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(54) **DOOR LOCKING DEVICE, PARTICULARLY FOR ELECTRICAL HOUSEHOLD APPLIANCES**

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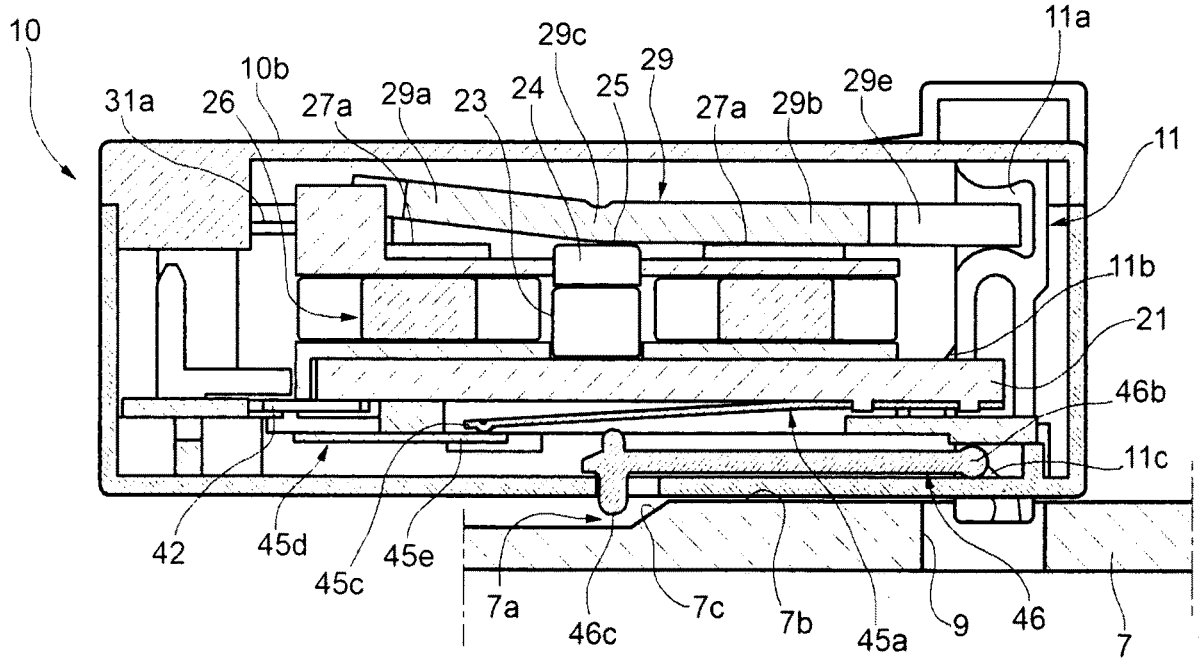
(57) **ABSTRACT**

A door-locking device (**1**) including an actuator (**20**); a locking pin (**11**) controllable by the actuator (**20**) and adapted to cooperate with a movable latching slider (**7**) to lock a door of an electrical household appliance, the locking pin (**11**) being movable between a rest position, wherein the locking pin allows the latching slider (**7**) to move, and a lock position, wherein the locking pin prevents the latching slider (**7**) from moving; a detection switch (**45**) able to switch between an open position and a closed position following a movement of the latching slider (**7**), the detection switch (**45**) including a fixed contact element (**45***e*) and a movable contact element (**45***c*) resiliently stressed in closure towards the fixed contact element (**45***e*), and a movable control member (**46**) interacting with the movable contact (**45***c*). The control member (**46**) is also movable by a movement of the locking pin (**11**).



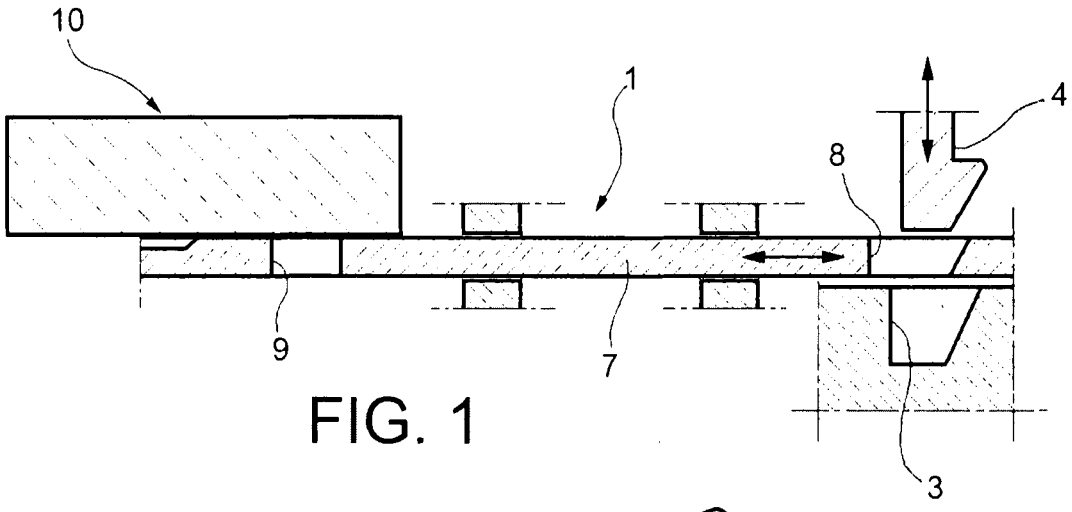


FIG. 1

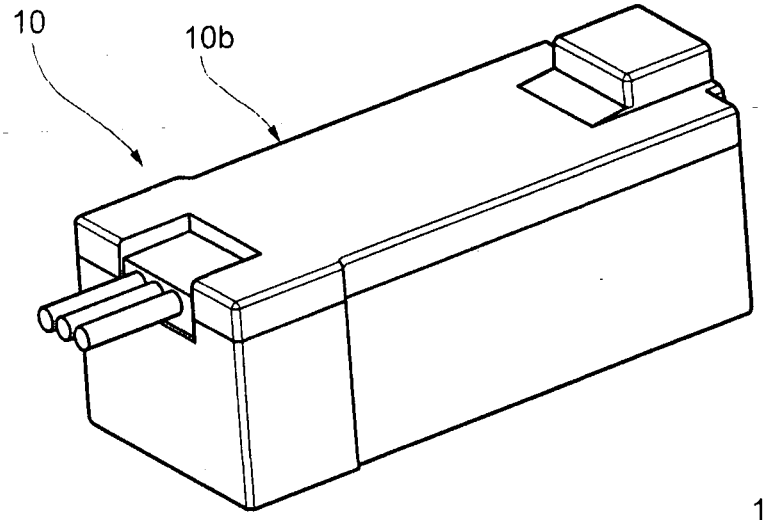


FIG. 2

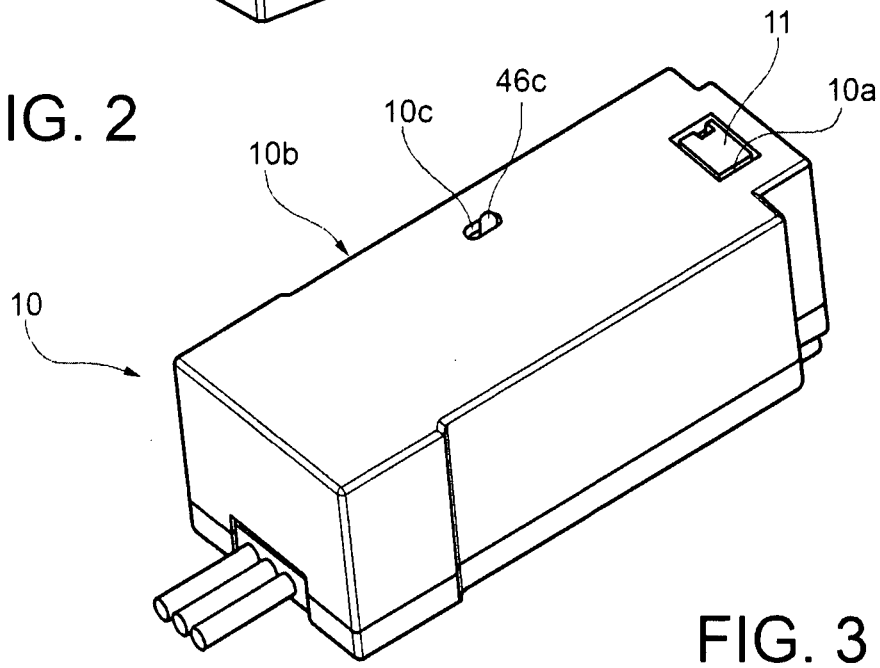
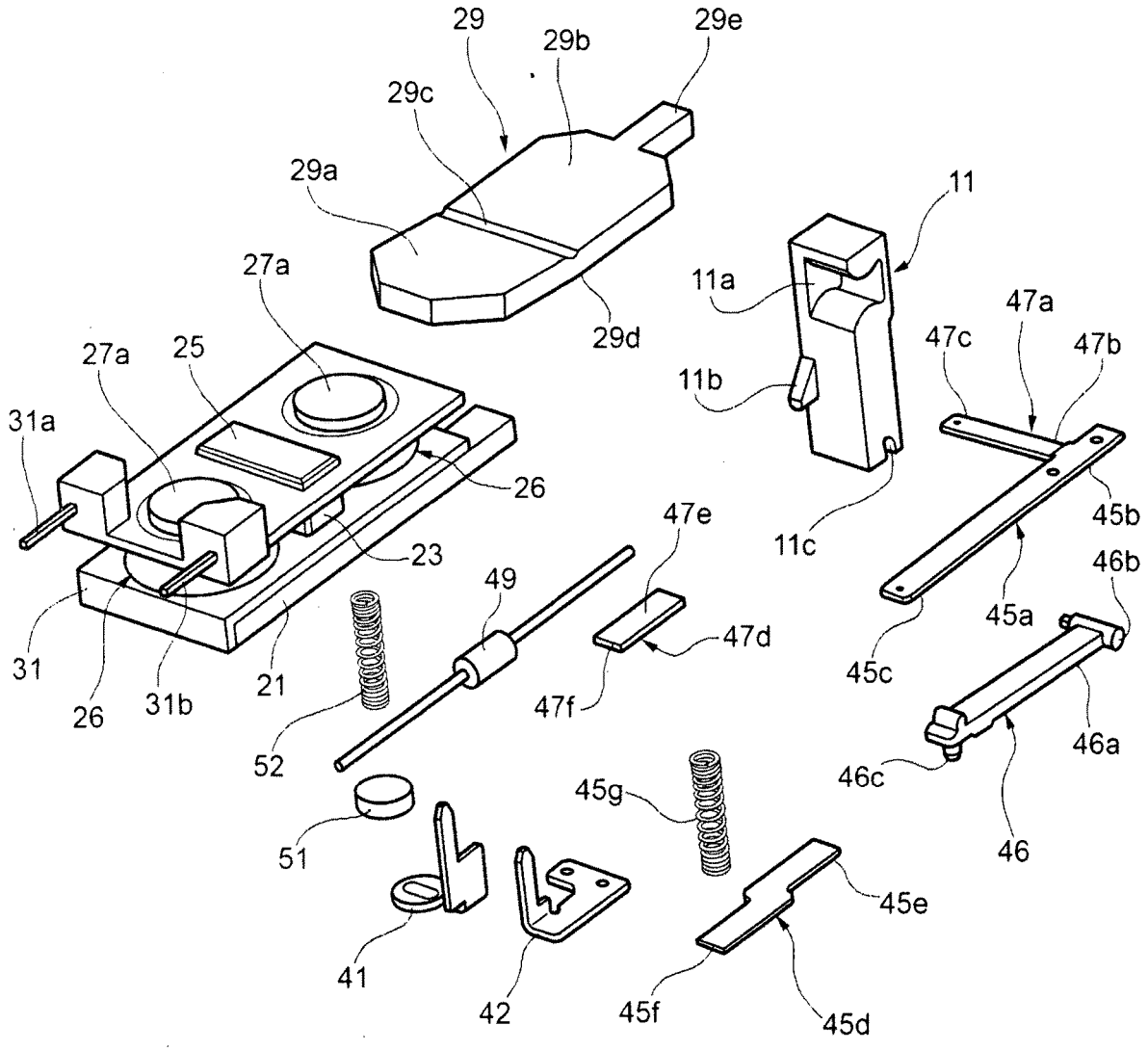


FIG. 3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47a
47c
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46c
46a
46
27a
25
31a
26
23
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45g
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FIG. 4

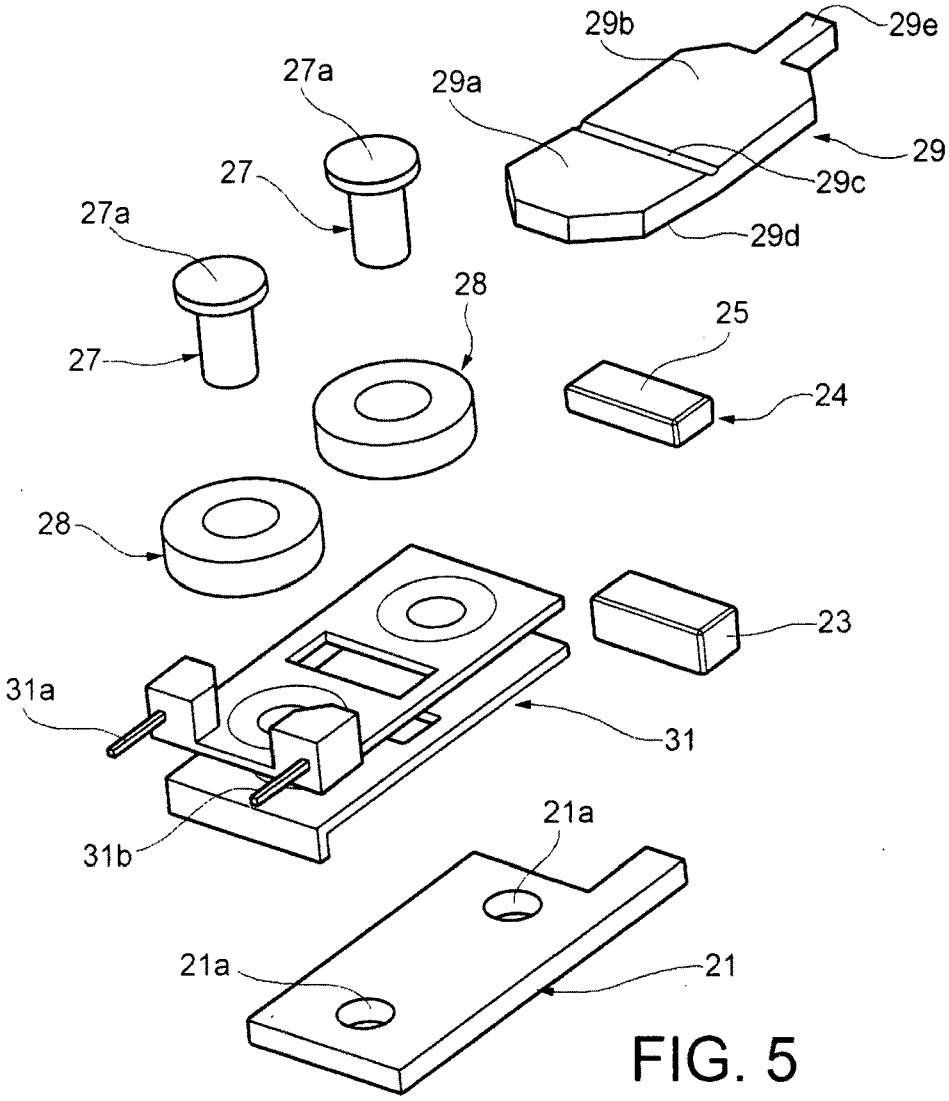
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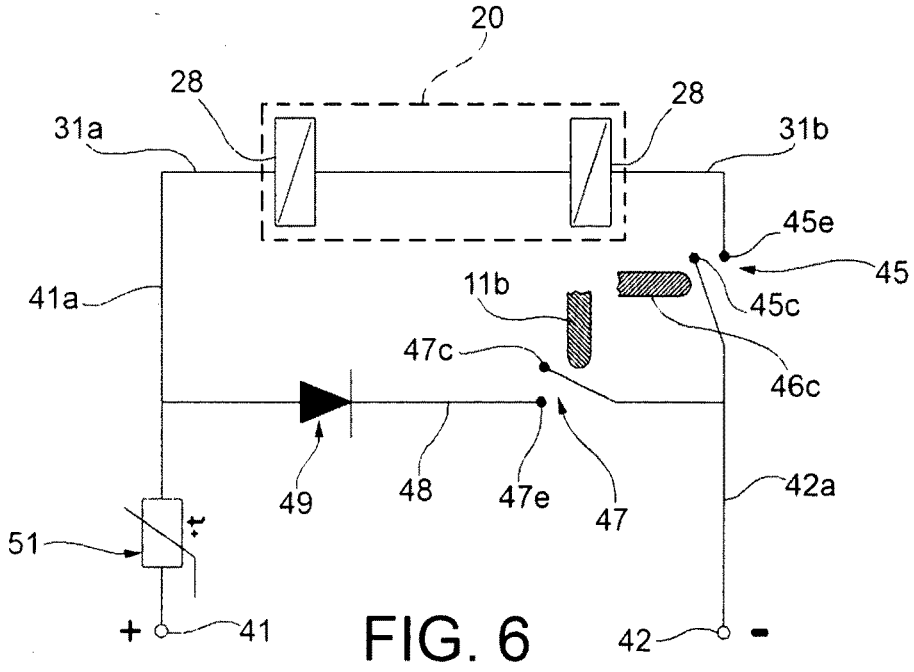
FIG. 5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45e
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45c
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49
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+
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-

FIG. 6

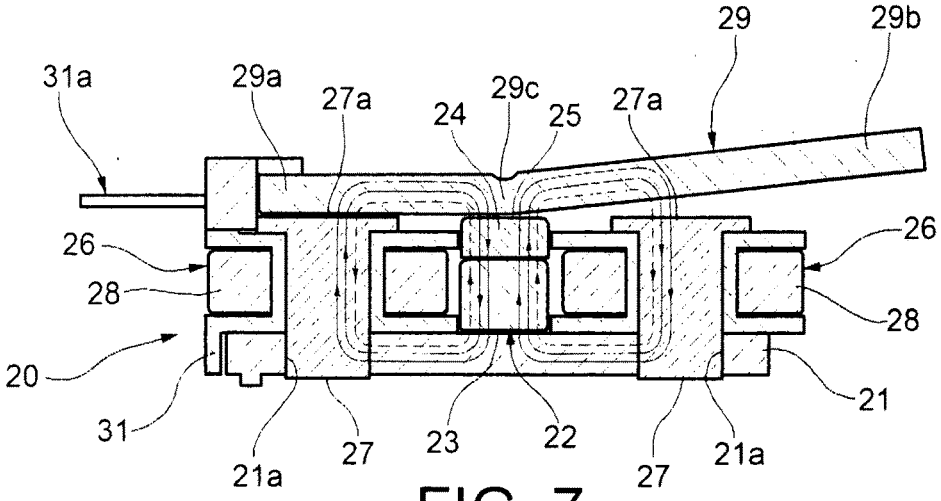

FIG. 7

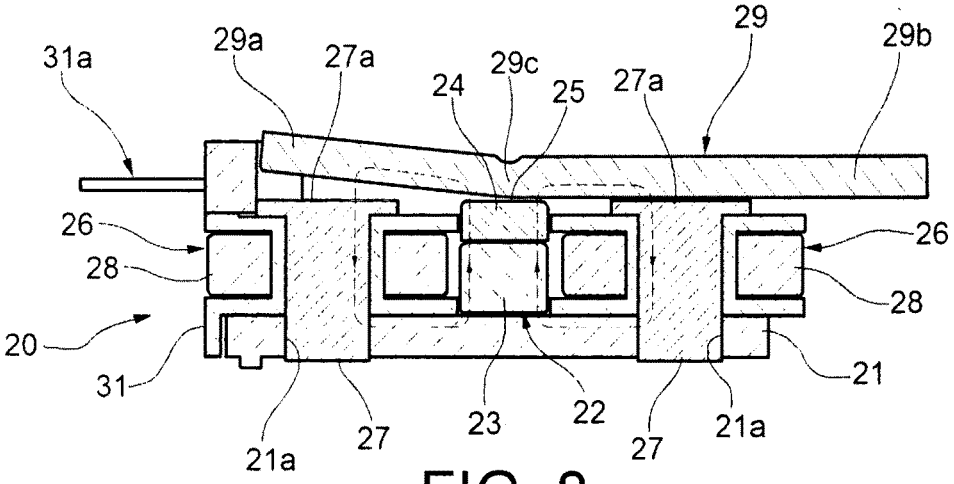

FIG. 8

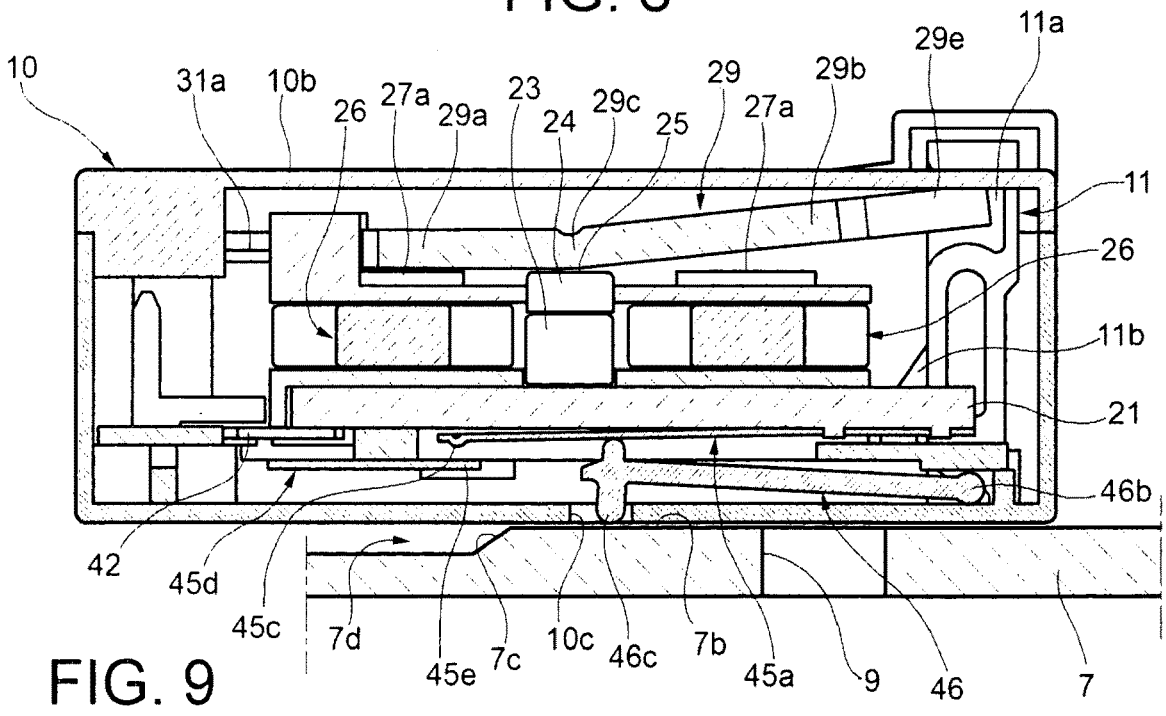

FIG. 9

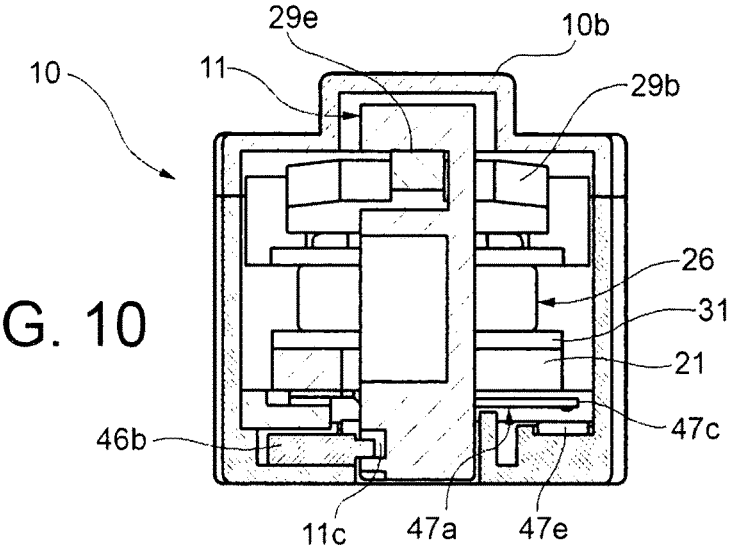

FIG. 10

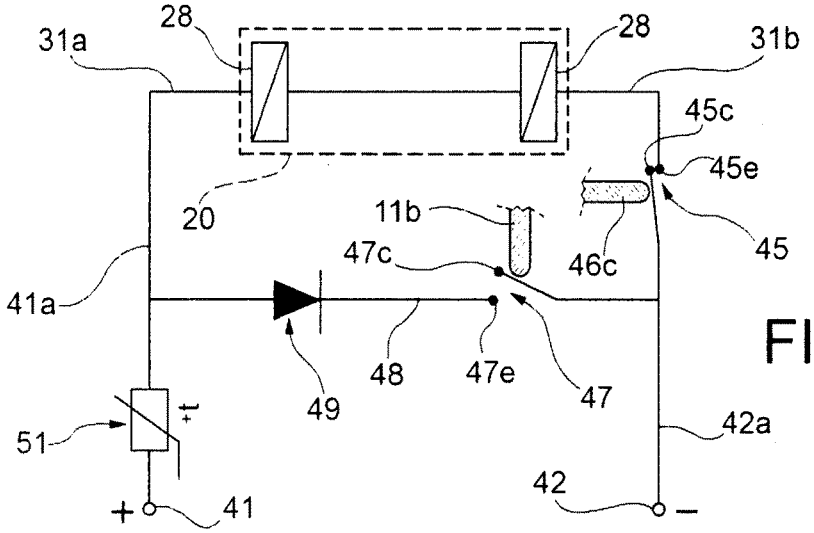

FIG. 11

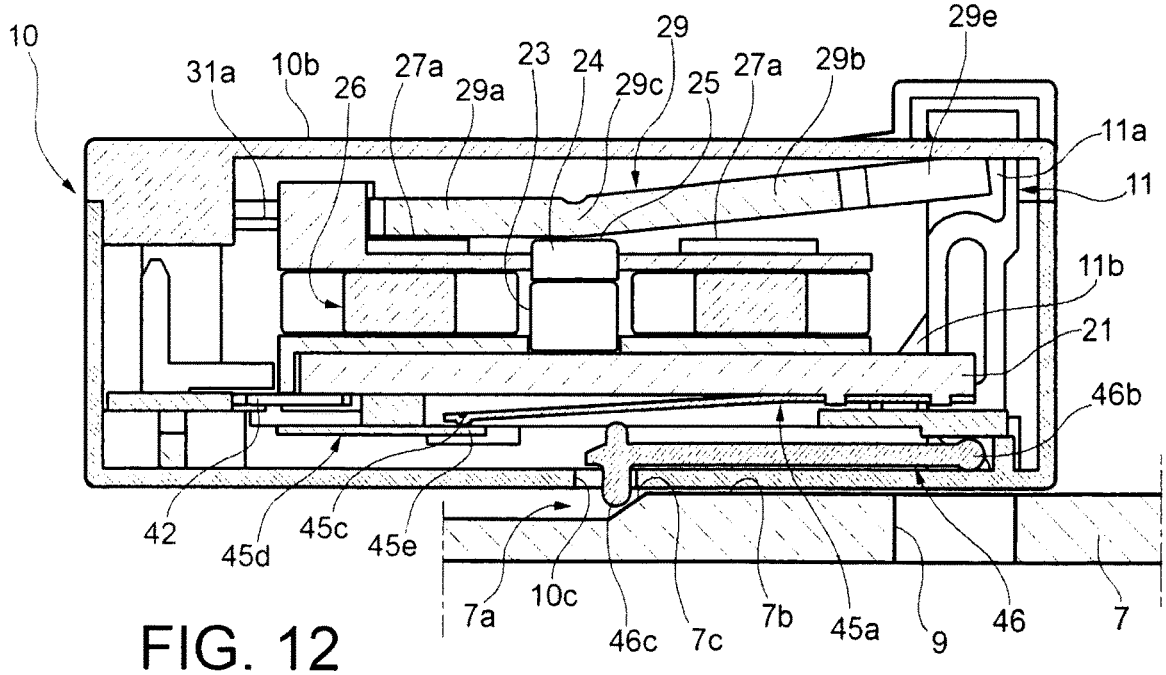

FIG. 12

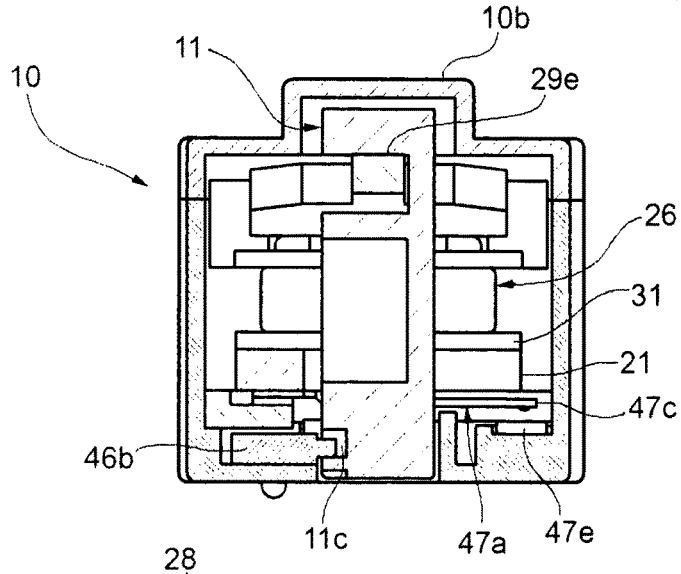

FIG. 13

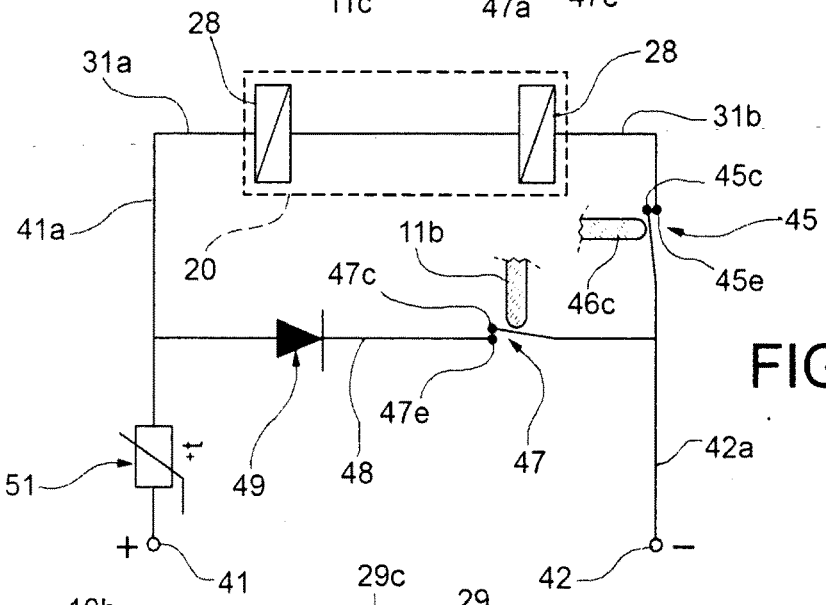

FIG. 14

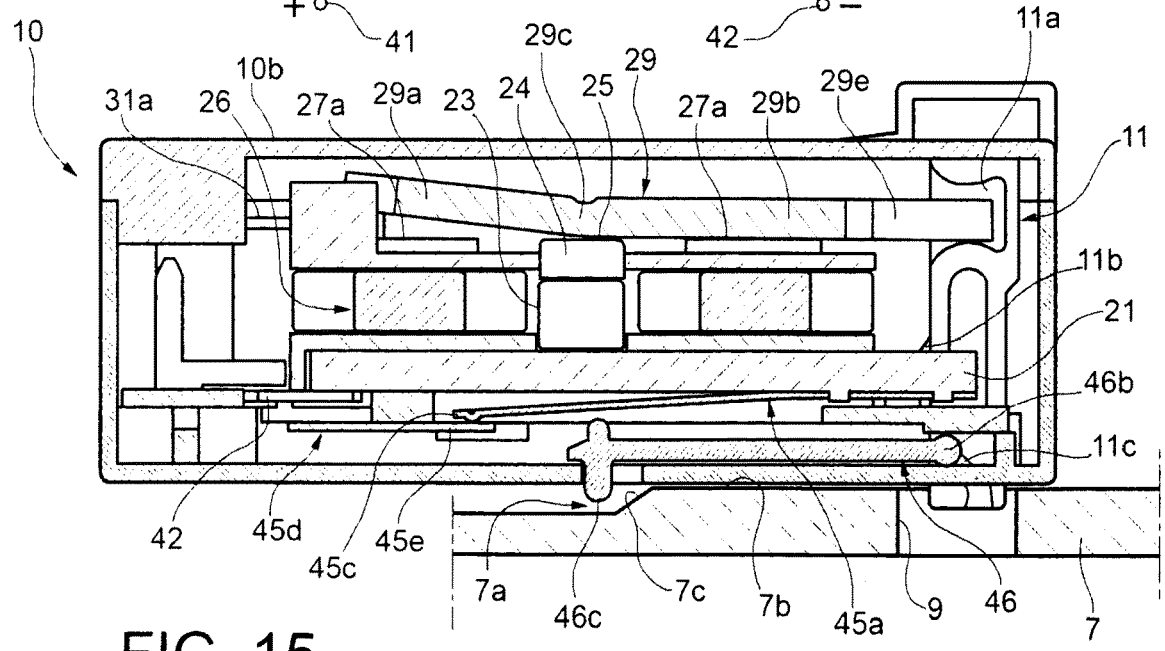

FIG. 15

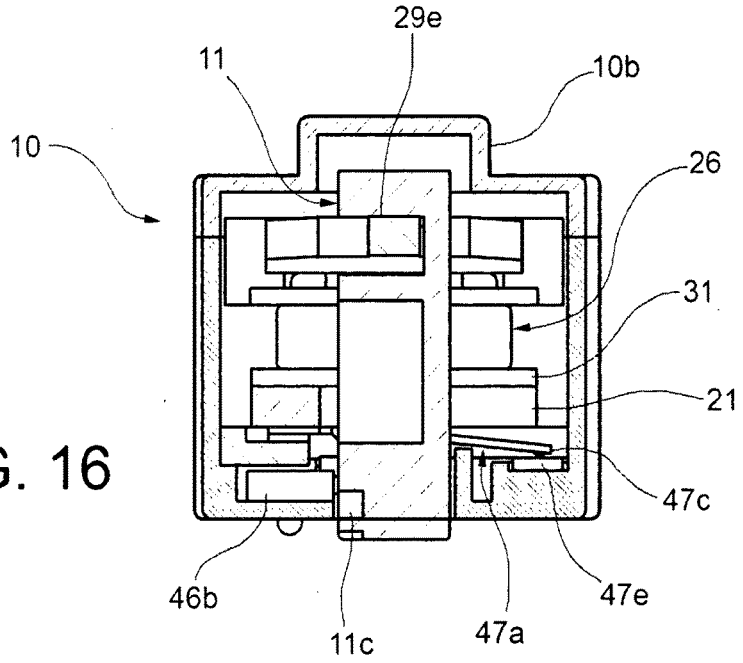

FIG. 16

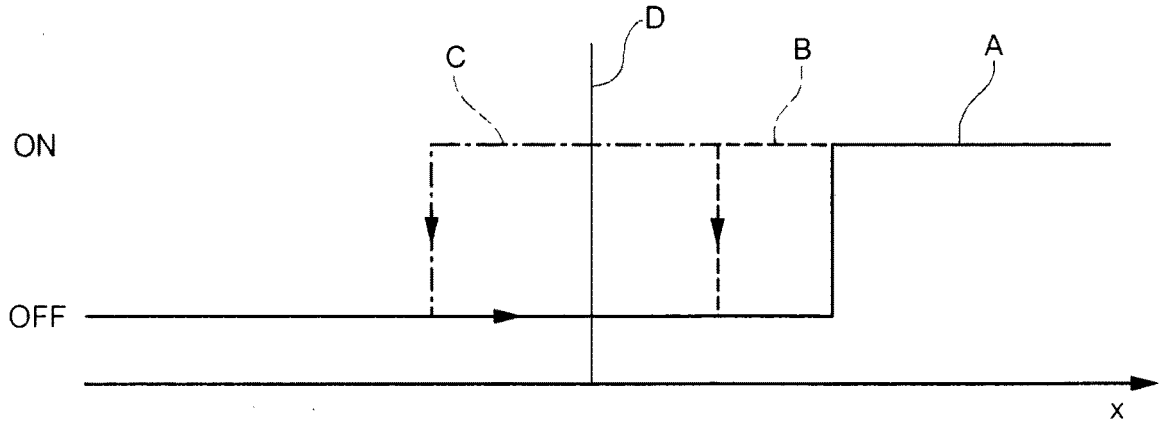

FIG. 17

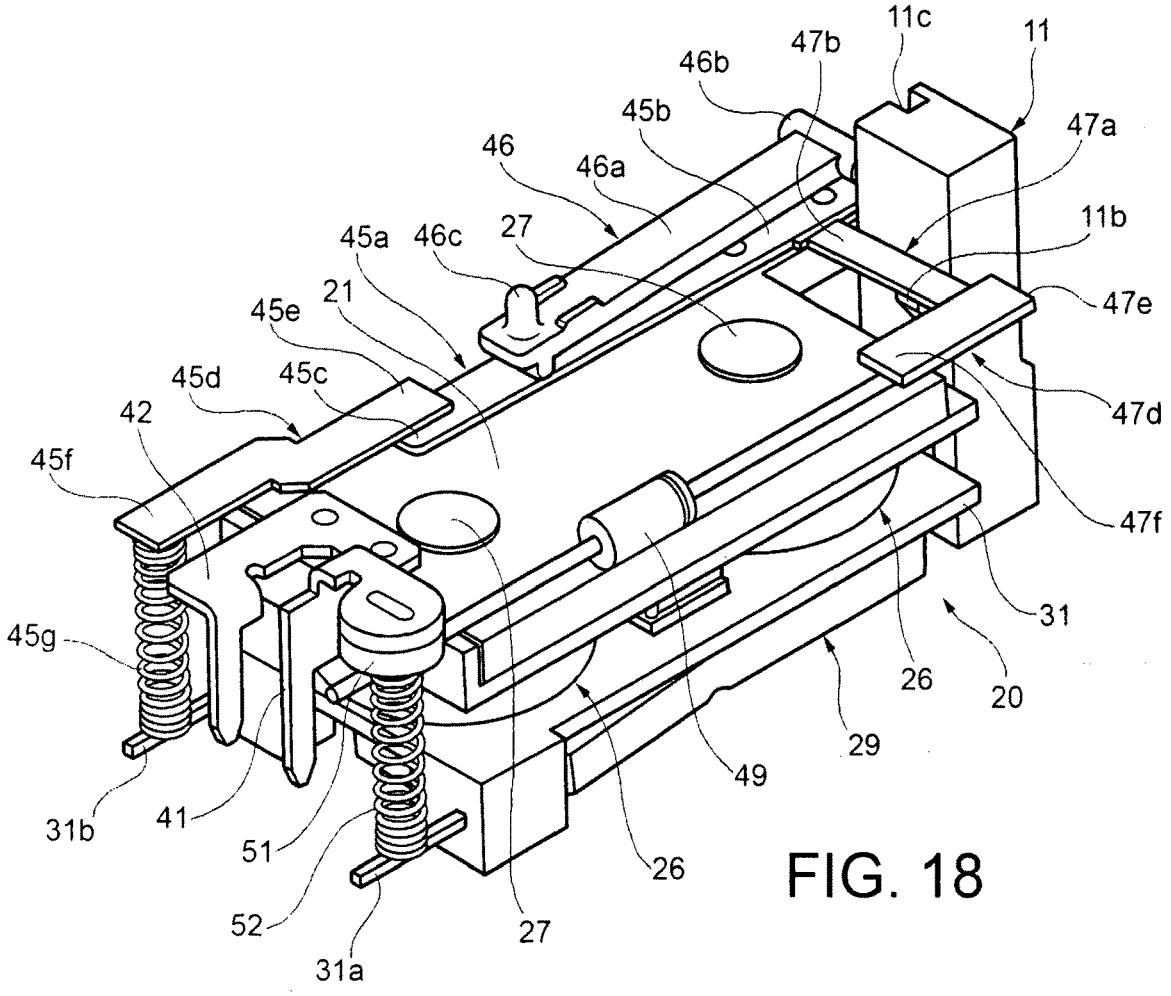
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FIG. 18

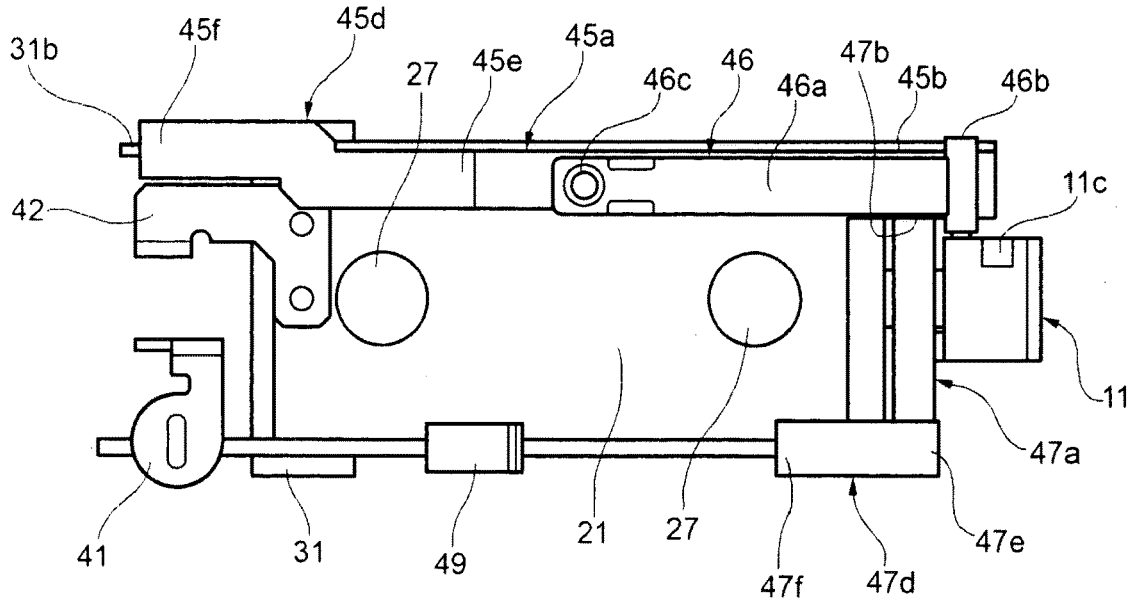
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FIG. 19

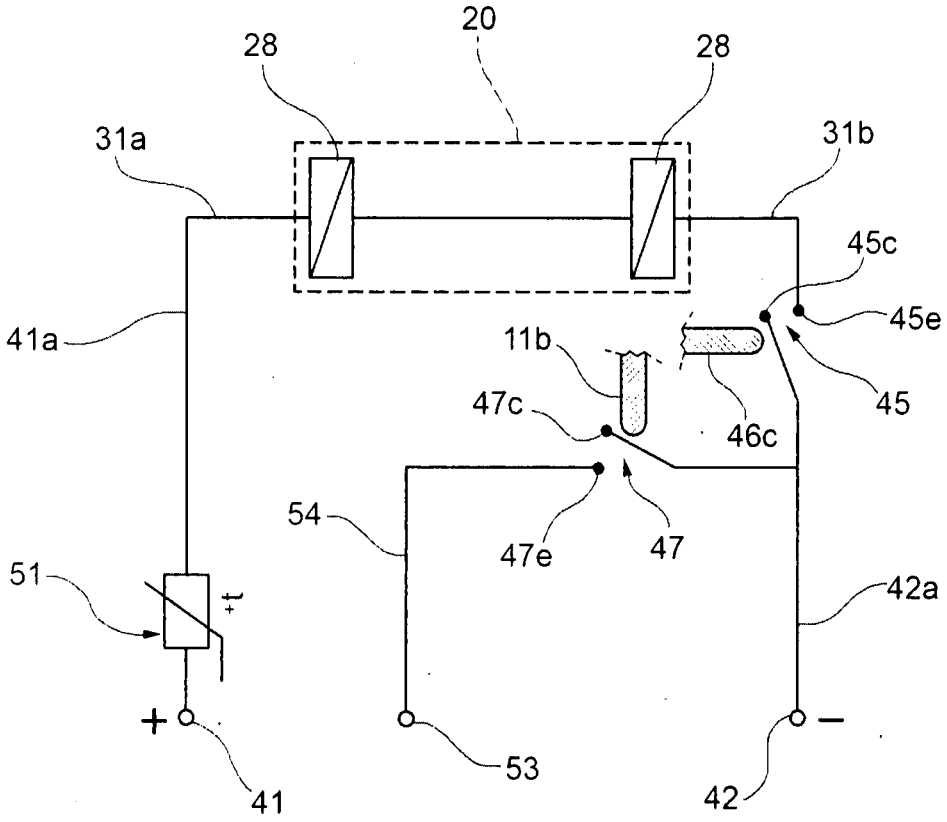
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FIG. 20

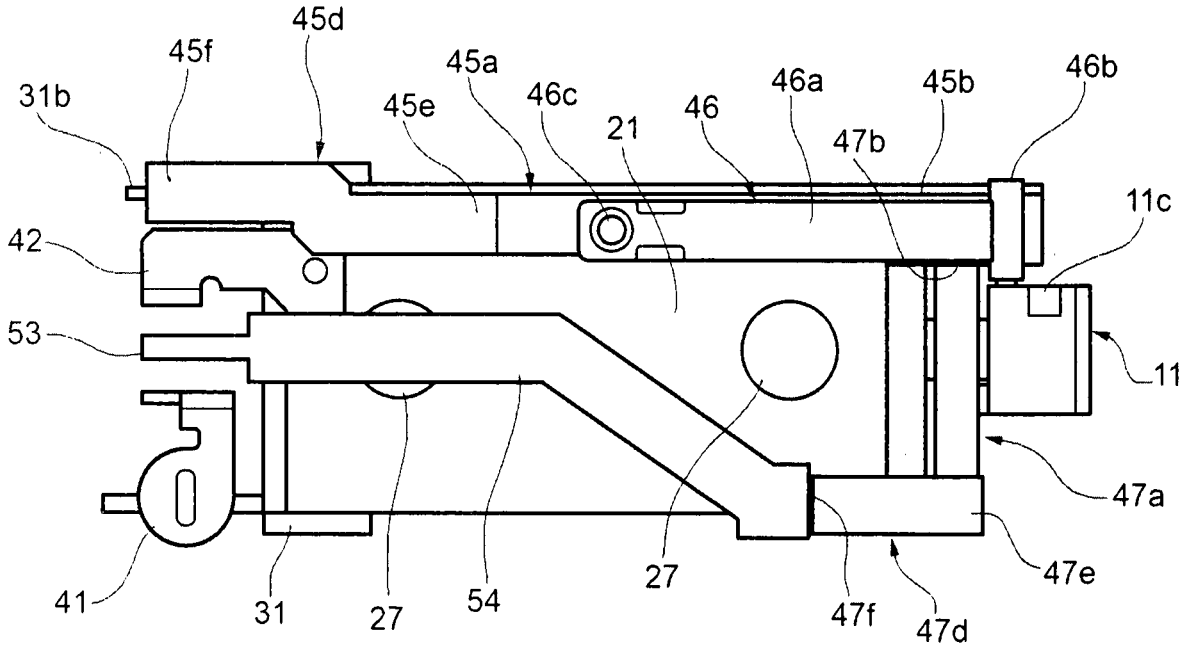
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FIG. 21

DOOR LOCKING DEVICE, PARTICULARLY FOR ELECTRICAL HOUSEHOLD APPLIANCES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a National Stage of International Application No. PCT/IB2018/052443 filed Apr. 9, 2018, claiming priority based on Italian Patent Application No. 102017000039100 filed Apr. 10, 2017.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a door-locking device, particularly for electrical household appliances.

[0003] More specifically, the invention relates to a door-locking device of the type comprising

[0004] an actuator;

[0005] a locking pin controllable by the actuator and adapted to cooperate with a movable latching slider to lock a door of an electrical household appliance, said locking pin being movable between a rest position, wherein the locking pin allows the latching slider to move, and a lock position, wherein the locking pin prevents said latching slider from moving;

[0006] a detection switch, able to switch between an open position and a closed position following a movement of the latching slider, said detection switch comprising a fixed contact element and a movable contact element resiliently stressed in closure towards the fixed contact element, and a movable control member interacting with the movable contact;

[0007] wherein the control member is also movable by a movement of the locking pin.

[0008] Preferred embodiments of the present invention are the subject of the dependent claims, which form an integral part of the present description.

BRIEF DESCRIPTION OF THE INVENTION

[0009] Further features and advantages of the invention will become apparent from the detailed description that follows, provided purely by way of non-limiting example with reference to the accompanying drawings, wherein:

[0010] FIG. **1** is a simplified view of a door-locking device according to the present invention;

[0011] FIGS. **2** and **3** are perspective views of an electromechanical control device of the door lock of FIG. **1**;

[0012] FIGS. **4** and **5** are exploded views of the device of FIGS. **2** and **3**, without the casing;

[0013] FIG. **6** is an electrical control diagram of the device of FIGS. **2** and **3**;

[0014] FIGS. **7** and **8** are sectional views representing a magnetic actuator of the device of FIGS. **2** and **3**, in two different operating positions;

[0015] FIGS. **9** and **10** are sectional views of the device of FIGS. **2** and **3**, in a condition corresponding to the state of the electrical diagram shown in FIG. **6**;

[0016] FIG. **11** shows the electrical diagram in a different state from that shown in FIG. **6**;

[0017] FIGS. **12** and **13** are sectional views of the device of FIGS. **2** and **3**, in a condition corresponding to the state of the electrical diagram shown in FIG. **11**;

[0018] FIG. **14** shows the electrical diagram in a different state from that shown in FIGS. **6** and **11**;

[0019] FIGS. **15** and **16** are sectional views of the device of FIGS. **2** and **3**, in a condition corresponding to the state of the electrical diagram shown in FIG. **14**;

[0020] FIG. **17** shows a graph illustrating the behavior of a detection switch according to the position of a latching slider of the door-locking device;

[0021] FIGS. **18** and **19** are perspective and plan views of the device of FIGS. **2** and **3**, without casing;

[0022] FIG. **20** represents an alternative embodiment of an electrical control diagram of the device of FIGS. **2** and **3**; and

[0023] FIG. **21** is a plan view of an embodiment of the device of FIGS. **2** and **3**, which implements the electrical diagram of FIG. **20**.

DETAILED DESCRIPTION OF THE INVENTION

[0024] In FIG. **1**, a door-locking device is collectively indicated at **1**.

[0025] The device has an opening **3** adapted to allow the insertion of a coupling member, such as the one indicated at **4** in FIG. **1**.

[0026] In a manner known per se, the door-locking device **1** is adapted to be fixed in the proximity of an opening of an electrical household appliance, for example a washing machine, and the coupling member **4** is intended to be connected, for example in an articulated way, to a movable door associated with such opening of the household electrical appliance.

[0027] A latching slider, axially movable in a direction which is approximately orthogonal to the direction of insertion of the coupling member **4** in the opening **3**, is indicated at **7**.

[0028] The latching slider **7** has a main opening **8**, which, in the various operating conditions or positions of the slider **7**, at least partially faces and is aligned with the opening **3** of the door-locking device.

[0029] By inserting the coupling member **4** of the door into the opening **3**, such coupling member **4** interacts in a manner known per se with the slider **7**, causing it to move against the action of elastic means (not shown). When the door is closed, the coupling member **4** of the door is arranged with the end head thereof engaged in the opening **8** of the slider **7**. In such condition, a portion of the neck of the coupling member **4** is held between the opening **3** and the slider **7**.

[0030] The coupling member **4** and the coupling configuration between the slider **7** and the coupling member **4** of FIG. **1** are shown for illustrative purposes only, and do not form part of the present invention.

[0031] The door-locking device **1** further comprises an electromechanical control device, generally indicated at **10** in the figures.

[0032] The electromechanical control device **10** includes a movable locking pin, indicated at **11** in FIG. **2** and subsequent figures. Such member is mounted axially movable, in a vertical direction for those observing FIG. **1**, through an opening **10***a* made in the casing **10***b* of the electromechanical device **10**, facing the area wherein the latching slider **7** is movable.

[0033] The movable locking member **11** is movable following an activation command of the household electrical

appliance to which the door-locking device **1** is associated, from a rest position, shown in FIGS. **9** and **12**, to a lock position, illustrated in FIG. **15**, wherein it is adapted to allow and respectively impede the movement of the latching slider **7**. In the locked position, the locking pin **11** engages a lock opening **9** formed on the latching slider **7**.

[0034] The device **10** comprises a magnetic actuator **20**, housed in the casing **10***b* and shown in particular in FIGS. **5** and **7** to **8**. The magnetic actuator **20** is provided for controlling the movement of the locking pin **11**.

[0035] The magnetic actuator **20** comprises a plate or yoke **21** fixed to the casing **10***b* and made of magnetically conductive material, such as iron. The yoke **21** has two through-holes **21***a* formed on opposite ends of the yoke.

[0036] The actuator **20** further comprises a magnet part **22**, comprising a permanent magnet **23** and an armature **24**. The permanent magnet **23** is fixed approximately to the center of the yoke **21**. The armature **24** is made of magnetically conductive material, e.g. iron, and is fixed to an upper surface of the permanent magnet **23**. The armature **24** comprises a support surface **25** facing the side opposite to the yoke **21** (upper surface in the illustrated example).

[0037] The actuator **20** further comprises two electromagnets **26**. Each electromagnet **26** comprises a core **27** of magnetically conductive material, such as iron, fixed in a respective through-hole **21***a* of the yoke **21**, and a solenoid **28**, wound around the core **27**. Each core **27** comprises a retaining surface **27***a* facing the side opposite to the yoke **21**. The two retaining surfaces **27***a* are coplanar with the support surface **25**.

[0038] The actuator **20** further comprises a rocking keeper **29**. The keeper **29** is made of magnetically conductive material, e.g. iron, and includes a first arm **29***a* and a second arm **29***b*. The first arm **29***a* and the second arm **29***b* have a planar shape and are joined at an angle to one another, through a corner portion **29***c* of the keeper. At the corner portion **29***c*, an edge **29***d* is formed which rests on the support surface **25** of the magnet part **22**. The keeper **29** is preferably formed as a monolithic structure. The second arm **29***b* of the keeper **29** may be connected to the locking pin **11** directly or through an articulation. In the illustrated example, the second arm **29***b* has an appendage **29***e* inserted in a seat **11***a* formed on the pin **11**.

[0039] The actuator **20** further comprises a support structure **31** of electrically insulating material, for example plastic, which is configured in such a way as to insulate the solenoids **28** with respect to the respective cores **27**, the yoke **21** and the magnet part **22**.

[0040] The insulation structure **31** supports two conductor leads **31***a* and **31***b* for sending electrical control signals to the electromagnets.

[0041] The solenoids **28** of the electromagnets **26** are preferably wound in opposite directions and connected in series, as shown in FIG. **6**.

[0042] In a first position (FIG. **7**), the first arm **29***a* of the keeper is in contact with the retaining surface **27***a* of the core **27** spaced apart from the pin **11** and with one half of the support surface **25** spaced apart from the pin **11**. Since the armature **24**, the keeper **29**, the core **27** and the yoke **21** are all magnetically permeable, the flow of the magnetic field of the permanent magnet **23** is as shown with dashed arrows in FIGS. **7** and **8**. Consequently, the magnetic force caused by the permanent magnet **23** between the first arm **29***a* and the respective core **27** is greater than that between the second arm **29***b* and the respective core **27**. The keeper **29**, therefore, remains in the first position without applying electrical power external to the device **10**.

[0043] When it is necessary to switch the actuator **20**, a pulse is applied to the electromagnet through the conductor leads **31***a* and **31***b*. The electromagnet **26**, spaced apart from the pin **11**, thus generates a magnetic field, the flow of which is shown with the continuous arrows in FIG. **7**. In this case, the magnetic field generated by the electromagnet **26**, spaced apart from the pin **11**, opposes the magnetic field generated by the permanent magnet **23** between the electromagnet **26**, spaced apart from the pin **11**, and the first arm **29***a* of the keeper. At the same time, the magnetic field generated by the electromagnet **26** near the pin **11** (connected in series and with opposite winding) positively overlaps the magnetic field generated by the permanent magnet **23** between the electromagnet **26** near the pin **11** and the second arm **29***b* of the keeper. Consequently, the magnetic force between the core **27** closer to the pin **11** and the second arm **29***b* is greater than that between the core **27** further from the pin **11** and the first arm **29***a*, and thus the second arm **29***b* moves to enter into contact with the core **27**, closer to the pin **11**, by switching the keeper **29** over to a second position (FIG. **8**).

[0044] In the second position, the second arm **29***b* is in contact with the retaining surface **27***a* of the core **27** closer to the pin **11** and with the middle of the support surface **24** near the pin **11**. To move the armature back to the first position, a pulse is applied, opposite to the preceding one, to the conductor leads **31***a* and **31***b*.

[0045] With reference in particular to FIG. **6**, the device **10** further comprises a first and a second electrical control terminal **41**, **42** connected to the magnetic actuator **20**, respectively at the conductor leads **31***a* and **31***b*, by respective first and second lines **41***a* and **42***a*.

[0046] Moreover, a detection switch **45** is provided, arranged in series with the magnetic actuator **20**. As will be explained below, the detection switch **45** is able to switch between an open position (FIGS. **6** and **9**) and a closed position (FIGS. **11** and **12**) following a movement of the latching slider **7**. In particular, the detection switch **45** is adapted to detect a condition of opening/closing of the electrical household appliance door.

[0047] A lock switch **47** is also connected to the second terminal **42**. As will be explained below, the lock switch **47** is able to switch between an open position (FIGS. **6** and **9**) and a closed position (FIG. **14**) following a movement of the locking pin **11**. In particular, the lock switch **47** is adapted to detect a condition for locking/unlocking the electrical household appliance door.

[0048] In the example of FIG. **6**, the lock switch **47** is connected to the terminals **41** and **42**, through a third line **48** arranged in parallel with the magnetic actuator **20**. In the third line **48**, a diode **49** is also provided, arranged in series with the lock switch **47**. A protection thermistor **51**, specifically, a PTC, is also provided between the first terminal **41** and the connection between the first line **41***a* and the third line **48**. Alternatively, such thermistor may be arranged on the first line **41***a*, between the electric actuator **20** and the connection between the first line **41***a* and the third line **48**.

[0049] In the illustrated example, the detection switch **45** comprises a flexible elongated leaf **45***a* of electrically conductive material, which extends along the movement direction of the latching slider **7**. The leaf **45***a* has a fixed end **45***b*,

fixed to the yoke **21** on the side opposite the magnetic actuator **10**, and a movable contact element **45***c*. Via its fixed end **45***b*, the leaf **45***a* is conductively connected to the yoke **21** of the magnetic actuator. The detection switch **45** further comprises a fixed leaf **45***d*, fixed to the casing **10***b* of the device **10**. The fixed leaf **45***d* has a fixed contact element **45***e*, which, in the closed position of the detection switch **45**, is contacted by the movable contact element **45***c* of the flexible leaf **45***a*, and a second end **45***f*, which is conductively connected by a contact spring **45***g* (or other types of conductive elements) with one of the conductor leads, **31***b*, of the magnetic actuator **20**.

[0050] A control member **46** is provided for closing/opening the detection switch **45**. Such control member **46** comprises a lever **46***a* extending along the direction of movement of the slider **7** and having a pin end **46***b* around which the lever is able to rotate along an axis transverse to the direction of movement of the slider **7**, and a follower end **46***c* able to engage a cam **7***a* formed on the face of the latching slider **7** facing the device **10**. Such cam **7***a* essentially comprises a first surface **7***b* extending parallel to the direction of movement of the slider **7**, and a second surface **7***c* inclined with respect to such direction, which extends from the first surface **7***b* away from the device **10**. A part of the follower end **46***c* of the lever **46***a* protrudes through a window **10***c* formed in the casing **10***b* of the device **10**, in order to be in contact with the slider **7**. In the open condition of the detection switch **45** (FIG. **9**), the movable contact element **45***c* of the flexible leaf **45***a* is maintained spaced apart from the fixed contact element **45***e* of the fixed leaf **45***d* by the engagement with the raised follower end **46***c* of the control member **46**, against the action of the elastic force of the flexible leaf **45***a*. In the closed condition of the detection switch **45** (FIG. **12**), the follower end **46***c* of the control member **46** is lowered, allowing the movable contact element **45***c* of the flexible leaf **45***a* to be in contact with the fixed contact element **45***e* of the fixed leaf **45***d*, due to the elastic force of the flexible leaf **45***a*.

[0051] In the illustrated example, the lock switch **47** comprises a flexible elongated leaf **47***a*, made of electrically conductive material, which extends transversely to the movement direction of the latching slider **7**. The leaf **47***a* has a fixed end **47***b*, fixed to the fixed end **45***b* of the leaf **45***a* of the detection switch **45**, and a movable contact element **47***c*. Via its fixed end **47***b*, the leaf **47***a* is conductively connected to the leaf **45***a* of the detection switch **45** and to the yoke **21** of the magnetic actuator. The lock switch **47** further comprises a fixed leaf **47***d*, fixed to the casing **10***b* of the device **10**. The fixed leaf **47***d* has a fixed contact element **47***e*, which, in the closed position of the lock switch **47**, is contacted by the movable contact element **47***c* of the flexible leaf **47***a*, and a second end **47***f*, which is conductively connected to an end of the diode **49**.

[0052] A control member is provided for closing/opening the lock switch **47**. Such control member comprises an appendage **11***b* formed integrally with the locking pin **11** extending along the direction of movement of the slider **7**. In the open condition of the lock switch **47** (FIG. **13**), the movable contact element **47***c* of the flexible leaf **47***a* is spaced apart from the fixed contact element **47***e* of the fixed leaf **47***d* by the engagement due to the position of the flexible leaf **47***a*. In the closed condition of the lock switch **47** (FIG. **16**), due to the movement of the locking pin **11**, the appendage **11***b* of the pin engages the flexible leaf **47***a*, keeping the movable contact element **47***c* of the flexible leaf **47***a* in contact with the fixed contact element **47***e* of the fixed leaf **47***d* against the action of the elastic force of the flexible leaf **47***a*.

[0053] The lead of the diode **49** not in contact with the fixed leaf **47***b* of the lock switch **47** is connected with one lead of the protection thermistor **51**, which is also connected, via a contact spring **52**, with the other conductor lead, **31***a*, of the magnetic actuator **20**.

[0054] The other end of the protection thermistor **51** is conductively connected to the first terminal **41**, which is fixed to the casing **10***b* of the device **10**. The second terminal **42** is fixed to the yoke **21** and is also conductively connected thereto.

[0055] The first line **41***a* therefore extends from the first terminal **41**, comprising the thermistor **51**, the contact spring **52** and one of the conductor leads **31***a* of the magnetic actuator. The second line **42***a* extends from the second terminal, comprising the yoke **21**, the flexible leaf **45***a* and the fixed leaf **45***d* of the detection switch **45**, the contact spring **45***g* and the other conductor lead **31***b* of the magnetic actuator. The third line, on the other hand, comprises the diode **49**, the fixed leaf **47***d* and the flexible leaf **47***a* of the lock switch **47**.

[0056] In resting and open-door conditions (FIGS. **6** and **9** to **10**), the latching slider **7** overlaps the opening **10***a* of the locking pin **11**, impeding the movement of the latter, and pushes the follower end **46***c* of the control member **46**, which forces the detection switch **45** to open.

[0057] In these conditions, even a possible electrical pulse does not generate any movement as the circuit is open, which may be verified by monitoring the resistance of the circuit through the two terminals **41** and **42**.

[0058] When the door is closed, the entry of the coupling member **4** in the door-lock mechanism causes a movement of the latching slider **7**, which frees the area of the locking pin **11** and at the same time frees the follower end **46***c* of the control member **46** of the detection switch **45**. Due to the preloading of the flexible leaf **45***a*, the detection switch **45** is closed (FIGS. **11-13**).

[0059] This condition may be controlled by the electronics of the machine by measuring the resistance between the two terminals **41**, **42** with a voltage which will result in a resistance equal to the series of resistances of the solenoids **28** with that of the protection PTC **51**.

[0060] In the state thus described, it is possible to provide a pulsed power supply between the terminals **41**, **42** which causes the activation of the magnetic actuator **20** with the consequent rotation of the keeper **29** and the escape of the locking pin **11** with closure of the lock switch **47** (FIGS. **14-16**).

[0061] This condition may be identified through the electronics by passing a detection current in the circuit with a proper polarity with respect to the operating direction of the diode and measuring the resistance of the circuit, which will have a value equal to that of the protection PTC **51**.

[0062] To unlock the door, it is sufficient to give a current pulse to the leads of the terminals **41**, **42** with polarity opposite to the locking pulse to rotate the keeper **29** into the rest position (first position) and open the lock switch **47**.

[0063] The device described above makes it possible to increase the hysteresis of the detection switch **45**. With reference to the graph of FIG. **17**, the position x of the latching slider **7** is shown in the abscissa. The continuous

line A represents the signal provided by the detection sensor **45** when the electrical household appliance door is closed. The dashed line B represents the signal provided by the detection sensor **45** in the step of opening the door in the unlocked door condition. The dashed line and point C represents the signal provided by the detection sensor **45** during the step of opening the door in the locked door condition. The vertical line D represents the position from which the latching slider **7** may be locked by the locking pin **11**, i.e. the position from which the lock opening **9** of the slider **7** allows the locking pin **11** to move.

[0064] The position of the step of curve A depends on the positioning of the inclined cam **7***c* with respect to the lock opening **9** of the slider **7**.

[0065] In the unlocked pin condition (curve B), the hysteresis of the detection switch **45** (due to the characteristics of the flexible leaf **45***a*) is entirely within the lockable range.

[0066] In the case of locked conditions (curve C), the detection switch **45** must be kept in a closed condition beyond the position of line D, in order to prevent a false opening signal from impeding the power supply to the domestic appliance.

[0067] To this end, an increased hysteresis is created of the detection switch **45** in the condition of a locked door, which allows the state of contact in the closed condition to be maintained.

[0068] In order to obtain an increased hysteresis, as may be seen from the comparison between FIGS. **12** and **15**, the pin end **46***b* of the control member **46** of the detection switch **45** is arranged to slide within the casing **10***b* of the device **10** in a direction parallel to the direction of movement of the slider **7**. The pin end **46***b* of the drive member **46** is coupled to an inclined cam **11***c* formed on a surface of the locking pin **11** facing the pin end **46***b* of the control member **46**. In this way, the movement of the locking pin **11** in a direction substantially perpendicular to the sliding direction of the slider **7** causes a movement of the control member **46** parallel to the sliding direction of the slider **7**, such as to move the follower end **46***c* of the control member **46** away from the inclined cam **7***c* of the slider **7**. Thus, a change in the open position of the detection switch **45** is obtained.

[0069] With reference to FIGS. **20** and **21**, an alternative embodiment of the electromechanical control device described above is now described.

[0070] A feature of the device is in effect the modularity, which allows the configuration with two terminals described above to be transformed into a configuration with three terminals with few changes of the device.

[0071] The same reference numbers have been assigned to elements corresponding to those of the preceding embodiment. Such elements will not be further described.

[0072] In such an embodiment, the fixed contact element **47***e* of the lock switch **47** is connected to a third terminal **53**, or auxiliary terminal, and no longer to the first line **41***a*, and therefore the diode is absent. Such additional terminal **53** allows the closing of the lock switch **47** to be monitored, while the function of monitoring the closing of the detection switch **45** and activating/deactivating the door lock remains at the terminals **41** and **42**.

[0073] As shown in FIG. **21**, the fixed leaf **47***e* is conductively connected to one end of a connecting leaf **54**, fixed to the casing **10***b* of the device, the opposite end of which bears the additional terminal **53**.

1. A door-locking device (**1**) particularly for electrical household appliances, comprising

an actuator (**20**);

a locking pin (**11**) controllable by the actuator (**20**) and adapted to cooperate with a movable latching slider (**7**) to lock a door of an electrical household appliance, said locking pin (**11**) being movable between a rest position, wherein the locking pin allows the latching slider (**7**) to move, and a lock position, wherein the locking pin prevents said latching slider (**7**) from moving;

a detection switch (**45**) able to switch between an open position and a closed position following a movement of the latching slider (**7**), said detection switch (**45**) comprising a fixed contact element (**45***e*) and a movable contact element (**45***c*) resiliently stressed in closure towards the fixed contact element (**45***e*), and a movable control member (**46**) interacting with the movable contact element (**45***c*);

wherein the door-locking device is characterized in that the control member (**46**) may also be moved by effect of a movement of the locking pin (**11**).

2. A device according to claim **1**, in which the movable control member (**46**) comprises a follower portion (**46***c*) adapted to engage a cam (**7***a*) formed on the latching slider (**7**), such that the control member (**46**) is movable between a first position, corresponding to said open position, wherein the control member (**46**) holds the movable contact element (**45***c*) spaced apart from the fixed contact element (**45***e*), and a second position, corresponding to said closed position, wherein the control member (**46**) allows the movable contact element (**45***c*) to come into contact with the fixed contact element (**45***e*)

3. A device according to claim **1**, wherein the control member (**46**) is movable along a direction parallel to the direction of movement of the latching slider (**7**) due to a movement of the locking pin (**11**).

4. A device according to claim **2**, wherein the control member (**46**) is rotatable between the first position wherein the follower end (**46***c*) of the control member (**46**) holds the movable contact element (**45***c*) spaced from the fixed contact element (**45***e*), and the second position wherein the follower end (**46***c*) of the control member (**46**) allows the movable contact element (**45***c*) to come into contact with the fixed contact element (**45***e*).

5. A device according to claim **4**, wherein the control member (**46**) has a pin end (**46***b*) around which the control member is able to rotate.

6. A device according to claim **5**, wherein said pin end (**46***b*) is coupled to a cam (**11***c*) formed on the locking pin (**11**)

7. A device according to claim **6**, wherein said cam (**11***c*) faces the pin end (**46***b*) of the control member (**46**).

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