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Fig. 2

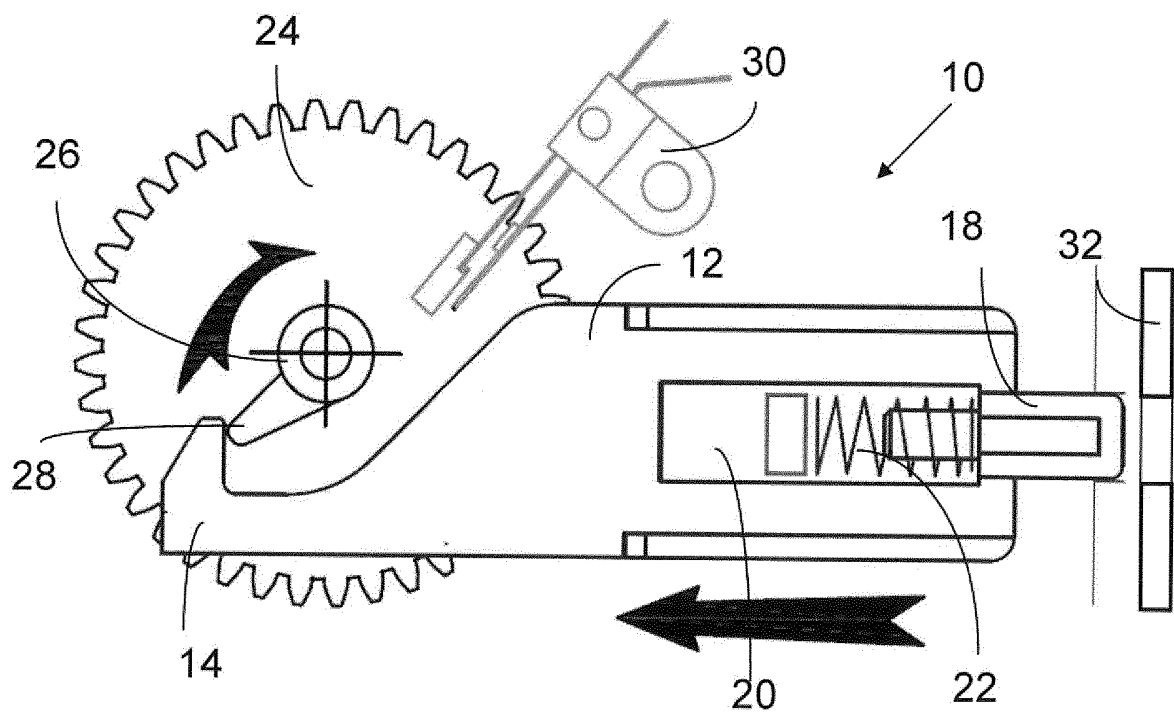


Fig. 3b

Description

[0001] The invention relates to an opening mechanism.

[0002] There is a multitude of opening mechanisms known from prior art in technology. These opening mechanisms are designed to allow for opening of two parts of a lockable device which are mounted movable towards each other, if adequate authorization and/or entitlement has been given. Opening mechanisms are preferably mounted at closure elements such as gates, doors or the like. But it is also conceivable to mount them at laptops, diaries, boxes and/or wherever personal effects and items need to be secured. The opening mechanism in total serves for granting selected persons access to certain items or areas and to refuse it to other persons. By entering a correct opening code, a latch engaging in a locking position into a corresponding strike plate and thus preventing relative movement between movable parts is usually released, thus allowing it to move out from the strike plate and admitting opening of the movable parts towards each other. However, prior art opening mechanisms often bear a disadvantage in that they show wear and tear in the course of time, because they are comprised of a multiplicity of elements which can be moved relative to each other. After frequent activation of the opening mechanism, it thus happens that individual parts get stuck and jammed, thus making it impossible to ensure faultless opening. Due to the multiplicity of elements, the opening mechanism is quite large with regard to its dimensions, so that it can only be used for relatively large components like doors, for example. These opening mechanisms cannot be attached to personal items like laptops and diaries. Furthermore, unauthorized opening cannot be prevented by prior art opening mechanisms with hundred percent safety. Instead, it is easy for unauthorized persons to open these mechanisms with no major effort.

[0003] Now, therefore, it is the object of the present invention to provide an opening mechanism which works wear-free and reliable and moreover which can also be mounted on personal effects.

[0004] This object is achieved by an opening mechanism of the characteristic features outlined in claim 1. Advantageous embodiments each are the subject of the dependent claims. It should be noted that the characteristic features outlined individually in these claims can also be combined with each other in arbitrary and technologically sensible manner, thus showing-up further embodiments of the present invention.

[0005] The inventive opening mechanism is comprised of:

- a locking element which is movably arranged along a locking element axis,
- a blocking element which is movably arranged along a blocking element axis, and which attacks in a locking position with a first end at the locking element,

thus blocking the locking element in its freedom of movement, and which is hook-shaped at its second end;

- a spring element acting along the locking element axis, and
- an actuator element which is so configured that by attacking at the hook-shaped second end it can transfer the blocking element from a closed position into an open position, whereby the blocking element releases the locking element.

[0006] As compared with prior art, the inventive opening mechanism has an advantage in that it is of a compact setup whereby it can also be attached to personal items without adversely affecting these in their dimensions. Furthermore, the inventive opening mechanism provides high safety against unauthorized opening.

[0007] According to the present invention, the locking position is understood to be the position in which the locking element is fixed by the blocking element and in which it is not or just slightly movable along its effective direction, i.e. the locking axis. In the inventive unlocking position, the locking element is freely movable in its effective direction. The locking element can then be moved along its effective direction. According to the present invention, the closed position is understood to be the position in which the blocking element is arranged along its effective direction, i.e. the blocking element axis, in such a manner that it causes a locking of the locking element. According to the present invention, open position is understood to be the position in which the blocking element is so arranged along the blocking element axis that it does not engage into the locking element.

[0008] The spring element acts along the locking element axis in such a manner that it releases the locking element from the locking position. Hence, it acts in the direction of the unlocking position and moves the locking element away from the blocking element.

[0009] Advantageously, the opening mechanism is comprised of a motor with a rotating motor shaft. The actuator element is driven by the motor, actuated by activating the motor. Furthermore, the opening mechanism may be comprised of a rotating part which is driven by the motor shaft. The rotating part acts on the actuating element and/or is advantageously connected to it. The actuating element may be arranged concentrically at the rotating part. Advantageously, the actuating element and the rotating element are configured as a one-piece part. The rotating part may be a wheel, preferably a cog wheel.

[0010] Preferably, the actuating element comprises at least one projection and/or cam with which it can attack the blocking element. The cam engages into the hook-shaped part of the blocking element and moves it out from the closed position. The actuating element is sensibly pivoted around an axis.

[0011] To enable the blocking element to engage into the locking element, the locking element preferably comprises a groove and/or recess or a passage. Ideally, the

locking element comprises a lug. This lug may have the most different shapes. It may be round, oval or square. It must merely be suitable to take-up at least part of the blocking element.

[0012] The locking element may be comprised of a fastening plate. By means of the fastening plate, the locking element can be fastened at one section of a lockable device. To this effect, the plate may comprise holes. These holes serve for taking-up bonding means such as screws or rivets. However, the locking element may also be arranged firmly bonded to one section of a lockable device.

[0013] Preferably, the blocking element is rod-shaped and/or oblong. With its first end, it can arrest the locking element in the locking position. With its other (second) end, which is hook-shaped, it can be brought into engagement with the actuating element whereby it is moved out from the locking position and/or closed position.

[0014] Advantageously, a spring is mounted at the blocking element. Preferably this is a compression spring, for example a helical spring. By means of this spring, the blocking element is ideally pressed permanently in the direction of the first end. This bears an advantage in that the blocking element in principle is so arranged that the locking element can easily be brought into the locking position. The blocking element may comprise an opening. Ideally, a spring is arranged in this opening. A space-saving arrangement can thus be achieved.

[0015] Preferably the first end of the blocking element runs out obliquely. Then the blocking element comprises a start-up slant. If the blocking element is moreover spring-loaded, the locking element is easy to bring into the locking position. When the locking element is brought into the locking position, on account of the slant, the blocking element is pressed back by the locking element against the pressure of the spring and thus moved out from the closed position. When the locking element has passed the blocking element, the spring again presses the blocking element into the closed position and/or into the locking position. The blocking element is configured similar to a slam lock.

[0016] At its first end, the blocking element may comprise a tongue which can block the freedom of movement of the locking element. With special preference, the tongue is configured with a slant. Accordingly, the tongue may be slimmer than the blocking element. The tongue may be adapted to get into the lug of the locking element in order to block it.

[0017] With the inventive opening mechanism, the blocking element axis ideally runs vertically to the locking element axis. The blocking element and the locking element thus move perpendicular towards each other.

[0018] Preferably, the spring element comprises a spring compression plate. The spring compression plate runs perpendicular to the locking element axis. Hereby, the effective area between the spring element and the locking element is improved. Moreover, a uniform distri-

bution of the spring load on the locking element is thus achieved. Preferably, the spring element comprises a groove which is so configured that part of the blocking element, preferably the tongue, can engage into the groove. The spring element may be comprised of one compression spring or more, in particular two, preferably helical springs which preferably are arranged each at the ends of the spring compression plate. A uniform distribution of the spring load is thus achieved.

[0019] The opening mechanism may be comprised of a switch for turning-off and/or deactivating the motor. This switch is preferably so arranged that it can be actuated by the actuating element. With special preference, it is so arranged that it is actuated immediately after the actuating element has engaged into the hook-shaped part of the blocking element and moved it out from the closed position. It is of advantage that the motor stays active only for as long as required to be able to release the locking element from the locking position. If the motor is driven by a battery, only the absolutely required minimum of battery power is hereby consumed, thereby increasing the battery service life.

[0020] Preferably, the opening mechanism comprises a battery. The battery supplies electric current to the motor. Ideally, the battery is arranged in a separate compartment. This arrangement bears an advantage in that the battery is easy to replace, if needed.

[0021] Furthermore, the opening mechanism may be comprised of a gearbox through which the rotating part and/or actuating element are linked to the motor shaft. By using a gearbox, it is possible to adapt a given input speed, e.g. the motor speed, to the required output speed. Preference is given to the use of mechanical gearboxes, for example positively connected gearboxes like gearboxes with cogged wheels.

[0022] In order to activate the opening mechanism and to release the locking element from the locking position, the opening mechanism may be comprised of an input device. Via this input device, one may enter an opening code. For example, the opening code can be entered via a keyboard, touchpad, chip card or via blue tooth. For this purpose, the opening mechanism comprises a keyboard, touchpad, or a card reader and/or a blue tooth interface.

[0023] For example, the input device may be a biometric identification system. With this input device, it is possible to record and evaluate voice, iris or fingerprints. To be able to activate the opening mechanism by means of speech recognition, it is comprised of at least one microphone. To pick-up a fingerprint, the input device is comprised of a fingerprint reader. The iris is picked-up via a camera. In accordance with the present invention, even biometric data are considered as opening code.

[0024] Moreover, the opening mechanism may be comprised of an interactive speech output. Hereby, the opening mechanism is able to give instructions, among others, to the user on how to operate the mechanism. In order to inform the user that the code input was right

and/or wrong, and that the opening mechanism was activated and/or not activated, an acoustic signal may be sounded. For example, this can be accomplished by a playback of music. For this purpose, the opening mechanism is comprised of at least one loudspeaker.

[0025] The opening mechanism may comprise a casing with an aperture. The casing preferably has holes which connecting means, like screws, can be plugged through. By way of the connecting means, the casing can be fastened to an element. A casing offers an advantage in that the elements of the opening mechanism can thereby be grouped together in a single item. Furthermore, a casing protects the elements of the opening mechanism from external influences such as dust and moisture. The service life of the opening mechanism can thereby be extended. The aperture preferably runs perpendicular to the locking element axis, with the locking element being introducible into the aperture. The casing is preferably made of plastic and can be configured as a bipartite unit.

[0026] In the following, the transition between the locking position and the unlocking position of the opening mechanism is described:

If the actuating element is actuated, it preferably engages with its cam into the hook-shaped part of the blocking element and moves it along the blocking element axis from the closed position in which the blocking element engages into the locking element, into an open position. Actuation of the actuating element, for example, may be accomplished by activating a motor, with the motor being activated by entering the right opening code. The motor drives a motor shaft which is preferably connected to a rotating part.

[0027] The actuating element may be arranged at the rotating part. If the blocking element is located outside the closed position (in the open position), it does not engage into the locking element and the locking element is movable along the locking element axis. The locking element is now pressed by the spring element acting along the locking element axis out from the locking position in order to open the system. Thus it is possible to open the two parts of a lockable device which are movable towards each other.

[0028] If the actuating element does not engage into the hook-shaped part of the blocking element any longer, it moves it back into the closed position. This is achieved by the fact that a spring is arranged at the blocking element which acts along the blocking element axis in the direction of the closed position. If the opening mechanism is comprised of a switch, it is then so arranged that it can be actuated by the actuating element. By actuating the switch by means of the actuating element, the motor is deactivated.

[0029] In order to bring the locking element back into the locking position, it is simply pressed by a user against the effective direction of the spring element into the lock-

ing position. When the locking element hits the blocking element, it is moved against the effective force of the spring from the closed position. As soon as the locking element has passed the blocking element, the blocking element spring presses the blocking element back into the closed position. Thus the locking element is back in the locking position. Opening the parts movable towards each other is no longer possible.

[0030] Advantageously, the locking element is arranged immediately at a movable element, for example a door, gate or the like and the rest of the opening mechanism is arranged at the other movable element. But it is indeed feasible that the locking element is connected via a lace, strap or belt with the movable element. Advantageously, the elements movable towards each other are connected to each other by means of joints and/or hinges.

[0031] The invention as well as the technical environment are explained more closely in the following by way of various figures. It should be noted that these figures show a particularly preferred embodiment of the present invention. However, the invention is not restricted to the embodiment shown here. In particular, the invention - inasmuch as technically purposive - comprises arbitrary combinations of the technical features outlined in the claims or described in the description as relevant for the invention.

[0032] These figures show the following:

- Fig. 1 is a schematic view of an inventive opening mechanism in a first embodiment;
- Fig. 2 is a schematic view of an inventive opening mechanism in a second embodiment;
- Fig. 3a is a schematic top view on the opening mechanism of Fig. 2 in the locking position;
- Fig. 3b is a schematic top view on the opening mechanism of Fig. 2 in the open position.

[0033] Fig. 1 shows a schematic view of an inventive opening mechanism 10 in a first embodiment. The opening mechanism 10 is comprised of a locking element 38. The locking element 38 has a lug 42 into which a blocking element 12 can engage. Furthermore, the locking element 38 has a fastening plate 40. By means of the fastening plate 40, the locking element 38 can be fastened to a lockable device. To this effect, the plate 40 may have holes. Furthermore, the opening mechanism 10 is comprised of a spring element 32. The spring element 32 thus acts along the locking element axis in such a manner that it releases the locking element 38 from the locking position. The spring element 32 has a spring compression plate 34. The spring compression plate 34 runs perpendicular to the locking element axis. Arranged at the spring compression plate 34 are two compression springs 36, preferably helical springs. A uniform distribu-

tion of the spring load is thus achieved.

[0034] Furthermore, the opening mechanism 10 is comprised of a blocking element 12 which is movably arranged along a blocking element axis. In its locking position, it attacks with a first end 16 comprising a tongue 18 that gets into lug 42, which is part of the locking element 38, whereby the locking element 38 is blocked in its freedom of movement. At the other second end, the blocking element 12 is hook-shaped. The blocking element 12 is still described more closely in Figures 3a and 3b.

[0035] Furthermore, the inventive opening mechanism 10 also comprises an actuating element 26. The actuating element 26 has a cam 28 by means of which it can attack at the blocking element 12. In order to activate the opening mechanism 10, it is equipped with a motor 44 comprising a rotating motor shaft 46. The actuating element 26 is connected to the motor 44.

[0036] Figure 2 shows a schematic view of an inventive opening mechanism 10 in a second embodiment. In order to activate the opening mechanism 10, and to release the locking element 38 from the locking position, the opening mechanism 10 is comprised of an input device. Via this input device, an opening code is entered. The input device ideally is a biometric identification system. For example, the input device records and evaluates the voice. In order to be able to record the voice of a user, the opening mechanism 10 is equipped with a microphone 58. The microphone 58 can be arranged at a printed-circuit board 56. Furthermore, the opening mechanism 10 is equipped with a loudspeaker.

[0037] The opening mechanism 10 is comprised of a gearbox 48 via which the rotating part 24 is linked to a motor shaft 46. By using a gearbox 48, a given input speed, e.g. the motor speed, can be adapted to a demanded output speed. The opening mechanism 10 furthermore is equipped with a battery 62 which supplies the motor 44 with electric current and which ideally is accommodated in a separate compartment 60, whereby it is easy to replace, if needed. In order to protect the elements of the opening mechanism 10 from external influences, the opening mechanism 10 is provided with a casing. This casing is comprised of two casing halves, an upper half 50 and a lower half 52.

[0038] Fig. 3a shows a schematic top view on an inventive opening mechanism 10 in the second embodiment. The opening mechanism 10 is located in the locking position. The blocking element 12 engages into the locking element 38 so that the locking element 38 is blocked in its freedom of movement. The blocking element 12 is of an oblong shape. At its first end 16, the blocking element 12 has a tongue 18 which can engage into the locking element 38. The tongue 18 is preferably of oblique shape, it has a start-up slant. The second end 14 of the blocking element 12 is hook-shaped. Hereby, the blocking element 12 can be moved by the actuating element 26 out from the closed position. The actuating element 26 is firmly arranged at a rotating part 24. Ad-

vantageously, the actuating element 26 and the rotating part 24 are configured as a one-piece unit.

[0039] The blocking element 12 has a spring 22. The spring 22 is configured as a helical spring and it presses the blocking element 12 ideally permanently in the direction of the first end 16. This provides an advantage in that the blocking element 12 is so arranged that the locking element 38 can be easily brought into the locking position. Furthermore, the blocking element 12 has an aperture 20 in which the spring 22 is arranged. Since the tongue 18 of blocking element 12 is spring-loaded and provided with a start-up slant, the locking element 38 can easily be brought into the locking position. The blocking element 12 by way of its slant is pressed back by the locking element 38 against the pressure of the spring 22 and moved out from the closed position. When the locking element 38 has passed the blocking element 12, the spring 22 presses the blocking element 12 again into the closed position.

[0040] The opening mechanism 10 moreover is provided with a switch 30. The motor 44 is deactivated by actuating the switch 30. The switch 30 is so arranged that it can be actuated by the actuating element 26.

[0041] In Figure 3a, the actuating element 26 does not engage into the hook-shaped part 14 of the blocking element 12. Since the spring 22 arranged at the blocking element 12 acts along the blocking element axis in the direction of the closed position, the blocking element 12 is located in the closed position and it arrests the locking element 38 in the locking position.

[0042] Figure 3b shows a schematic top view on the opening mechanism 10 from Fig. 3a in an open position. The cam 28 of the actuating element 26 engages into the hook-shaped part 14 of the blocking element 12 and moves it along the blocking element axis from the closed position in which the blocking element 12 engages into the locking element 38, into an open position. The locking element 38 is now movable along the locking element axis. The locking element 38 is pressed by the spring element 32 acting along the locking element axis and moved out from the locking position.

[0043] The actuation of the actuating element 26, for example, is accomplished by activating the motor 44. Upon activation of the motor 44, the actuating element 26 revolves about a rotating axis. The switch 30 is so arranged that it is actuated by the actuating element 26 shortly after it has engaged into the hook-shaped part 14 of the blocking element 12. By actuating the switch 30 by means of the actuating element 26, the motor 44 is deactivated.

List of Reference Numbers

[0044]

- | | |
|----|-------------------|
| 10 | Opening mechanism |
| 12 | Blocking element |

(continued)

- 14 Hook-shaped end of the blocking element
- 16 First end of the blocking element
- 18 Tongue
- 20 Aperture
- 22 Spring blocking element
- 24 Rotating part
- 26 Actuating element
- 28 Cam
- 30 Switch
- 32 Spring element
- 34 Spring compression plate
- 36 Helical spring, spring element
- 38 Locking element
- 40 Fastening plate
- 42 Lug
- 44 Motor
- 46 Motor shaft
- 48 Gearbox
- 50 Upper casing half
- 52 Lower casing half
- 54 Loudspeaker
- 56 Printed-circuit board
- 58 Microphone
- 60 Battery compartment
- 62 Battery

Claims

1. Opening mechanism comprising:

- a locking element (38) movably arranged along a locking element axis;
- a blocking element (12) movably arranged along a blocking element axis, attacking in a locking position with a first end (16) at the locking element (38), whereby the locking element (38) is blocked in its freedom of movement, and which is hook-shaped at its second end (14);
- a spring element (32) acting along the locking element axis, and
- an actuating element (26) which is so configured that it can transfer the blocking element (12) by attacking at the hook-shaped second end (14) from a closed position into an open position, whereby the blocking element (12) releases the locking element (38).

2. Opening mechanism according to claim 1, **characterized in that** the opening mechanism (10) is provided with a motor (44) with a rotating motor shaft (46) and a rotating part (24), wherein the actuating element (26) is connected to the rotating part (24) and wherein the rotating part (24) is driven by the

motor shaft (46).

- 3. Opening mechanism according to claim 1 or 2, **characterized in that** the actuating element (26) is provided with a cam (28) which on rotation of the actuating element (26) attacks at the hook-shaped end (14) of the blocking element (12) and transfers it from the closed position into the open position.
- 4. Opening mechanism according to any of the preceding claims, **characterized in that** the locking element (38) is provided with a lug (42) which the blocking element (12) can engage into.
- 5. Opening mechanism according to any of the preceding claims, **characterized in that** the locking element (38) is comprised of a fastening plate (40), by means of which the locking element (38) can be fastened to a part of a lockable device.
- 6. Opening mechanism according to any of the preceding claims, **characterized in that** a spring (22) is arranged at the blocking element (12), said spring pressing the blocking element (12) into the locking position.
- 7. Opening mechanism according to claim 6, **characterized in that** the blocking element (12) is provided with an aperture in which the spring is arranged.
- 8. Opening mechanism according to any of the preceding claims, **characterized in that** the blocking element (12) is provided with a start-up slant at the first end (16).
- 9. Opening mechanism according to any of the preceding claims, **characterized in that** the blocking element (12) at its first end (16) is provided with a tongue (18) which blocks the freedom of movement of the locking element (38) in the locking position.
- 10. Opening mechanism according to any of the preceding claims, **characterized in that** the opening mechanism (10) is provided with an input device for entering an opening code.
- 11. Opening mechanism according to claim 10, **characterized in that** the input device represents a biometric identification system, preferably for recording the voice, iris or fingerprint.
- 12. Opening mechanism according to any of the preceding claims 2 to 11, **characterized in that** the opening mechanism (10) is provided with a switch (30) for deactivating of the motor (44), which is so arranged that the switch (30) can be actuated by the actuating element (26).

13. Opening mechanism according to any of the preceding claims 2 to 12, **characterized in that** the rotating part (24) is driven via a gearbox (48) by a motor shaft (46).

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14. Opening mechanism according to any of the preceding claims, **characterized in that** the spring element (32) is provided with a spring compression plate (34) extending perpendicular to the locking element axis and arranged at compression springs (36) extending in the direction of the locking element axis.

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15. Opening mechanism according to any of the preceding claims, **characterized in that** the opening mechanism (10) is provided with a casing (50, 52) having an aperture, with the aperture extending perpendicular to the locking element axis and with the locking element (38) being introducible into the aperture.

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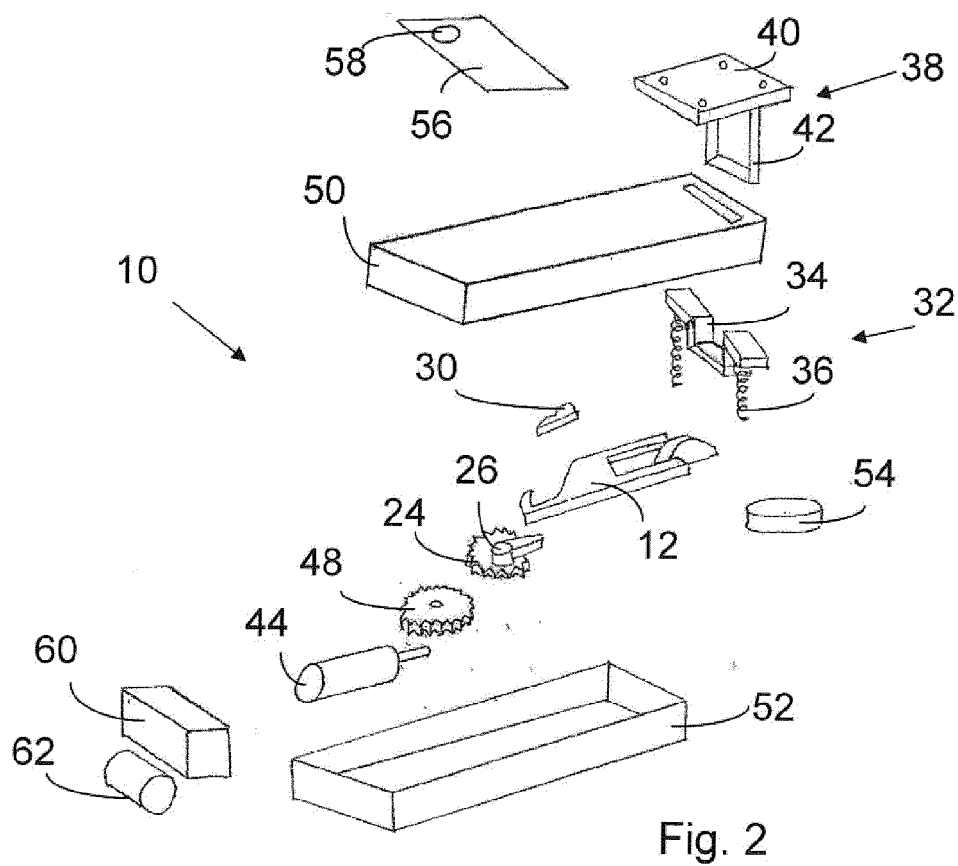
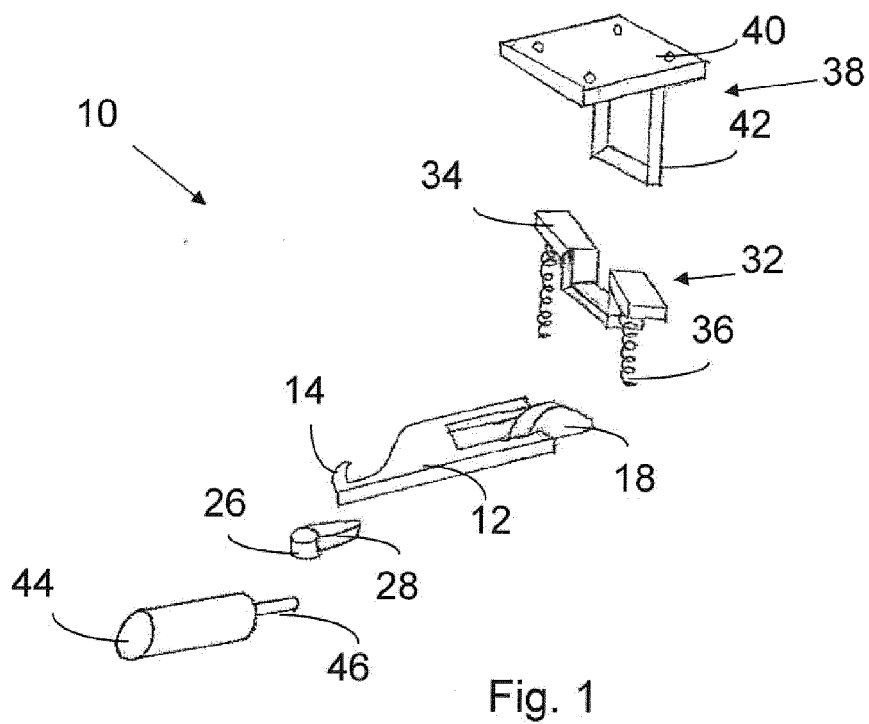
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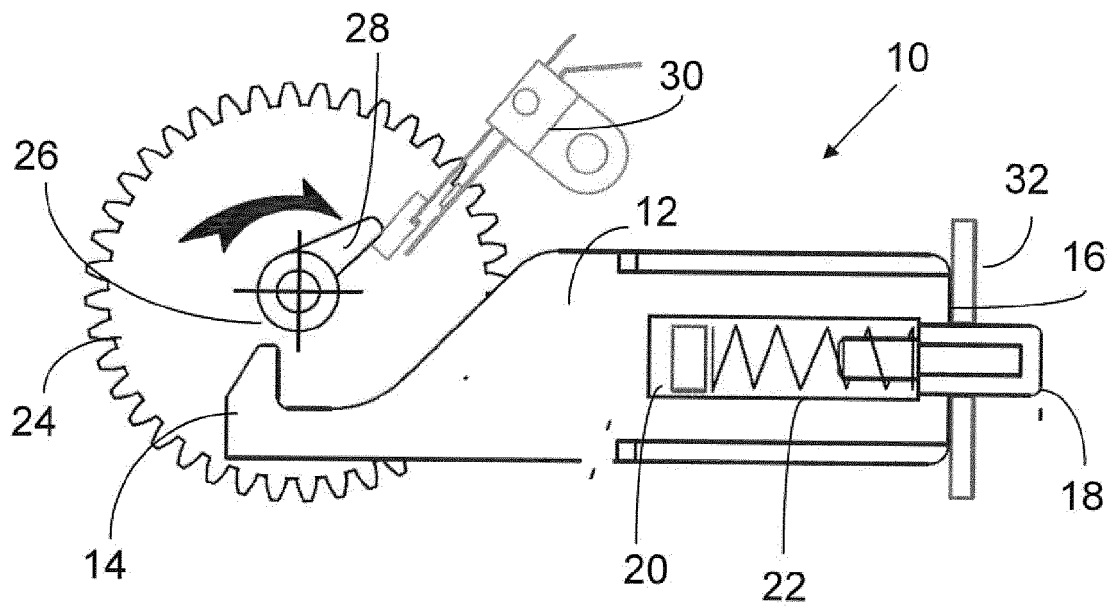


Fig. 3a

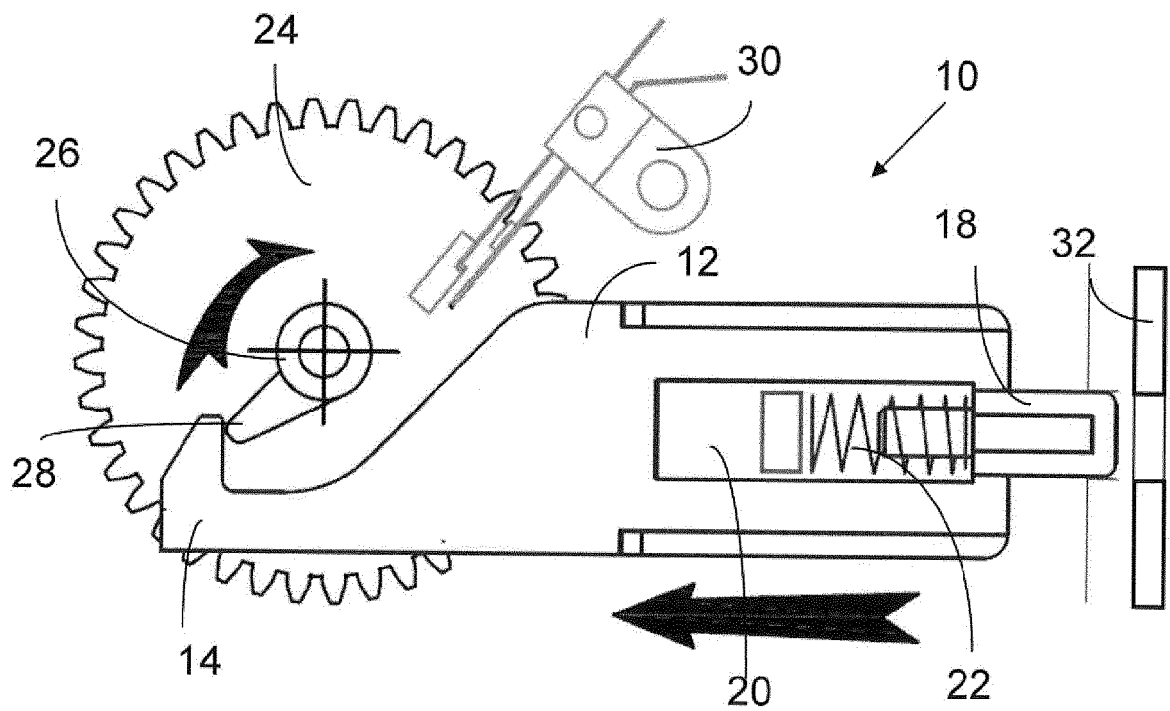


Fig. 3b



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 3529

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Place of search The Hague		Date of completion of the search 20 November 2015	Examiner Antonov, Ventseslav
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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