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(71) Applicant: **Guarisa, Gianni**
31044 Montebelluna (TV) (IT)
(72) Inventor: **Guarisa, Gianni**
31044 Montebelluna (TV) (IT)
(74) Representative: **Burchielli, Riccardo**
Barzano & Zanardo Roma S.p.A.
Via Piemonte 26
00187 Roma (IT)

(54) **CLOSING DEVICE FOR SECURITY LOCKS**

(57) A closing device for security locks, comprising a key (10) with a end (14) with shaped recesses, which is inserted within at least one guide or channel (21) connected with a rotor of a bolt or cylinder (40); said cylinder (40) is provided with pistons that fit into the respective recesses of said end (14) of the key (10) in order to control a lock opening or closing device. Said guide or channel (21) has a first portion which extends in a direction which is parallel to the direction according to which the key (10) is inserted, and a second portion, placed next to said cylinder (40), which extends in a direction which is substantially orthogonal to said first portion, so that said key (10) travels along a path which is at least partially curved between an external protection plate (31, 34) and the cylinder (40). Finally, the key (10) is made at least partially of a flexible and/or jointed material.

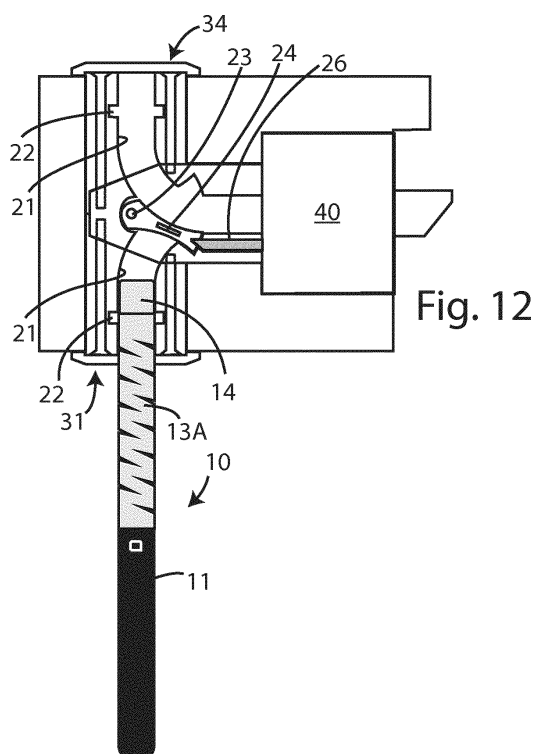


Fig. 12

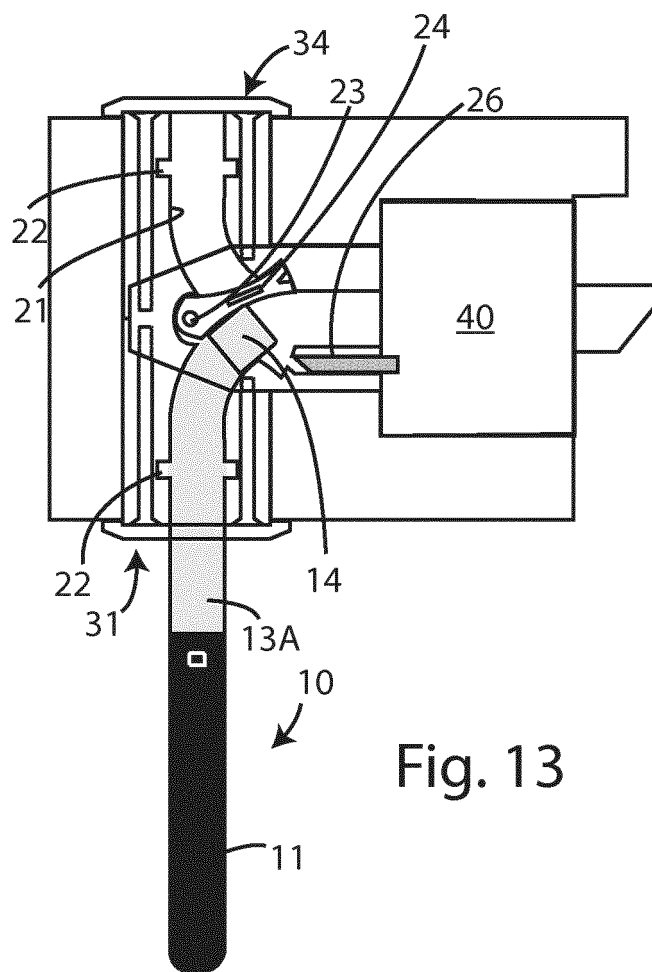


Fig. 13

Description

[0001] The present invention generally relates to a closing device for safety locks. More particularly, the invention relates to a closing device comprising a flexible and jointed key, so that said key is difficult to duplicate and the lock is more secure and difficult to break.

[0002] Currently, there are on the market different types of locks, such as the standard locks (such as the Yale® locks), the paracentric locks, the tubular locks, the double map locks or the Zeiss® locks.

[0003] The lock is a system where there are two main components, namely a key or blade, which is used to open and close the lock and which usually consists of a handle to allow the rotation and of a thin metal bar, and a bolt or cylinder, which presents a series of shaped abutments corresponding to a series of carved grooves, of which the blade is provided, configured to form teeth and/or grooves and/or small grooves.

[0004] The bolt or cylinder is a complex device placed inside the lock, which allows the opening or closing of doors, boxes, handles, etc.; there are many different types of cylinders, made for single types of keys, but the base system is constituted by a spring-and-piston system, in which the pistons are moved from the blade of the key and said blade, by means of a rotational movement, allows the unblocking of internal mechanisms, thus allowing the opening or closing of the lock.

[0005] In particular, the bolt or cylinder is composed of a stator, where the pistons and the relative guiding springs are inserted, and a rotor, within which the blade of the key is inserted and rotated.

[0006] Therefore, the above mentioned different types of keys must be coupled with a corresponding latch device or cylinder in order to operate.

[0007] The known keys are almost totally made of metal and are axially inserted into the rotor of the cylinder; some of said known keys are also equipped with a recess or groove to allow a tear-off protection and a secure strength of the key, in order to ensure the effective coupling of the teeth and/or of the recesses to the pistons of the cylinder.

[0008] The morphology of the known keys is made so as to allow their duplication, even if this possibility, on the other hand, makes it possible to break the lock; furthermore, the fact that the cylinder is axially positioned above the key and the fact that the connection of the key with the rotor of the lock's cylinder can be seen (externally to the lock) allow attackers to be able to easily insert one or more tools within the lock in order to act on the lock's cylinder, thus rotating the cylinder and opening the lock.

[0009] In the context of the above mentioned requirements, an object of the present invention is therefore to obviate the above mentioned drawbacks and, in particular, to provide a closing device for safety locks, which makes difficult or impossible a burglary of a lock.

[0010] Another object of the present invention is to provide a closing device for safety locks, which allows to use

different types of known blades or keys, as well as devices of known cylinders or latches.

[0011] A further object of the invention is to provide a closing device for safety locks, which is extremely safe, reliable and easy to use.

[0012] These and other objects are achieved by a closing device for safety locks according to the attached claim 1; more detailed features of the closing device according to the invention are described in the dependent claims. Advantageously, the closing device, which is the object of the present invention, allows to obtain a rotor of the lock's cylinder which is placed inside an element which can be opened, which is not accessible from outside and which is not visible.

[0013] Furthermore, the device according to the invention provides that the key is not inserted into the lock's cylinder according to an axial direction, as known, but according to an angular direction, so as to avoid that attackers can introduce from the outside objects and/or pointed tools into the lock's cylinder, in order to obtain a burglary lock.

[0014] Further purposes and advantages of the present invention will be clear apparent from the following description which refers to a preferred embodiment of the closing device for safety locks, according to the present invention, and from the enclosed drawings, in which:

- figure 1 is a side view of a key used for the closing device for safety locks according to the invention;
- figures 2 and 3 show respective components of the key of figure 1;
- figure 4 is a front view of a protection plate, placed on the outside of a window frame, where is inserted the key of figure 1, according to the present invention;
- figure 5 is a front view of a protection plate, placed inside a window frame and opposite to the plate of figure 4;
- figures 6 and 7 show schematic views of the closing device, according to the present invention, in case the safety lock is installed on a window frame, such as the door of a house;
- figures 8, 9, 10 and 11 show schematic views of the closing device, according to the present invention, in case the safety lock is installed on safes, garage doors, doors for motor vehicles and in any case when it is required an opening from only one side with a key;
- figures 12, 13 and 14 show schematic views of the closing device, according to the present invention, in case the safety lock is installed on doors and windows where the opening is carried out with a key from opposite sides;
- figure 15 shows a series of side views and cross sections of possible keys used for the closing device for safety locks according to the invention. With particular reference to figures 1, 2 and 3, the closing device for safety locks, which is the object of the

present invention, includes a key 10, which has a handle 11 made of metal and/or composite material and which is provided with a guiding tooth 12 which allows the key 10 to enter into the lock with the right angle and which allows the locking of the key 10 during its rotation.

[0015] The handle 11 is connected to a shaped end 14, also made of metal or composite material, by means of a steel cable or a swivel chain 13, which is covered by a body 13A made of plastic rubbery and/or elastic material, such as a injection molded polymer, which features of flexibility, proof to chemical agents and remarkable stability at low and high temperatures. The shaped end 14 has an internal secured seat 15 where a microchip is housed (with various positions), while the blade of the key 10 is formed in the outer part.

[0016] The enclosed figure 4 shows a protective plate 31, equipped with an aesthetic finishing, which is typically installed on the outer side of a window frame and which has a circular seat 32, with a relative guide 33 for inserting the key 10 in a direction according to which the tooth 12 engages with the guide 33, while the enclosed figure 5 shows a protective plate 34, equipped with an aesthetic finishing, which is typically installed on the inner side of a window frame and which is provided with a circular seat 35 and with a guide 36 for inserting the key 10 and with two LEDs 37, placed in correspondence of respective compartments for housing related emergency power batteries, which are used to indicate the state of charge of the emergency power batteries (to be used in case of power failure (black-out)).

[0017] As shown in the enclosed figures 6, 7, 12, 13 and 14, according to the present invention, the rotor of the lock's cylinder 40, within which the end 14 of the key 10 engages, is mounted on a fixed portion of the object on which the lock is installed and is positioned along a direction which is perpendicular to the direction of introduction of the key 10 through the outer 31 or inner plate 34 of said object (such as, for example, a window frame or a casing).

[0018] Following the introduction of the key 10 through the outer 31 or the inner plate 34, the key 10 is then guided towards the rotor of the lock's cylinder 40 by means of a respective channel or guide 21, which has a seat 22, within which the tooth 12 of the key 10 engages and blocks when the end 14 is inserted into the rotor of the cylinder 40 and the key 10 is able to rotate to open or close the lock.

[0019] Each guide or channel 21, which has a cylindrical shape and which has a diameter slightly greater than the diameter of the body 13A of the key 10, has a first portion which is substantially displaced axially to the direction of introduction of the key 10 and a second portion, which is angular and which is displaced according to a direction substantially perpendicular to the first portion, said second portion also being in contact with the rotor of the lock's cylinder 40, so that the key 10 is able to

rotate (also thanks to the flexible and jointed conformation of the body 13A) inside the guide or channel 21.

[0020] In practice, the key 10, after being inserted into the channel 21, crosses it entirely by following the curved profile, so as to couple the end 14 with the rotor of the lock's cylinder 40.

[0021] A gate or shutter 24 can be inserted inside the channel 21, substantially in correspondence of the curved portion of said channel 21, said gate or shutter 24 being provided with a retaining spring 23, in order to insert and pull out the key 10 into/from the channel 21.

[0022] A microchip can be inserted inside the shutter 24, so as to drive an electromagnetic pin 26 which opens the shutter 24 when the end 14 of the key 10 is brought near, because the microchip inserted inside said end 14 of the key 10 enables the release of said shutter 24 by communicating with said microchip placed inside the shutter 24.

[0023] The enclosed figures 8, 9 and 10 show an operative mode of the closing device for security locks, according to the present invention, with blind inner side and suitable, for example, for safes, garage doors, doors of motor vehicles and, in general, for objects where the key opening occurs only from one side (fig. 8 and 9) or with a knob 25, which directly operates on the rotor of the cylinder 40, for a quick closing from inside; in this case, a single channel 21 is provided for inserting the key 10 in correspondence of the outer plate 31.

[0024] Finally, the shaped end 14 of the key 10 can house other different types of blades (as shown in the enclosed figure 15, where some embodiments of blades of the key 10 are shown), which are configured to be inserted in the corresponding pistons provided in the rotor of the lock's cylinder 40.

[0025] The closing device for safety locks, according to the present invention, operates as follows.

[0026] When the key 10 is inserted into the guide 21, both at the outer plate 31 and at the inner plate 34, is forced to follow the curved path of the guide 21, because it is made of flexible and jointed material (fig. 12).

[0027] When the recognition microchip is used, the electronic circuit placed in correspondence of the shutter 24 recognizes the successful introduction of the key 10 (as a result of a recognition of said microchip placed inside the seat 15 of the end 14 of said key 10), and then releases the safety pin 26 (fig. 13), thus allowing a full insertion of the key 10, which, when it is fully engaged, can be connected to the rotor of the lock's cylinder 40, so that the user is able to rotate the key 10 thereby enabling the device to open or close the lock (fig. 14).

[0028] Because the rotor of the lock's cylinder 40 is no longer place, as in the known locks, in the same (axially) direction according to which the blade of the key 10 is inserted, but it is placed laterally and angularly with respect to said inserting direction, the possible action of tampering of the lock is extremely more complex, if not impossible.

[0029] A further complexity for attackers is also given

by the presence of the gate or shutter 24, placed in correspondence of the angled portion of the guide 21 and configured to bar the channel 21; only when the microchip placed inside the end 14 of the key 10 will be recognized by the microchip placed inside the shutter 24, the opening of the unlocking pin 26 will be provided and the key 10 will be able to continue its path within the channel 21, so as to connect the rotor of the lock's cylinder 40.

[0030] The electromagnetic unlocking pin 26 is supplied with electric energy; in this case, in order to obviate possible black-out, the pin 26 is also powered by two batteries placed in the inner plate 34 where the key 10 is inserted; the cover of the said inner plate 34 has also two LED light sources 37, which show the charge status of the batteries, so that the user can replace said batteries before they are finally discharged.

[0031] The features of the closing device for safety locks, which is the object of the present invention, are clear from the above description, as well as the related advantages.

[0032] It is finally clear that many other variations may be made to the object of the present invention, without departing from the novelty principles of the inventive idea as defined in the attached claims; it is also clear that in the practical implementation of the invention, materials, shapes and dimensions of the described features can be different, depending on the technical requirements.

Claims

1. Closing device for security locks, comprising a key (10) with a end (14) with shaped recesses, which is inserted, in correspondence of at least one protection plate (31, 34), within at least one guide or channel (21) connected to a rotor of a bolt or cylinder (40), said cylinder (40) being provided with pistons that fit into the respective recesses of said end (14) of the key (10) in order to control a lock opening or closing device, **characterized in that** said guide or channel (21) has a first portion, which extends in a direction which is parallel to the direction according to which said key (10) is inserted at said plate (31, 34), and a second portion, placed next to said cylinder (40), which extends in a direction which is substantially orthogonal to said first portion, so that said key (10) travels along a path which is at least partially curved between said plate (31, 34) and said cylinder (40), said key (10) being made at least partially of a flexible material.
2. Closure device according to claim 1, **characterized in that** said key (10) has a handle (11), made of metal and/or composite material and having at least one guide tooth (12), which is connected to said end (14) through a metal cable or a swivel chain (13) covered by a body (13A) made of a flexible and/or elastic material, such as a molded polymer, said ma-

terial being resistant to chemical agents and remarkably stable at low and at high temperatures.

3. Closure device according to at least one of the preceding claims, **characterized in that** said end (14) of the key (10) is made of metal or other composite material and has an inner protected seat (15) for housing a first miniaturized electronic circuit or microchip.
4. Closure device according to at least one of claims 2 and 3, **characterized in that** said plate (31, 34) has a circular seat (32, 35) with a guide (33, 36) for inserting said key (10), so that said guide tooth (12) engages with said guide (33, 36).
5. Closure device according to at least one of claims 2 and 3, **characterized in that** said plate (31, 34) has means (37) for displaying the state of charge of emergency batteries, which are inserted within said protection plate (31, 34).
6. Closure device according to at least one of the preceding claims, **characterized in that** said rotor of the cylinder (40) of said lock, within which said shaped end (14) of the key (10) engages, is mounted on a fixed portion and is placed along a direction which is substantially orthogonal to said direction according to which the key (10) is inserted at said protection plate (31, 34).
7. Closure device according to at least one of the preceding claims, **characterized in that** said channel (21) has a seat (22) where said guide tooth (12) of the handle (11) of said key (10) engages, by latching, when said shaped end (14) is inserted in the rotor of said cylinder (40) and the key (10) can rotate to open or close the lock.
8. Closure device according to at least one of the preceding claims, **characterized in that** a gate or shutter (24) is placed through said channel (21) and substantially at a curved portion of said channel (21), said shutter (24) being provided with a retaining spring (23) and being equipped with a second miniaturized electronic circuit or microchip, able to control an electromagnetic pin (26), which opens said shutter (24) when said shaped end (14) of the key (10) is approaching to said shutter (24), since said first microchip placed within said end (14) of the key (10) communicates with said second microchip placed within said shutter (24), in order to enable the release once a recognition between said first and second microchips is carried out.
9. Closure device according to at least one of the preceding claims, **characterized in that** said closure device is provided for security locks of window

frames and/or swinging fixtures, with inner and outer sides, and/or for locks with a blinded inner side, such as safes locks, garage doors locks, car doors locks or windows or fixtures with an inner knob (25).

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10. Closure device according to at least one of the preceding claims, **characterized in that** said electromagnetic pin (26) is powered via the power supply network or via said emergency batteries which are placed within said protection plate (31, 34).

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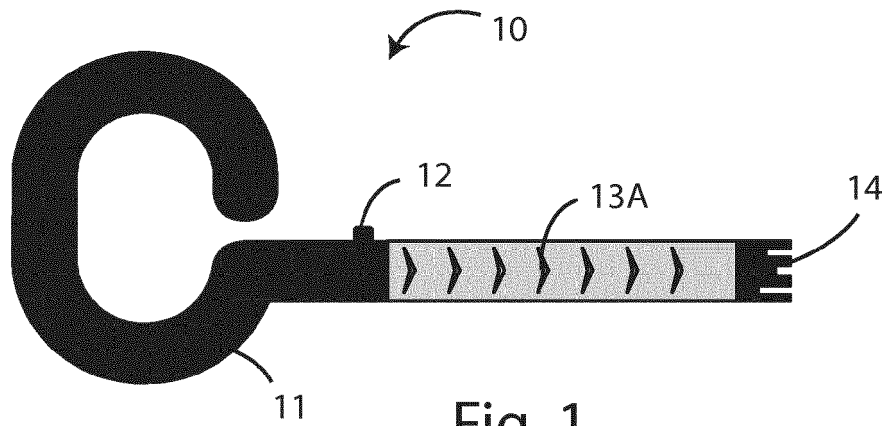


Fig. 1

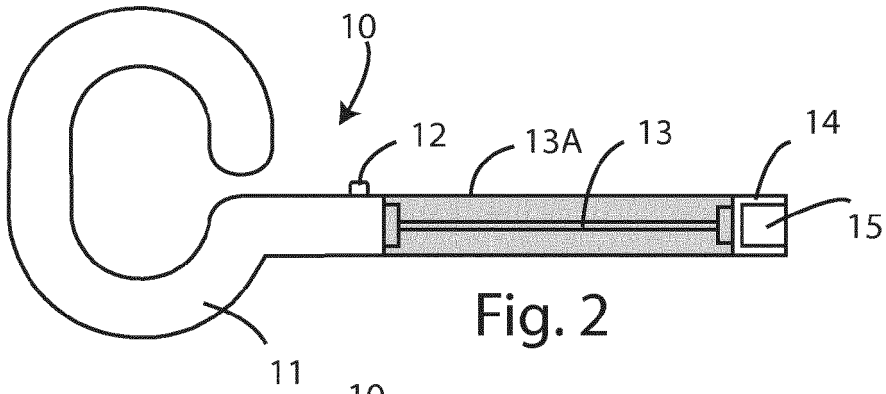


Fig. 2

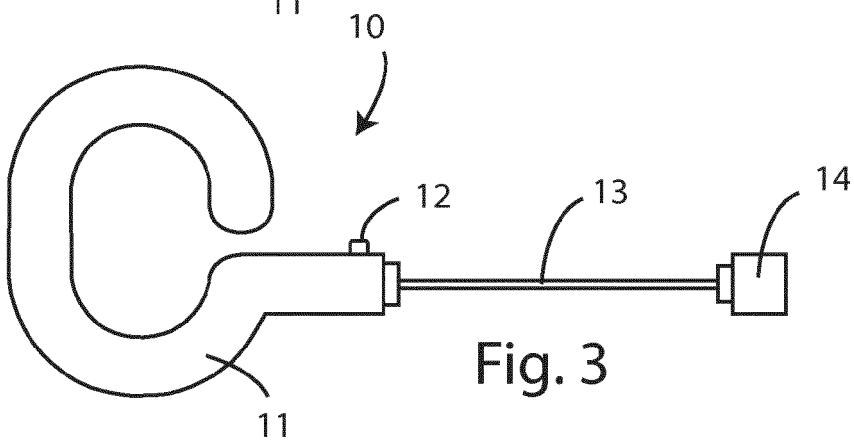


Fig. 3

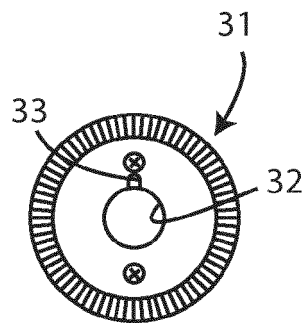


Fig. 4

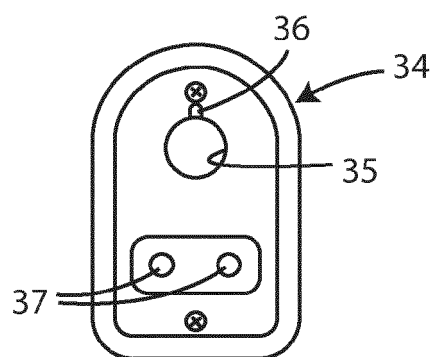
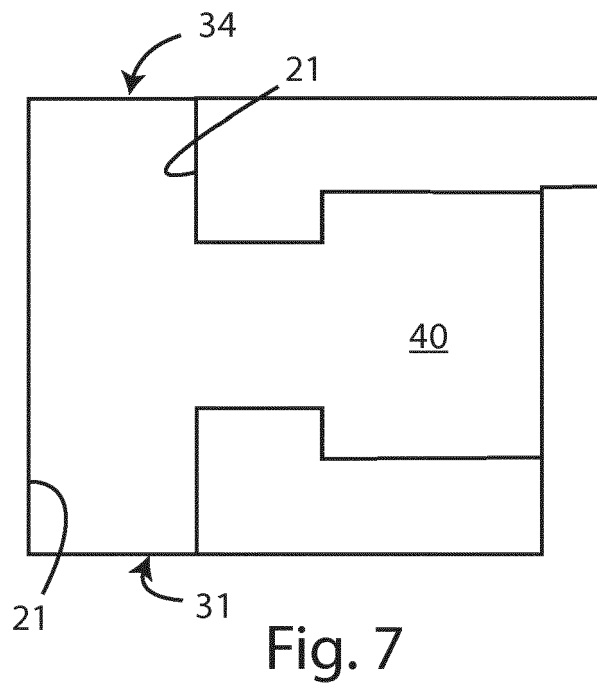
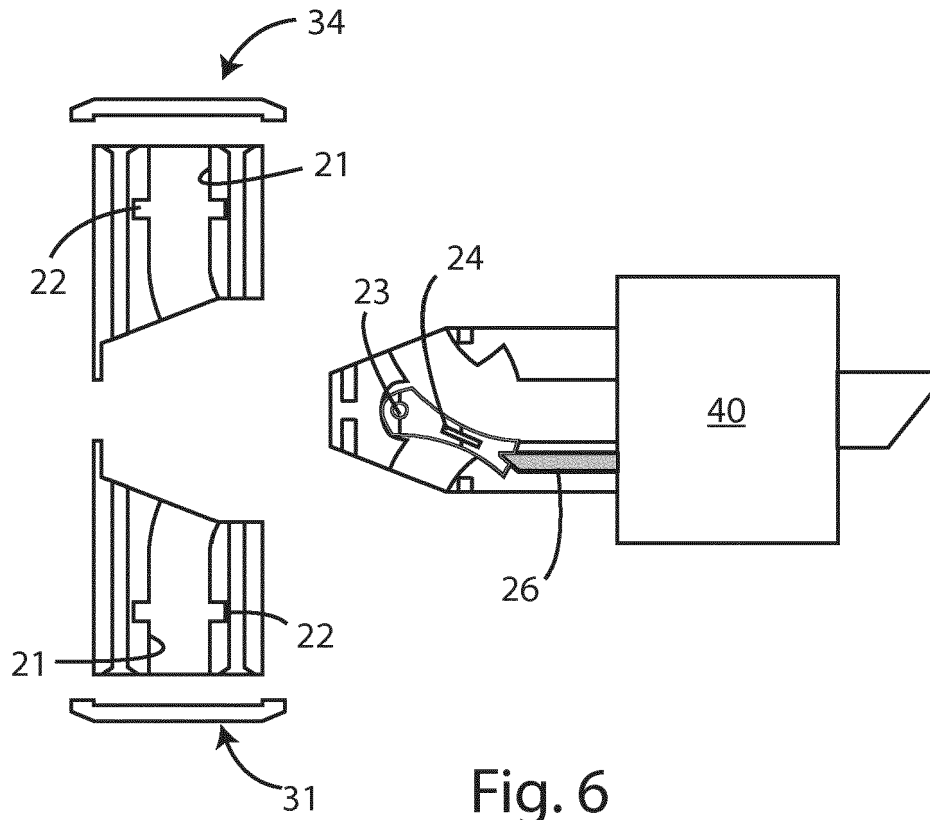
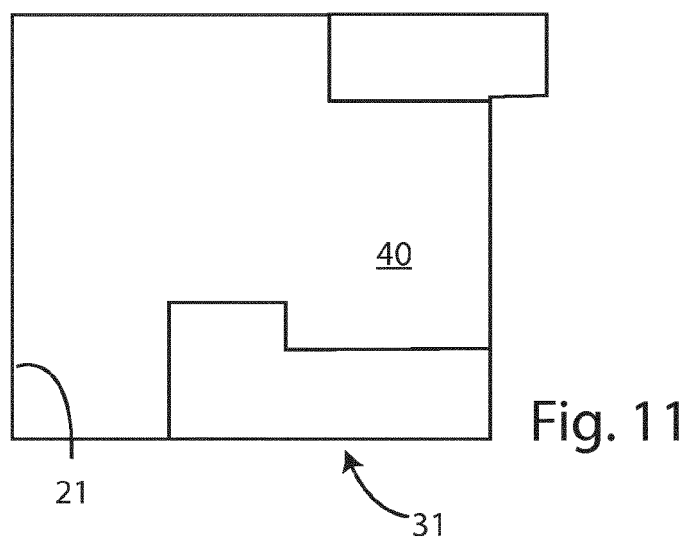
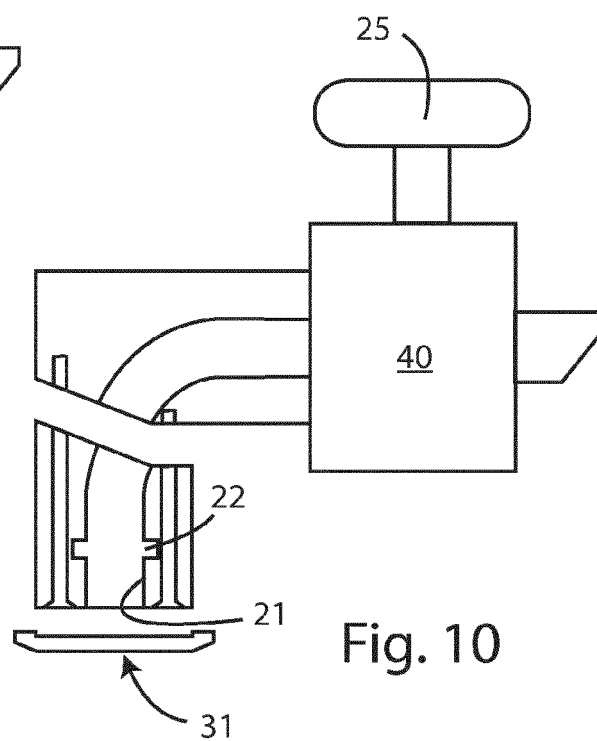
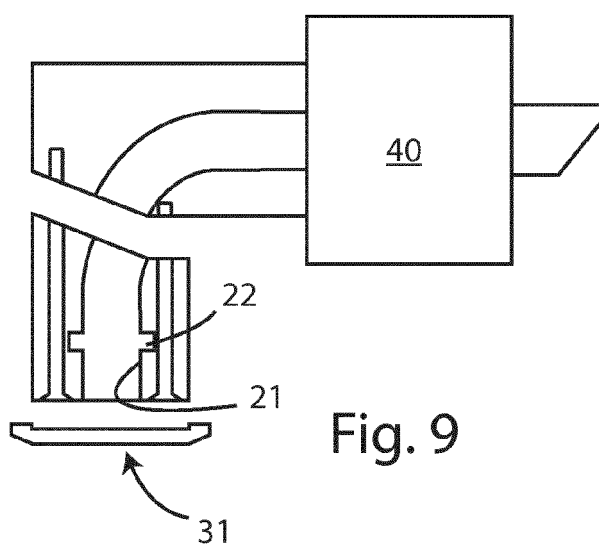
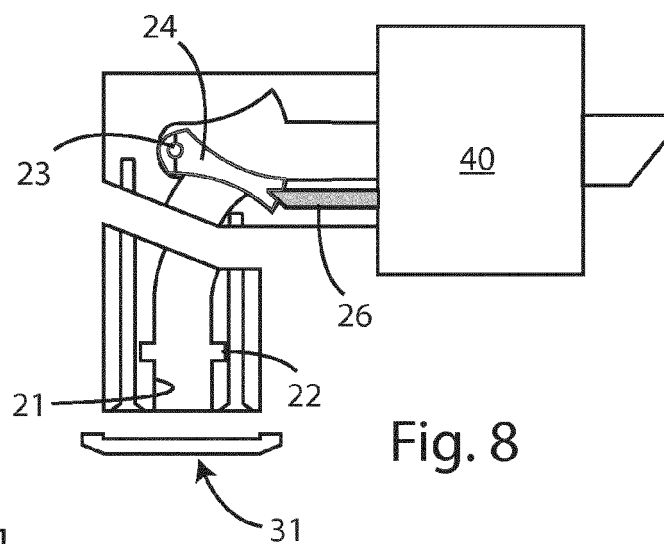


Fig. 5





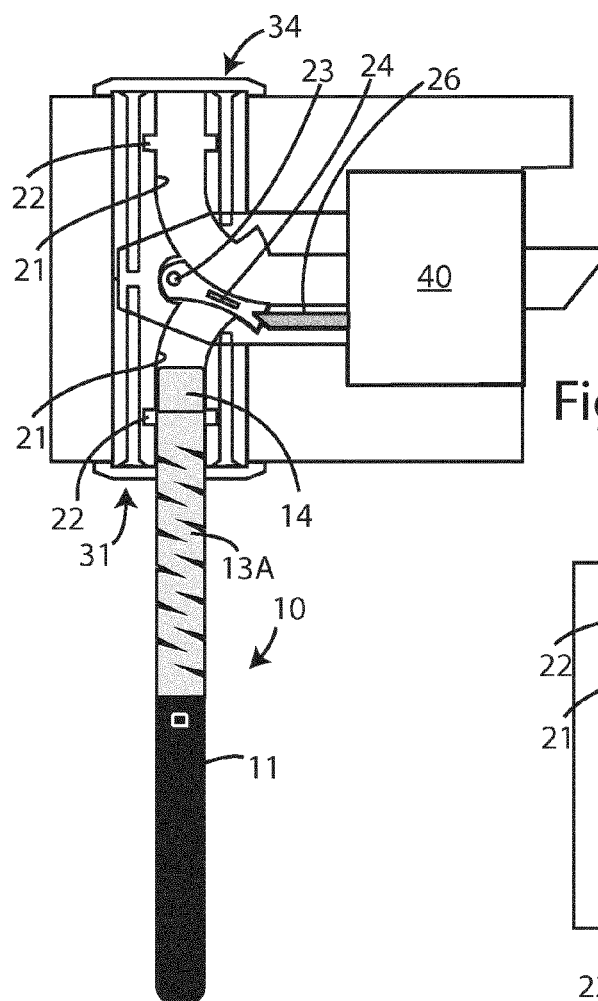


Fig. 12

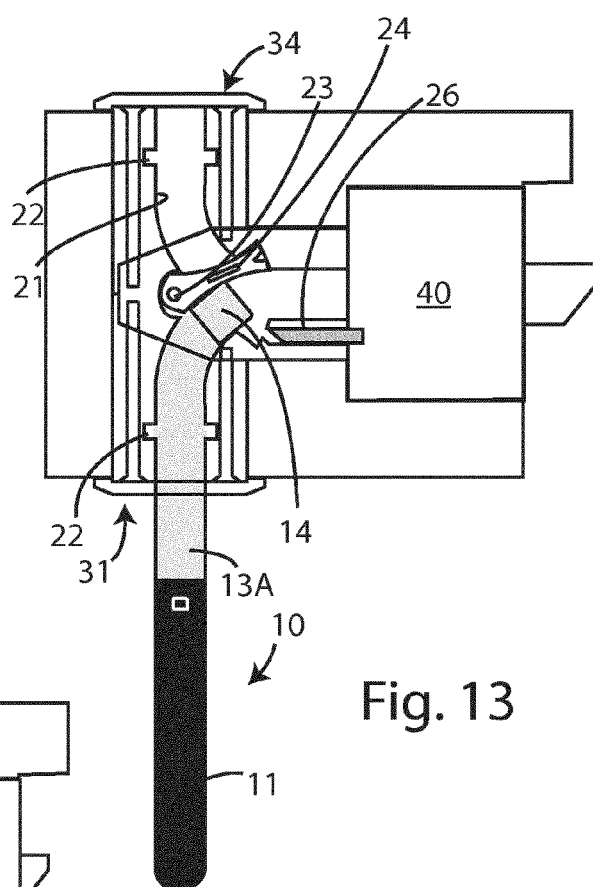


Fig. 13

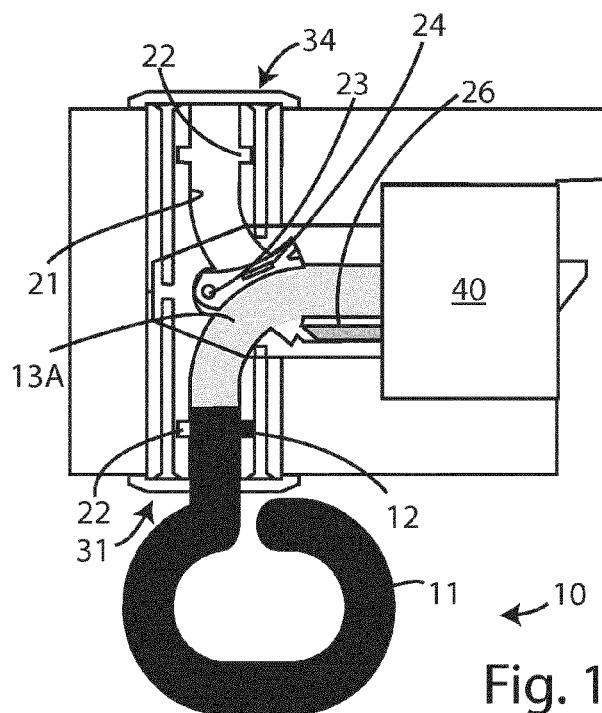


Fig. 14

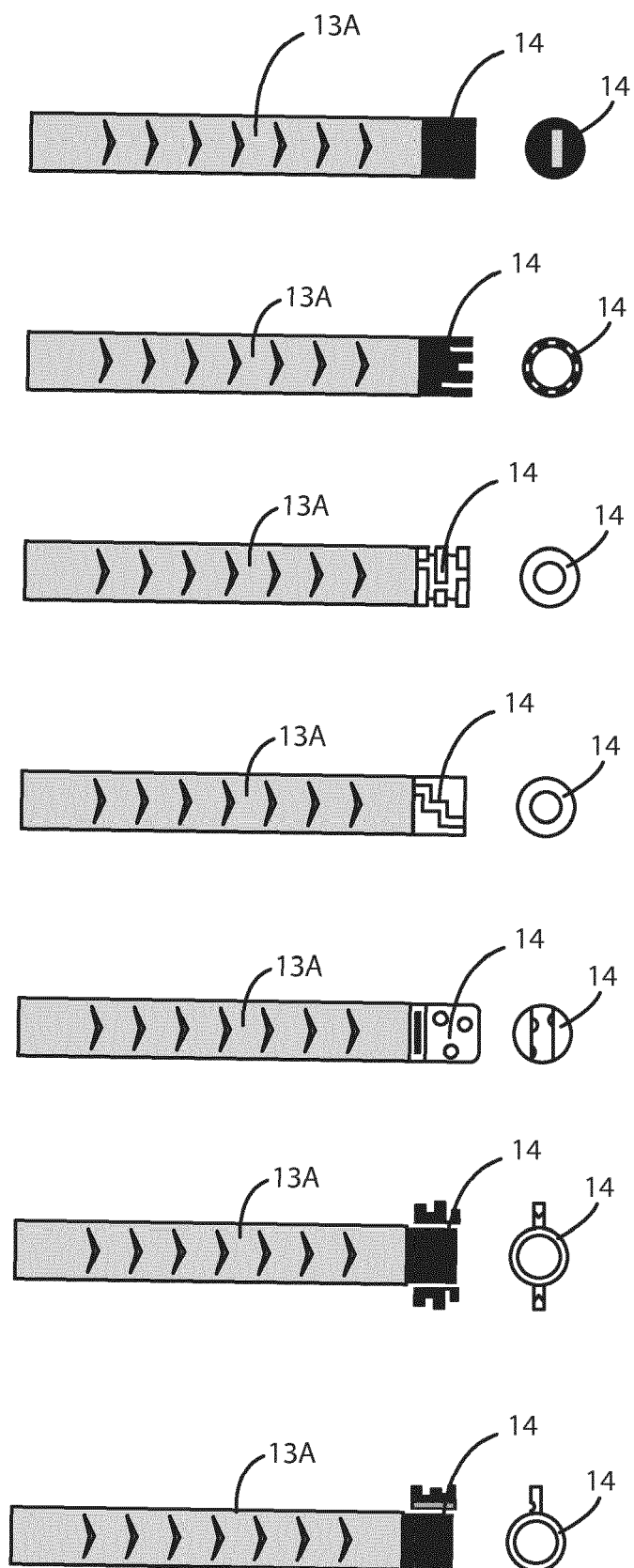


Fig. 15



EUROPEAN SEARCH REPORT

 Application Number
 EP 16 15 0365

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 July 2016	Examiner Westin, Kenneth
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 16 15 0365

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