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(54) **ELECTRIC STRIKE WITH A MONITORING SYSTEM**

(57) The present invention relates to an electric strike with a monitoring system, comprising: a box (1), a swivelling latch (2), an internal locking and unlocking mechanism which can be actuated by the core (10) of a coil (8), a PCB circuit (13), two PCB connecting strips (11), a monitoring system for monitoring the state of the internal mechanism comprising an internal microswitch as-

sembly (14) connected to a PCB circuit (13) of the strike and which can be actuated by the core (10) of the coil (8). The present invention further comprises a monitoring system for monitoring the state of a door, provided with a microswitch assembly (12) connected to the PCB circuit (13) of the strike and actuated by an actuation lever (3) located in the latch of the strike, when the door is in the closed position and the latch of the door actuates said actuation lever (3).

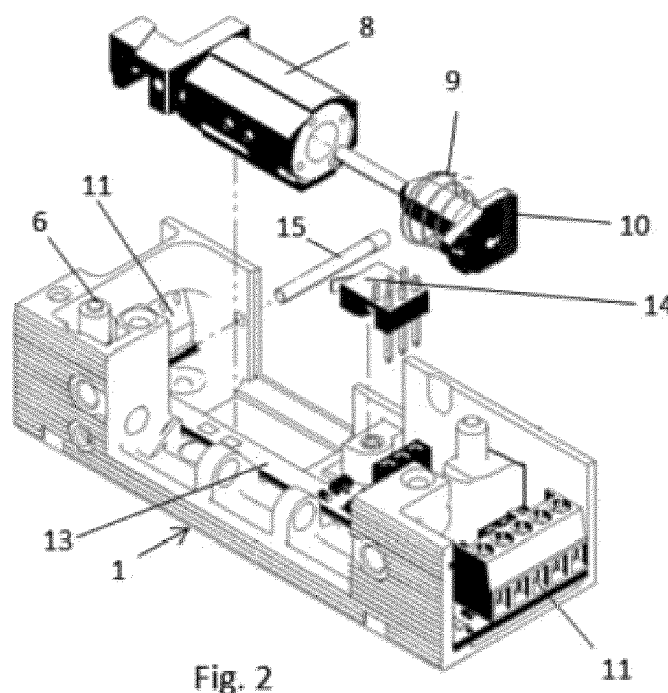


Fig. 2

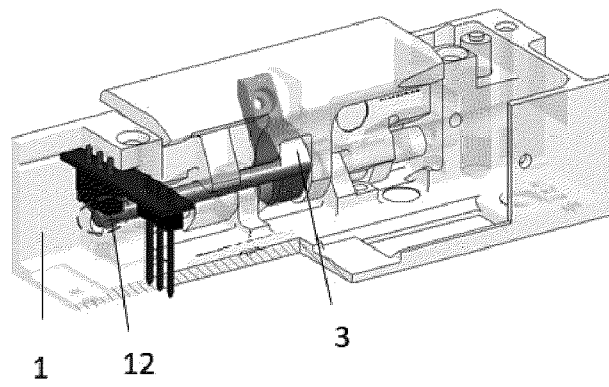


Fig. 10a

Description

Technical field

[0001] The present invention is applicable in the sector of electric strikes for doors or closures, and more specifically of strikes provided with monitoring systems for monitoring the open/closed state of the door and the state of the internal mechanism of the strike.

Prior state of the art

[0002] Monitoring systems allow controlling the state of the different security systems integrated in an installation, and in the case of electric strikes, manufacturers have two types of different monitoring systems:

- Monitoring the state of the door: This refers to the positioning of the door. This system controls whether the door is open or closed by means of the actual movement of the door leaf, or whether or not the latch of the door is in contact with the strike, and therefore whether the door is open or closed, without the door leaf having been moved.
- Monitoring the state of the internal mechanism of the strike: This refers to the positioning of the internal mechanisms (levers or cams) which allow locking or unlocking the latch of the strike. This monitoring system allows knowing whether the strike is locked or unlocked.

[0003] A monitoring system for monitoring the state of the door or the state of the strike consists generally of two parts:

- Sensors in the strike.
- External monitoring/indication devices.

[0004] The electric strike alone cannot indicate the open or closed state of the door or the locked or unlocked state of the internal mechanism of the strike in a manner readily noticeable for the user. External monitoring/indication devices are required for interpreting the signal received by the sensors incorporated in the strike.

[0005] The two types of monitoring mentioned above are available in electric strike models existing on the market. Within this division of monitoring systems, two other types can furthermore be distinguished based on whether:

- The sensor or the monitoring assembly is arranged on the outside of the box of the strike.
- The sensor or the monitoring assembly is arranged in the interior, or partially in the interior, with respect to the box of the strike.

[0006] Monitoring systems arranged on the outside of

the box of the strike are made with a microswitch assembly which is actuated by means of a cam assembled on the front face of the strike and actuates a mechanical sensor assembled on one of the side faces.

[0007] This sensor is independent of the box of the strike and remains assembled by means of a plastic box which in turn acts as protection for the sensor and also as a housing for the connecting strip of the monitoring system.

[0008] This monitoring system allows knowing whether the door, and more specifically whether the latch of the door, is open or closed. When it receives pressure from the latch of the door, the cam assembled in the front of the latch of the strike rotates about a lower shaft, pressing on the sensor which can be formed by a normally open microswitch.

[0009] Said shaft can rotate without coming out as a result of a cavity formed between the box of the strike, consisting of a base and a cover, and the cam support part. The sensor causes the signal to reach the upper monitoring system through the strip of the microswitch.

[0010] The microswitch assembly is formed by a microswitch and a strip, housed in a plastic box the base of which has lugs which are assembled in holes of the side face of the strike.

[0011] Unlike the preceding case, monitoring systems arranged in the interior or partially in the interior allow monitoring the state of the internal mechanism of the strike, in addition to monitoring the state of the door as mentioned above.

[0012] Since they do not have access to the internal components of the strike, external monitoring systems do not allow the possibility of knowing the locked or unlocked state of the internal mechanism of the strike.

[0013] One example of an electric strike with an internal monitoring system is the Series 4 model from Openers & Closers, proprietor of the present invention. This double monitoring strike furthermore allows the possibility of combining the monitoring of the state of the door with the monitoring of the levers making up the mechanical locking system.

[0014] The monitoring systems are placed in the rear area with respect to the latch and below the levers of the mechanical locking system.

[0015] The components intervening in a double monitoring strike, the state of the door, and the state of the internal mechanism, can also use only one of the systems, by way of simple monitoring. The operation of the two monitoring systems is explained below.

[0016] In an installation with an electric strike provided with a monitoring system for monitoring the state of the door, when the door is closed, the latch of the door presses on a sliding part which in turn moves the contact of a microswitch indicating the state of the door; this microswitch can have a normally open (NO) contact or a normally closed (NC) contact. The signal emitted by this microswitch is received by an upper monitoring device which converts the signal of the microswitch into a signal

that the user can interpret according to device specifications.

[0017] In the case of an electric strike with a monitoring system for monitoring the state of the internal mechanism of the strike (locked or unlocked), the sensor interacts with the very levers of the mechanism, either directly or by means of other complementary parts intended for such purpose. The sensor can contact any of the levers intervening in the operation of the locking/unlocking mechanism of the strike.

[0018] Electric strikes in which the short lever of the internal mechanism contacts the sensor by means of a sliding part guided by the box of the strike are also known. Again, the sensor can be normally open (NO) or normally closed (NC) and is actuated by the movement of the aforementioned parts causing the interaction with the coil or with the return spring of the lever.

[0019] The technical problem being considered relates to the development of an electric strike with technical features which allow improving the assembly process and reducing the number of components added when assembling the electric strike.

Description of the invention

[0020] The electric strike of this invention is of the type described in the preamble of claim 1 and comprising: a box, a swivelling latch swivelling between a retention position for retaining the latch of a door in a closed position and a release position for releasing the latch of the door, an internal locking and unlocking mechanism for locking and unlocking the latch, which can be actuated by the core of a coil, and comprising a long lever and a short lever which are assembled on respective shafts, a PCB circuit, two PCB connecting strips, and a monitoring system for monitoring the state of the internal mechanism of the strike.

[0021] According to the invention, this monitoring system for monitoring the state of the internal mechanism of the strike comprises an internal microswitch assembly arranged in the area after the coil, and provided with a sensor connected to a PCB circuit of the strike; said microswitch assembly is actuated by the core of the coil when said coil is electrically powered and moves the core towards the short lever of the strike, so as to unlock the internal mechanism of the strike.

[0022] Once the core has been moved as a result of the action of the coil, said core returns to the initial position as a result of the action of a spring.

[0023] The sensor can be normally open (NO) or normally closed (NC), according to the desired function.

[0024] In one embodiment of the invention, this strike has a double monitoring system: the aforementioned monitoring system for monitoring the state of the internal mechanism of the strike, and a monitoring system, arranged in the interior or partially in the interior, for monitoring the state (open or closed) of a door provided with a latch interacting with the latch of the strike in the closed

position of the door.

[0025] This monitoring system for monitoring the state of the door, arranged in the interior or partially in the interior with respect to the box of the strike, consists of an actuation lever located in the latch of the strike, and enables the rotation between: a protruding position in which it is maintained as a result of the action of a spring when the door is open, and a withdrawn position when the door is closed and the latch of the door moves it to said withdrawn position.

[0026] In the protruding position, the actuation lever actuates a sensor of the microswitch assembly of the monitoring system for monitoring the state of the door, indicating the open position of the door through the PCB circuit and the connecting strip.

[0027] When the door is closed and the actuation lever is in the withdrawn position, said actuation lever no longer acts on the sensor, providing an indicative signal indicating that the door is closed.

Brief description of the contents of the drawings

[0028] As a complement to the description provided herein, and for the purpose of helping to make the features of the invention more readily understandable, the present specification is accompanied by a set of drawings which, by way of illustration and not limitation, represent the following:

- Figure 1a shows a front perspective view of an exemplary embodiment of the strike of the invention, with a monitoring system for monitoring the state of the internal mechanism, without the cover of the box and the latch of the strike.
- Figure 1b shows a view similar to Figure 1a, in which the levers of the internal mechanism have been eliminated, and the monitoring system for monitoring the internal mechanism which can be actuated by the core of the coil can be seen.
- Figure 2 shows a view similar to Figure 1b, with the monitoring system for monitoring the internal mechanism in an exploded view.
- Figure 3 shows a perspective view of the internal microswitch assembly of the monitoring system for monitoring the mechanism of the strike.
- Figure 4 shows a rear, perspective, transparency view of the strike of the preceding figures assembled and non-actuated.
- Figures 5a and 5b correspond to respective elevational and plan transparency views of Figure 1 with the internal mechanism locked.
- Figure 6 shows a rear perspective view of the strike of the preceding figures with the internal mechanism actuated by the core of the coil and unlocked.
- Figures 7a and 7b show respective elevational and plan views of the strike with the internal mechanism in the unlocked position of Figure 6.
- Figures 8 and 9 show respective front perspective

views of a variant embodiment of the strike without the cover and provided with a monitoring system for monitoring the state of the door.

- Figures 10a and 10b show respective rear, perspective, transparency views of the strike of Figures 8 and 9, with the actuation lever of the monitoring system for monitoring the door in a position corresponding to the open position of the door, and acting on the microswitch assembly of said monitoring system for monitoring the state of the door.
- Figure 11 shows a front view of the strike with the actuation lever in a position corresponding to the closed position of the door, moved towards the rear area of the latch of the strike.
- Figure 12 shows a rear, perspective, transparency view of the strike with the monitoring system for monitoring the state of the door in the same position as Figure 11, and with the actuation lever not in contact with the sensor of the microswitch assembly of the monitoring system for monitoring the state of the door.

Detailed description of embodiments of the invention

[0029] Figures 1 to 7 correspond to an embodiment of the electric strike provided with a monitoring system for monitoring the state of the internal mechanism of the strike, which is activated by the core of the coil.

[0030] This strike comprises a series of elements typical of electric strikes, such as: - a box (1) with a removable cover, - a latch (2), - an internal locking and unlocking mechanism for locking and unlocking the latch (2) made up of a long lever (4) and a short lever (7) which are assembled on the respective shafts (5, 6); - a coil (8) provided with a spring (9), a core (10) and a pin (15); a PCB circuit (13), and two PCB connecting strips (11).

[0031] When the coil (8) is electrically activated, the core (10) acts on the short lever (7), moving it to a position for unlocking the long lever (4), and accordingly the latch (2) of the strike.

[0032] In this first embodiment, the electric strike comprises a monitoring system for monitoring the state of the internal mechanism of the strike provided with an internal microswitch assembly (14) connected to the PCB circuit (13) of the strike. Said internal microswitch assembly (14) is located in the part after the coil (8) and provided with a sensor which contacts the core (10) of the coil.

[0033] The sensor of the microswitch assembly (14) can be normally open (NO) or normally closed (NC), according to the desired function.

[0034] In this strike, the core (10) of the coil remains in contact with the sensor of the microswitch assembly (14) until the coil (8) receives electric current. In that moment, the core (10) is subjected to a magnetic force induced by the coil (8) and moves towards the short lever (7). The short lever (7) rotates about its shaft (6) as a result of the action of the core of the coil (10) and unlocks

the internal mechanical system of the strike, releasing the long lever (4) and allowing the opening of the door when the latch of the strike (2) rotates as a result of the latch of the door being pulled in an opening direction. In this situation, the sensor of the microswitch assembly (14) is in the normally open (NO) state.

[0035] As can be seen in Figures 1a, 4, and 5a, 5b, the internal mechanism of the strike remains locked. The short lever (7) and the long lever (4) contact one another and the core (10) of the coil is pressing on the sensor of the microswitch assembly (14) of the monitoring system and in this situation said sensor is in the normally closed (NC) position.

[0036] As shown in Figures 6 and 7, when the coil (8) is electrically actuated, the core (10) moves and acts on the short lever (7) of the internal mechanism of the strike, causing the movement thereof to a release position for releasing the long lever (4). At this precise moment, the core (10) of the coil is not in contact with the sensor of the microswitch assembly (14) of the monitoring system for monitoring the internal mechanism and said internal mechanism for mechanically locking the latch (2) has been released, allowing the movement of the latch (2) to an open position of the strike.

[0037] This internal microswitch assembly (14) provides the PCB circuit (13) of the strike with an indicative signal indicating the locked/unlocked state of the internal mechanism of the strike.

[0038] In a second embodiment of the invention shown in Figures 8 to 12, the electric strike further comprises a system, arranged in the interior or partially in the interior, for monitoring the open/closed state of a door provided with a latch which is retained by the latch (2) of the strike when the door is in the closed position.

[0039] This monitoring system for monitoring the state of the door comprises a microswitch assembly (12) connected to the PCB circuit (13) of the strike and provided with a sensor which can be actuated by an actuation lever (3) located in the latch (2) of the strike.

[0040] In Figures 8 to 10 corresponding to an open position of the door, the actuation lever (3) is maintained in a protruding position as a result of the action of a spring (not depicted) pressing on the sensor of the microswitch assembly (12) indicating the open state of the door.

[0041] In Figures 11 and 12 corresponding to a closed position of the door, the actuation lever (3) is moved by the latch of the door to a subsequent position in which it releases the sensor of the microswitch assembly (12) indicating the closed state of the door.

[0042] The signal produced by the sensor is transmitted to the external monitoring systems through the PCB circuit (13) and the strip (11) of the strike.

[0043] This strike is easy to assemble and disassemble, and the microswitch assemblies (12, 14) can be welded to the PCB circuit (13) bearing the two PCB connecting strips (11) which are arranged on opposite sides of the strike or coupled to said PCB circuit (13) by means of connectors.

[0044] Having sufficiently described the nature of the invention, in addition to a preferred exemplary embodiment, it is hereby stated for the relevant purposes that the materials, shape, size and layout of the described elements may be modified, provided that it does not imply altering the essential features of the invention claimed below.

Claims

1. An electric strike with a monitoring system, comprising: a box, a swivelling latch (2) swivelling between a retention position for retaining the latch of a door in a closed position and a release position for releasing the latch of the door, an internal locking and unlocking mechanism for locking and unlocking the latch (2) which can be actuated by the core (10) of a coil (8), and comprising a long lever (4) and a short lever (7) which are assembled on respective shafts (5, 6); a PCB circuit (13), two PCB connecting strips (11), and a monitoring system for monitoring the state of the internal mechanism of the strike; **characterised in that** said monitoring system for monitoring the state of the internal mechanism of the strike comprises an internal microswitch assembly (14) connected to a PCB circuit (13) of the strike, arranged in the area after the coil (8) and provided with a sensor which is actuated by the core (10) of the coil (8) when said coil (8) is electrically powered causing the core to move towards the short lever (7) of the strike and the internal mechanism of said strike to become unlocked.
2. The strike according to claim 1, **characterised in that** it comprises a monitoring system for monitoring the state of a door, arranged in the interior or partially in the interior with respect to the box of the strike, which in turn comprises: a microswitch assembly (12) connected to the PCB circuit (13) of the strike and provided with a sensor which can be actuated by an actuation lever (3) located in the latch of the strike; in the open position of the door, said actuation lever is arranged in a protruding position as a result of the action of a spring and actuates the sensor of the microswitch assembly (12) indicating the open state of the door, and in the closed position of the door, it is arranged in a withdrawn position as a result of the action of the latch of the door and releases the sensor of the microswitch assembly (12) indicating the closed state of the door.

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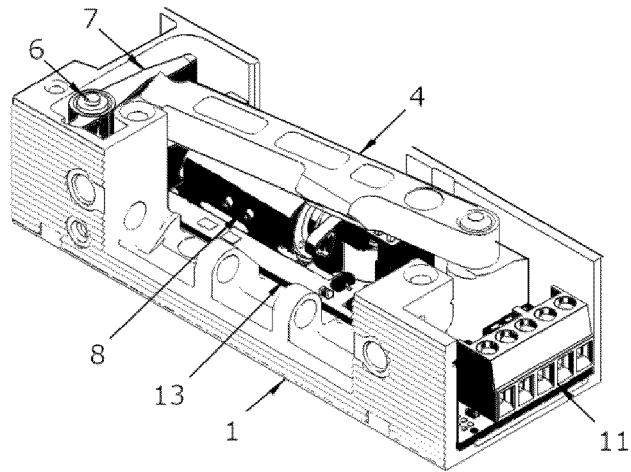


Fig. 1a

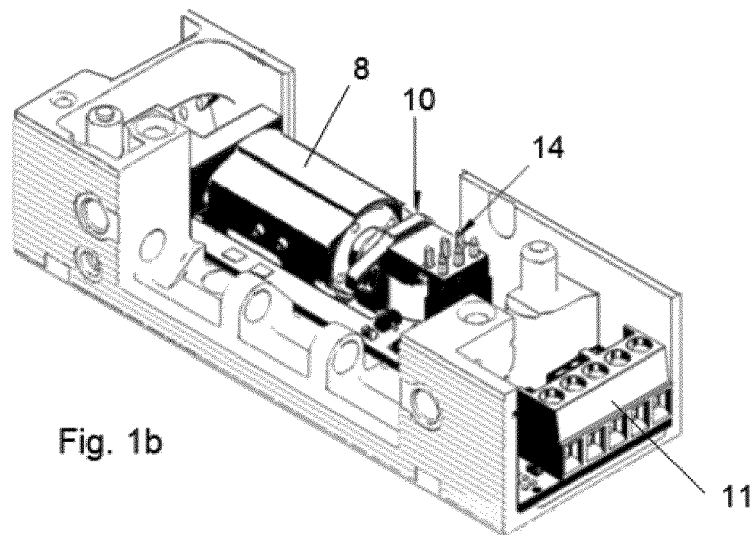


Fig. 1b

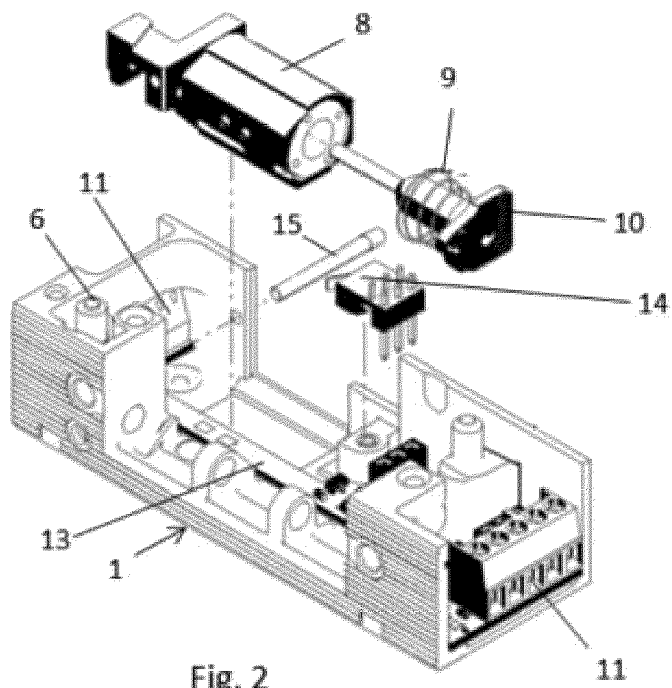


Fig. 2

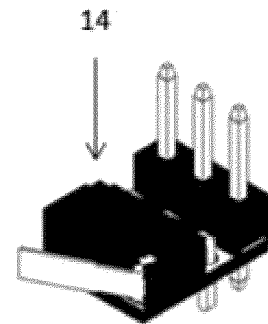


Fig. 3

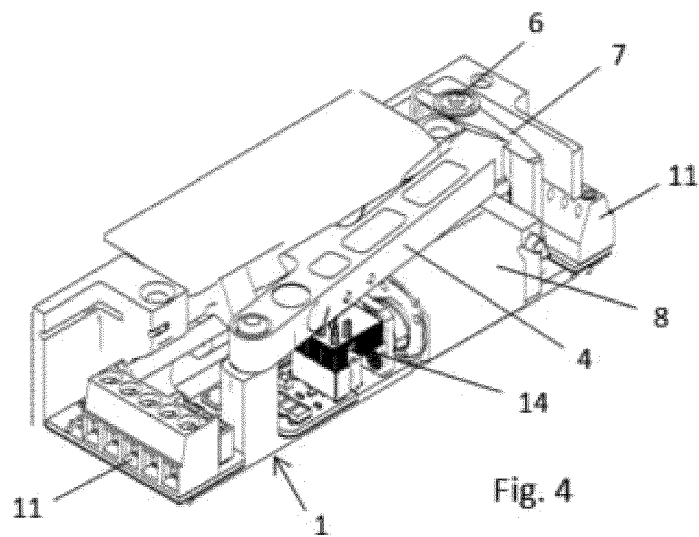


Fig. 4

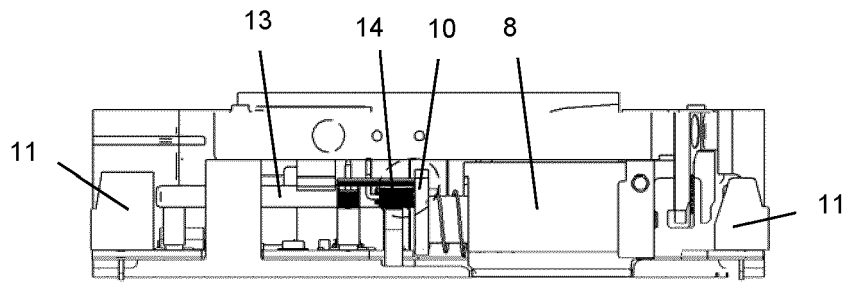


Fig. 5a

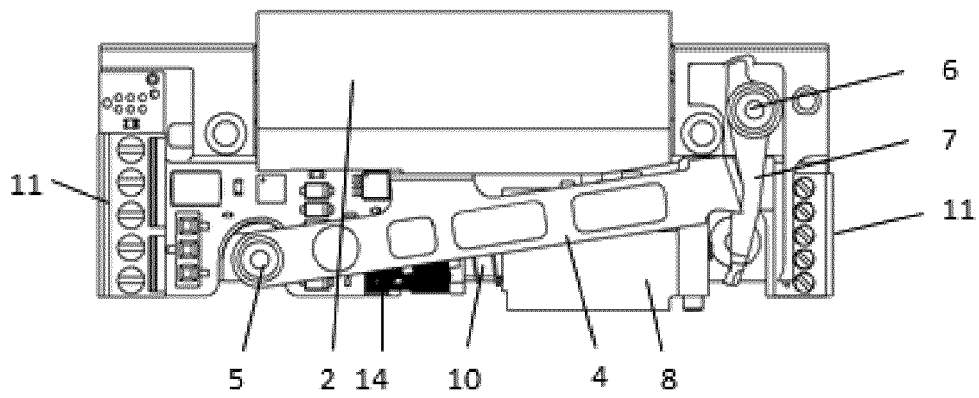


Fig. 5b

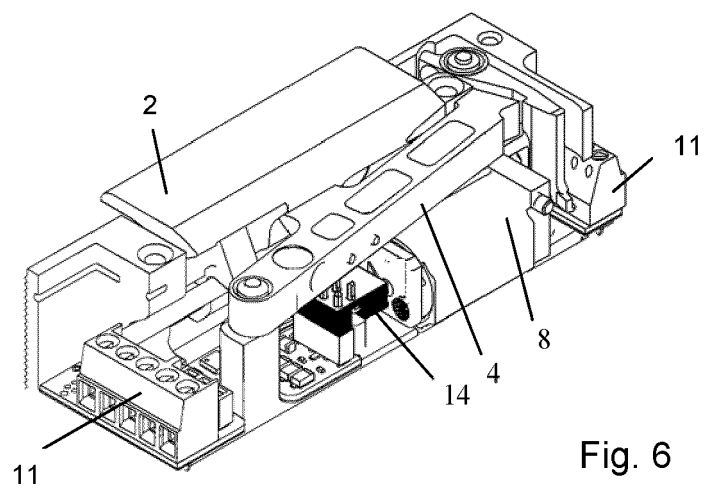


Fig. 6

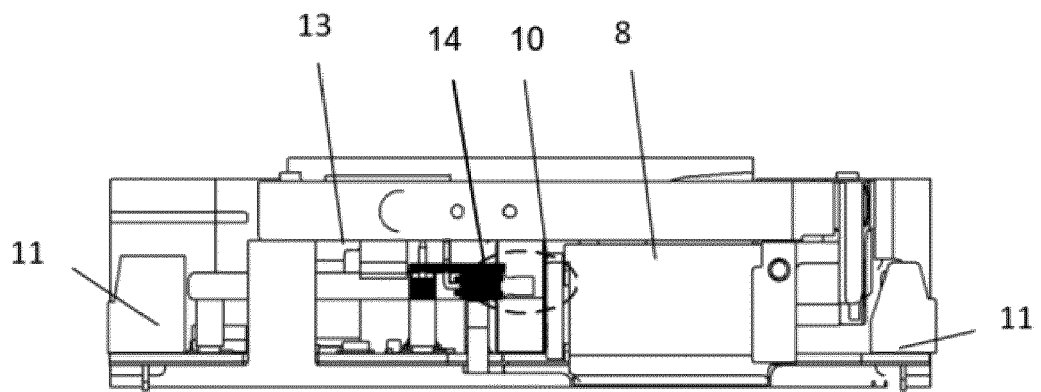


Fig. 7a

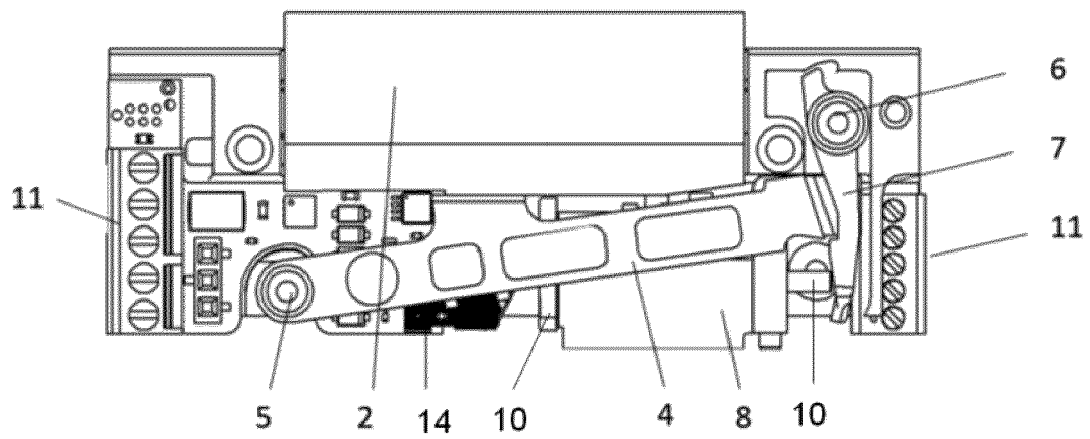


Fig. 7b

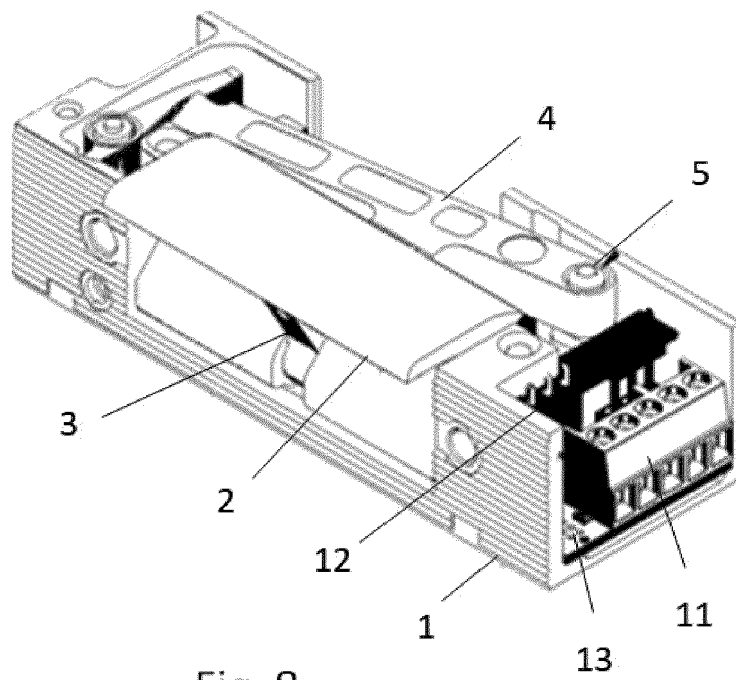


Fig. 8

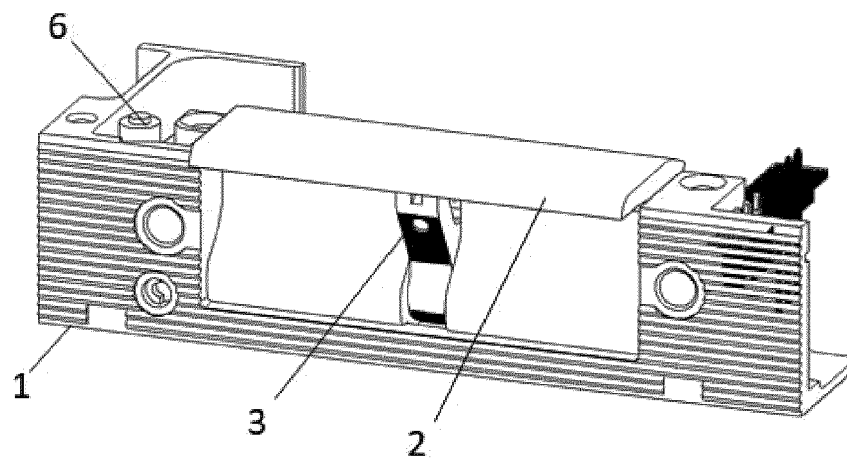


Fig. 9

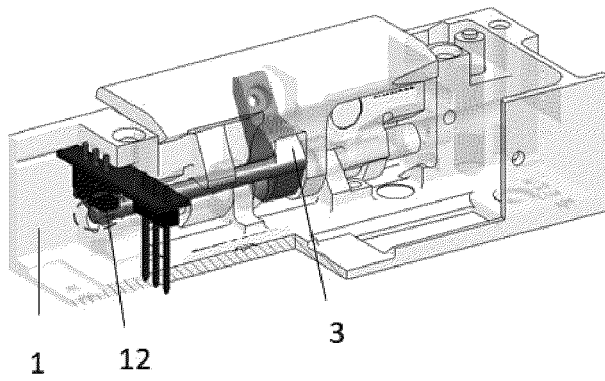


Fig. 10a

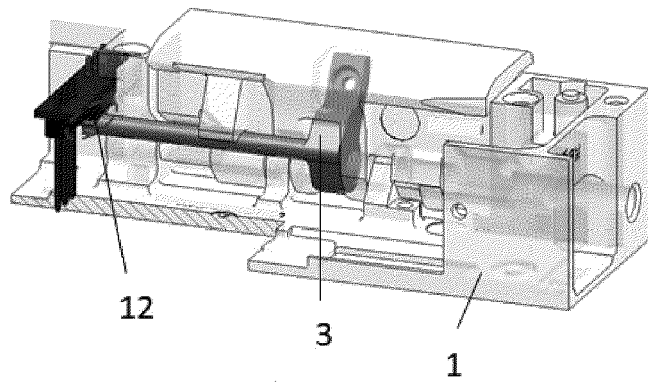


Fig. 10b

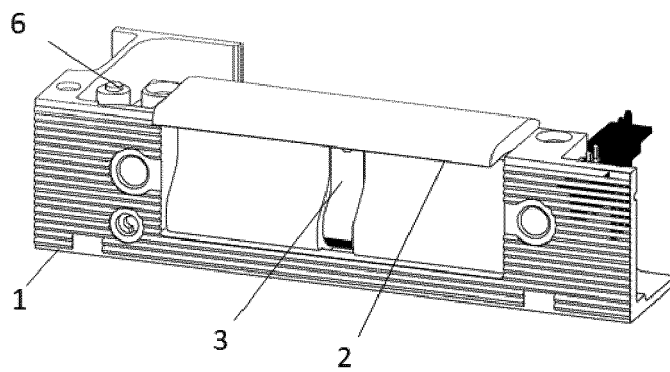


Fig. 11

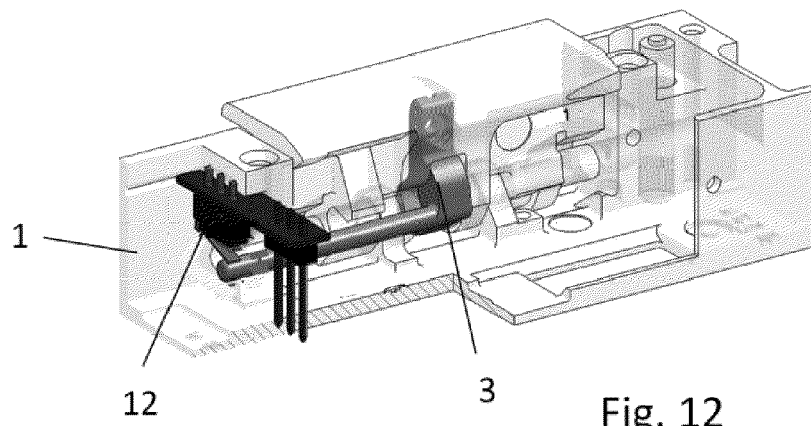


Fig. 12



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Application Number

EP 21 38 2695

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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 15 December 2021	Examiner Geerts, Arnold
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