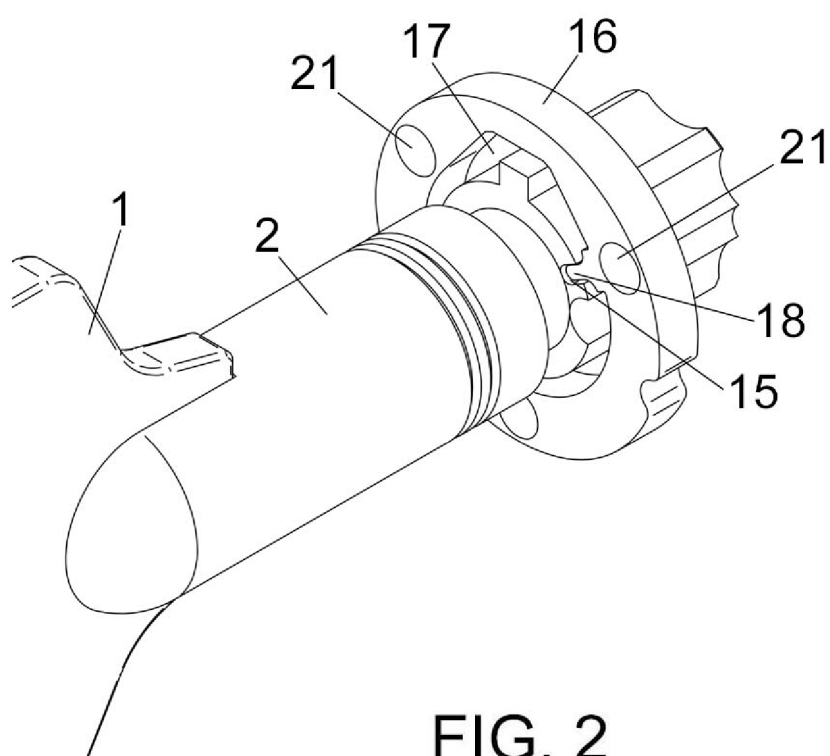


FIG. 2

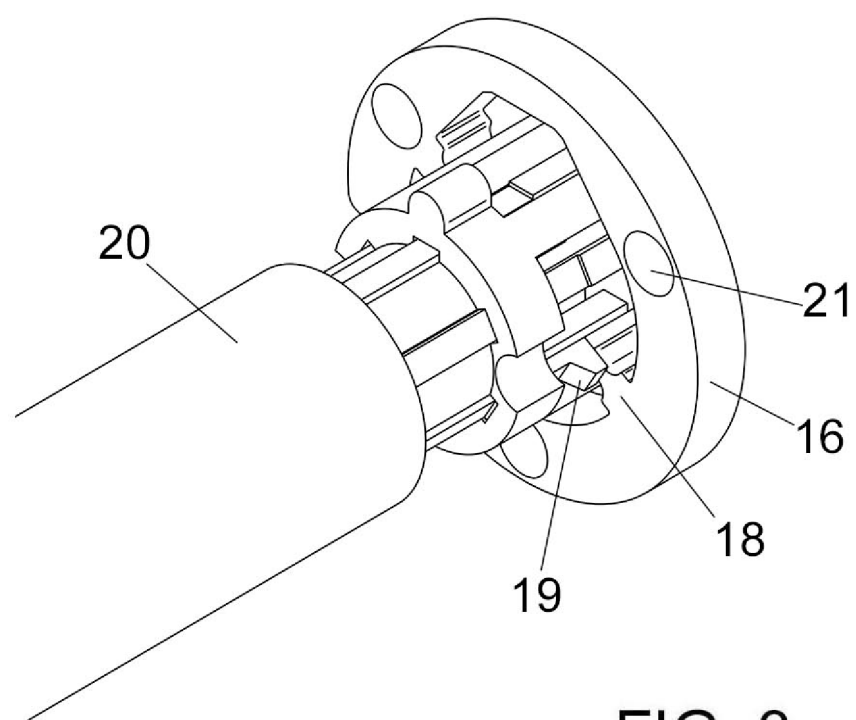


FIG. 3

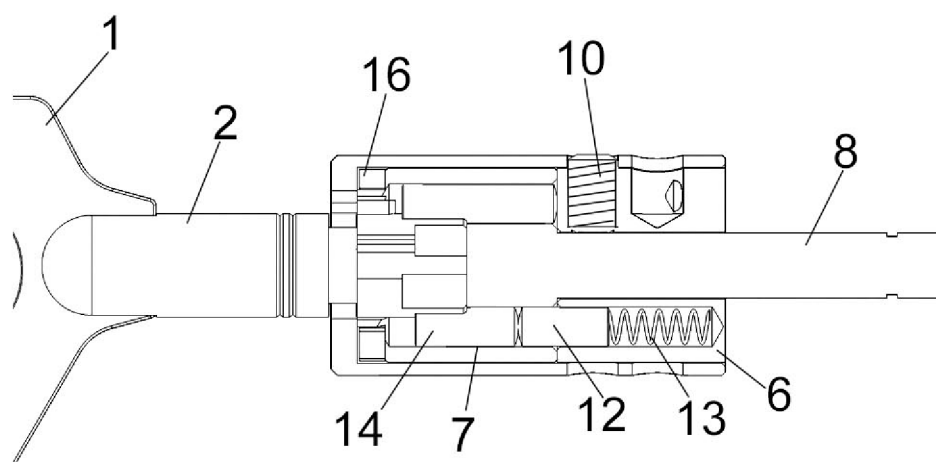


FIG. 4

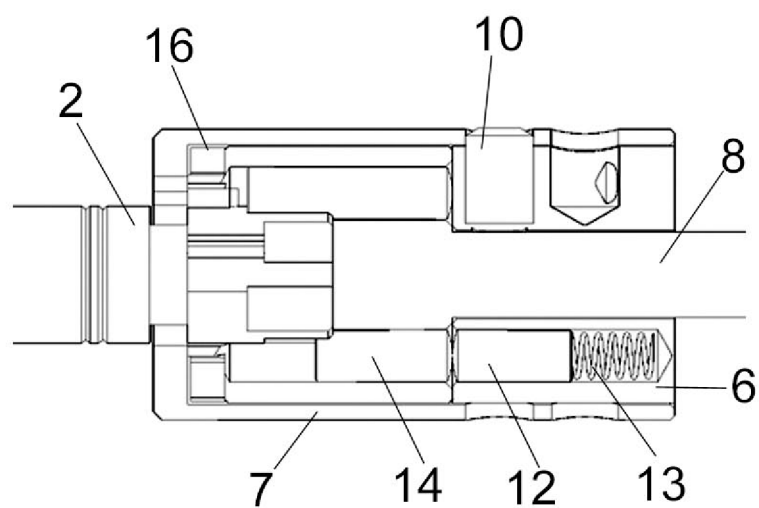


FIG. 5

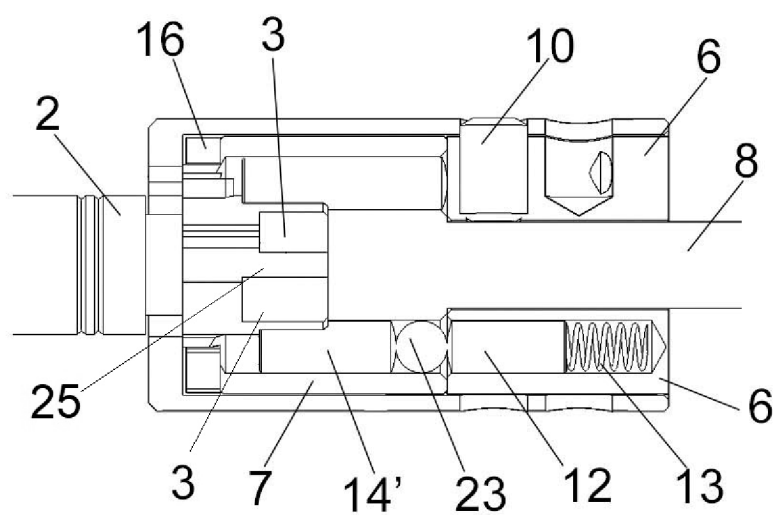


FIG. 6

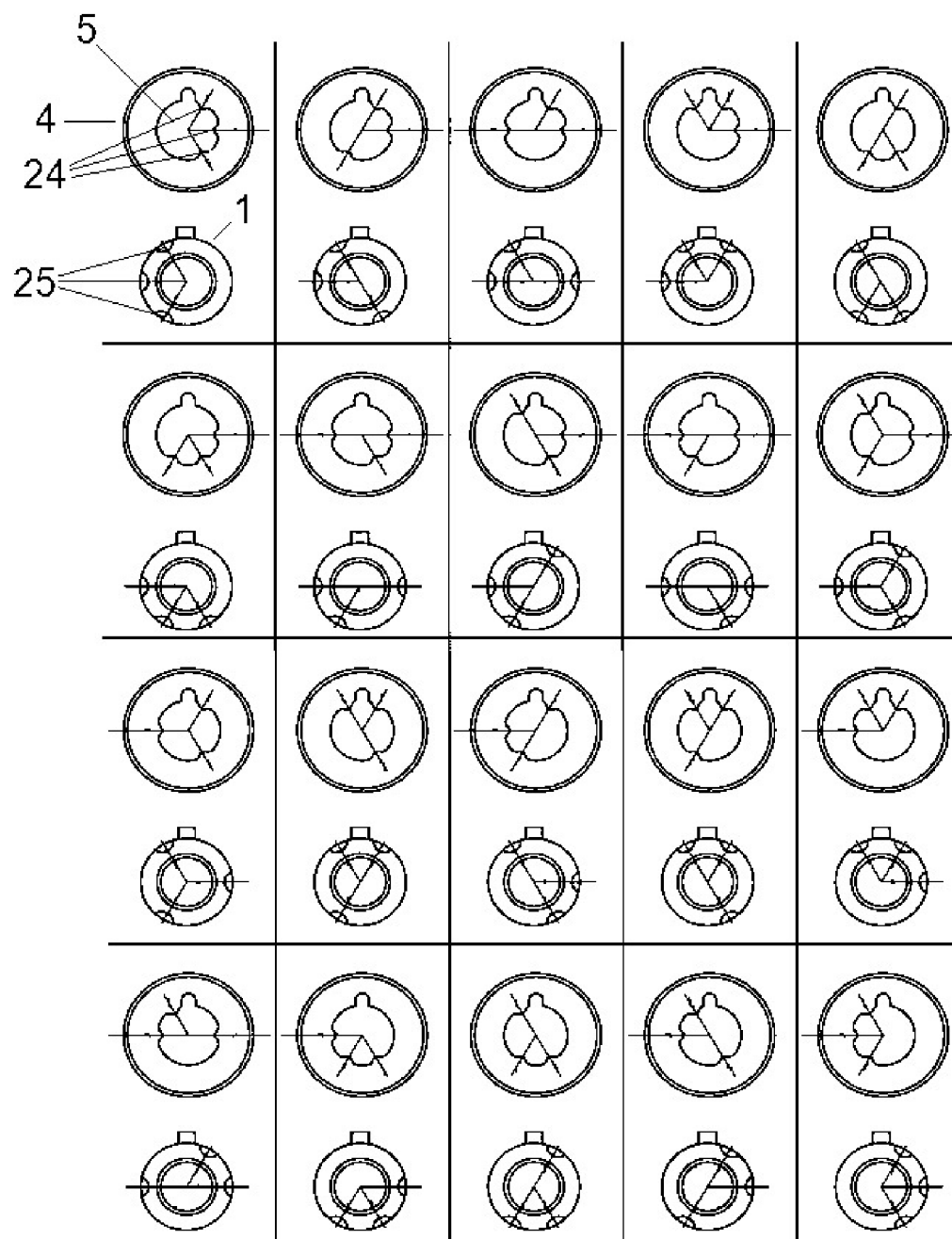


FIG. 7

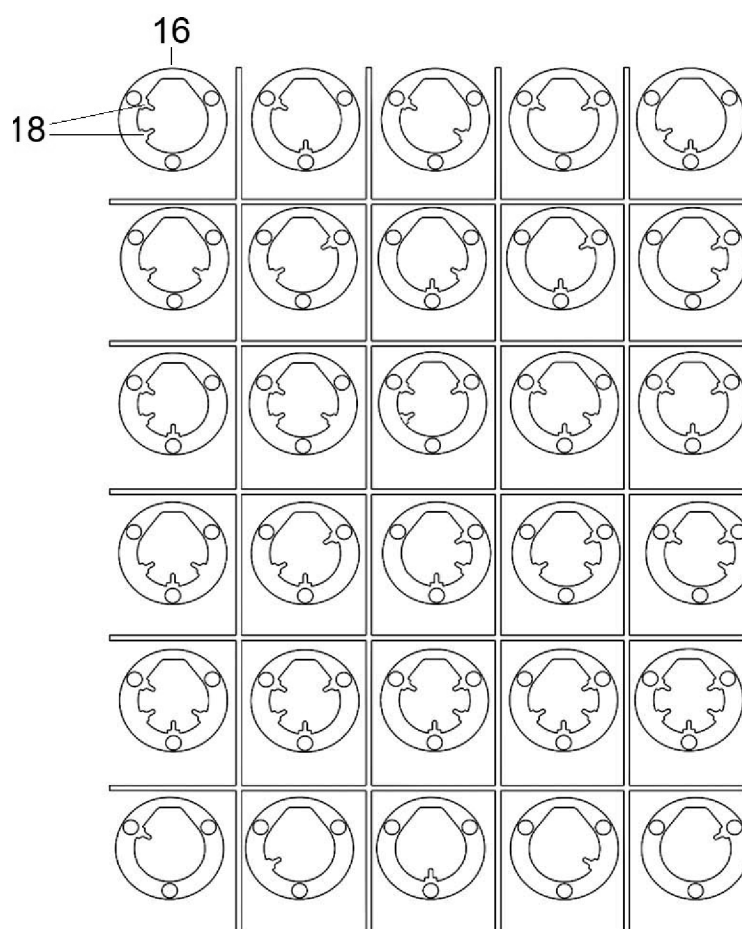


FIG. 8

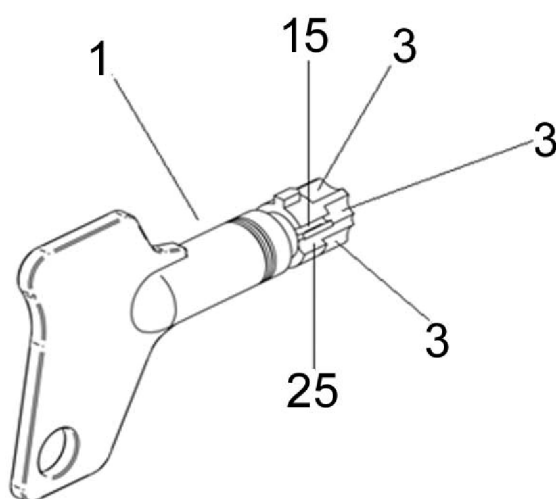


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2024/070778

A. CLASSIFICATION OF SUBJECT MATTER

E05B13/00 (2006.01)*E05B27/08* (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010024497 A1 (WU KUN-YU) 04/02/2010, description; figures.	1-4
A	US 3524335 A (GEORGE HARRY F) 18/08/1970, description; figures.	1-4
A	US 4094177 A (WELLEKENS JOHN F) 13/06/1978, description; figures.	1-4
A	GB 589871 A (YALE & TOWNE MFG CO) 02/07/1947, description; figures.	1-4

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2024/070778

Information on patent family members

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Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
GB589871 A	02.07.1947	NONE	
US3524335 A	18.08.1970	NONE	
US4094177 A	13.06.1978	NONE	
US2010024497 A1	04.02.2010	NONE	