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(54) Modular auxiliary electrical device, particularly for minimum operating voltage control

(57) A modular auxiliary electrical device, particularly for minimum operating voltage control, includes a casing adapted to be associated with an electrical device, such as a circuit breaker, and includes an electrical connection means for connection to conducting components. The electrical connection means are connected to a kinematic system which is adapted to act on the associated electrical device. The auxiliary device includes a lever which is rigidly coupled to a movable portion of an armature of a relay and is suitable to actuate the kinematic means when the value of the supply voltage drops below a preset value.

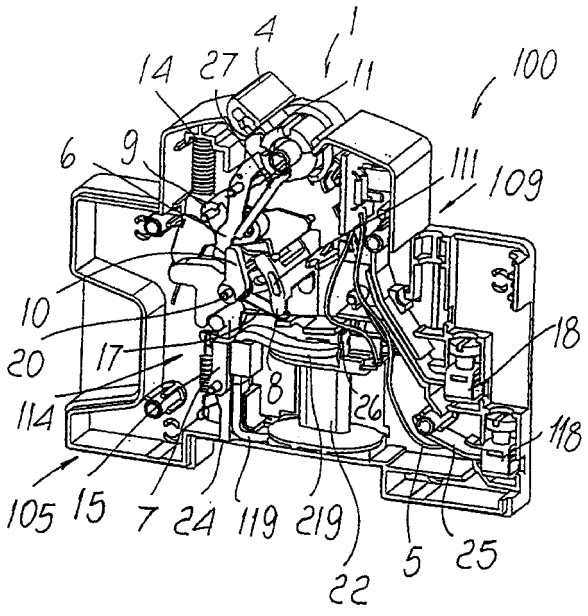

FIG. 1

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Description

[0001] The present invention relates to a modular auxiliary electrical device particularly for minimum operating voltage control.

[0002] A device of this kind is usually associated with a safety circuit breaker in order to open the circuit if the supply voltage drops below a preset minimum level.

[0003] A constant problem in the design and manufacture of this kind of device is to reduce the mechanical and constructive complexity and the dimensions as much as possible while maintaining absolute reliability and precision in operation.

[0004] The need is constantly felt to simplify the kinematic systems from the constructive point of view in order to achieve low-cost production, and in this regard it is also very important to achieve an assemblying which is simple and can be automated.

[0005] Another fundamental problem is to improve the performance of electrical devices while maintaining compact dimensions which in any case should comply with the standards.

[0006] The aim of the present invention is to provide a modular auxiliary electrical device, particularly for minimum voltage control, which has improved electrical characteristics.

[0007] An object of the invention is to provide a modular auxiliary electrical device, particularly for minimum voltage control, which can be manufactured more cheaply than conventional ones and at the same time has an improved performance.

[0008] Another object of the invention is to provide a modular auxiliary electrical device particularly for minimum voltage control which is more reliable in use.

[0009] This aim, these objects and others which will become better apparent hereinafter are achieved by a modular auxiliary electrical device particularly for minimum operating voltage control comprising a casing adapted to be associated with an electrical device, such as a circuit breaker, and comprising an electrical connection means for connection to conducting components, the electrical connection means being connected to a kinematic means adapted to act on the associated electrical device; characterized in that it comprises a lever which is rigidly coupled to a movable portion of an armature of a relay, the lever being adapted to actuate the kinematic means when the value of the supply voltage drops below a preset value.

[0010] Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated only by way of nonlimitative example in the accompanying drawings, wherein:

Figure 1 is a cutout perspective view of the device according to the invention;

Figure 2 is a lateral elevation view of the device according to the invention, with a wall of the casing removed, illustrating the kinematic system in the closed position;

Figure 3 is a view, similar to Figure 2, of the kinematic system in the open position;

Figure 4 is a view, similar to Figure 3, of the kinematic system in the tripped closed position.

[0011] With reference to the above figures, the modular auxiliary electrical device particularly for minimum operating voltage control, according to the invention, generally designated by the reference numeral 100, substantially comprises a casing 1 which has the classic standard shape and forms, at a rear face 105, means for coupling to an omega-shaped guide (not shown) according to DIN standards.

[0012] The casing 1 has, at the front face, a protrusion 109 in which an actuation element or actuation lever 11 is arranged.

[0013] The casing 1 contains an electrical actuation member, constituted by a relay, which is generally designated by the reference numeral 110 and is associated with a kinematic tripping system 114 and with terminals 18 and 118 for the external electrical connections.

[0014] The actuation lever 11 comprises a lever cover 4 and a lever spring 13 which is coaxial to the lever. The lever 11 is connected to a driving lever 9 by means of a lever linkage 27. The driving lever 9 acts by means of a driving spring 14. The kinematic system 114 also comprises an engagement lever 6 which is pivoted to a pivot 3 and acts in contrast with, and by virtue of the action of, an engagement spring 12. A motion lever 8 is pivoted on a pivot 20 of a release lever 10 and acts in cooperation with a motion spring 17 for return to position. The relay 110 comprises a coil support 24 which comprises a relay spool 22 and a relay core 19. The ends of the winding of the coil are connected to an electronic board 23 which has two outputs connected to the terminals 18 and 118.

[0015] The motion lever 8 comprises a slot 111 which is adapted to receive an actuation pin of an adjacent device and, on the opposite side, a pin for the actuation of an adjacent device.

[0016] The relay core 19 comprises a lower fixed part 119 and an upper movable part 219 with which a minimum-voltage lever 7 is rigidly coupled; the lever is actuated by a relay spring 15 and is adapted to actuate the kinematic system 114.

[0017] A relay resetting spring 16 is adapted to act on the minimum-voltage lever 7 in order to reset the relay, i.e., return the armature of the relay to the closed position, or to move the upper movable part 219 to the lowered position with reference to the figures.

[0018] By actuating the lever 11, the device is moved from the position in which the kinematic system

is open, shown in Figure 3, to the position in which the kinematic system is closed, shown in Figure 4. In case of activation, for example if the supply voltage of the circuit drops below a preset minimum level, there is no voltage across the relay and therefore the armature of the relay is opened, i.e., the upper part 219 of the core 19 is raised. To avoid unnecessary activations due to momentary voltage drops, the electronic board 23 establishes an activation delay, typically 300-500 milliseconds. The electronic board 23 also comprises a converter so as to supply DC current to the coil in order to avoid unpleasant humming due to supply of the coil with AC current. The relay 110 is characterized by extremely low power absorption, so that it does not heat up and has practically negligible consumption. After acting, the relay reset spring 16 immediately returns the upper part 219 to the closed position, shown in Figure 4. Advantageously, the relay reset spring 16 is adjusted so as to close the part 219 without striking the surface of the part with excessive force, which might damage it, in the long run.

[0019] If an attempt is made to close the device, i.e., to move the lever 11 into the closed position, while it is in the tripped-closed condition and there is insufficient voltage across the coil of the relay 110, the relay spring 15 reopens the relay, which is not kept closed by the flow of current.

[0020] In order to reset the device it is sufficient, once the voltage has been restored, to return the lever to the closed position and then reset the circuit breaker.

[0021] In practice it has been observed that the invention achieves the intended aim and objects.

[0022] The modular auxiliary electrical device particularly for minimum operating voltage control, according to the invention, is susceptible of numerous modifications and variations, within the scope of the appended claims. All the details may be replaced with technically equivalent elements.

[0023] The materials used, as well as the dimensions, may of course be any according to requirements and to the state of the art.

Claims

1. A modular auxiliary electrical device particularly for minimum operating voltage control, comprising a casing adapted to be associated with an electrical device, such as a circuit breaker, and comprising an electrical connection means for connection to conducting components, said electrical connection means being connected to a kinematic means adapted to act on said associated electrical device; characterized in that it comprises a lever which is rigidly coupled to a movable portion of an armature of a relay, said lever being adapted to actuate said kinematic means when the value of the supply voltage drops below a preset value.

2. The device according to claim 1, characterized in that said relay comprises a relay core comprising a lower fixed part and an upper movable part with which said minimum-voltage lever is rigidly coupled, said lever being actuated by a relay spring.

3. The device according to claim 1 or 2, characterized in that it comprises a relay reset spring adapted to act on said minimum-voltage lever in order to reset the relay.

4. The device according to one or more of the preceding claims, characterized in that said relay reset spring acts on said upper movable part.

5. The device according to one or more of the preceding claims, characterized in that said relay comprises a spool for a coil and a coil support, said coil support comprising a wider portion adapted to contain said movable part so as to limit the opening of said movable part.

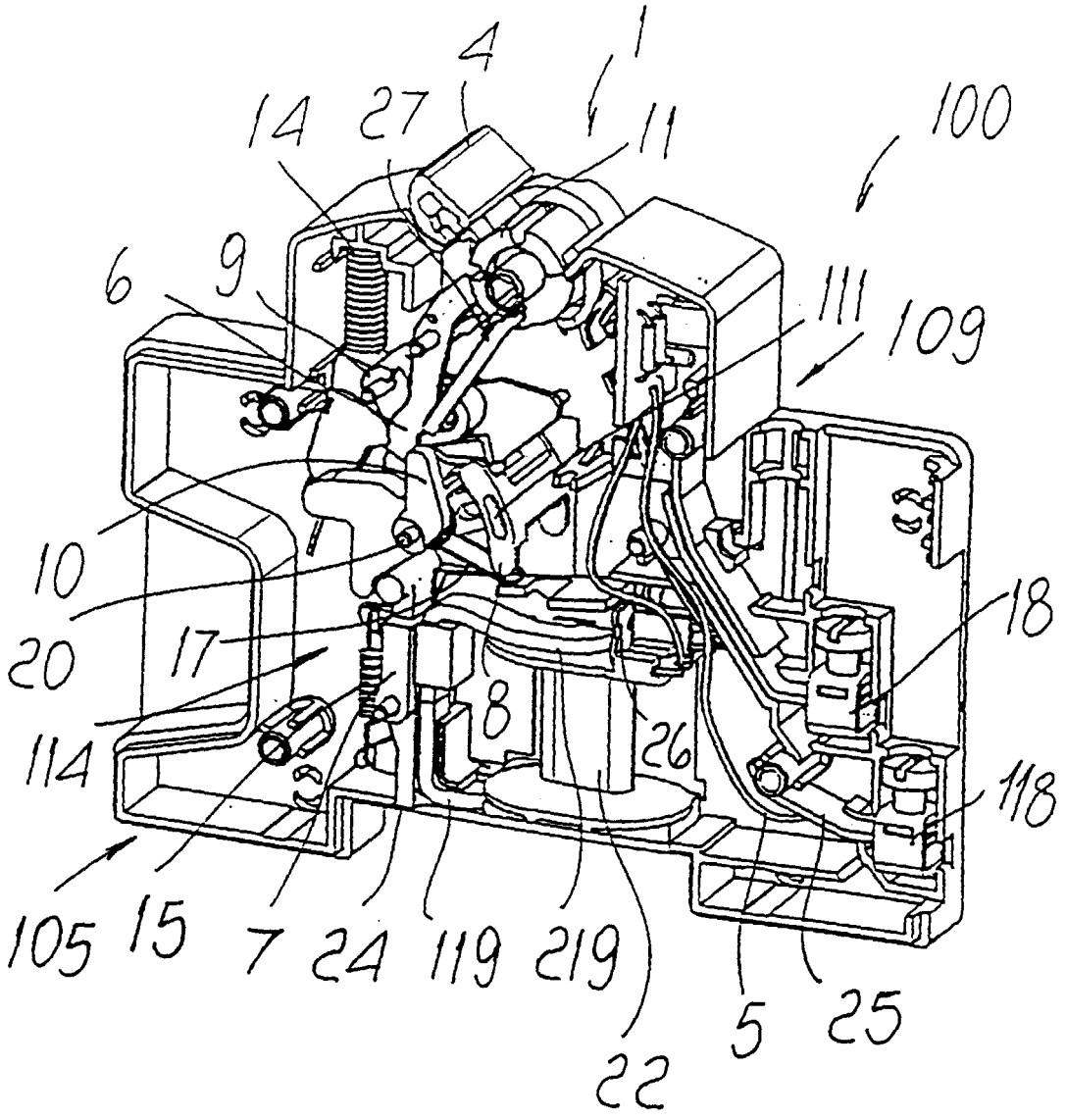
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FIG. 1

Fig. 2

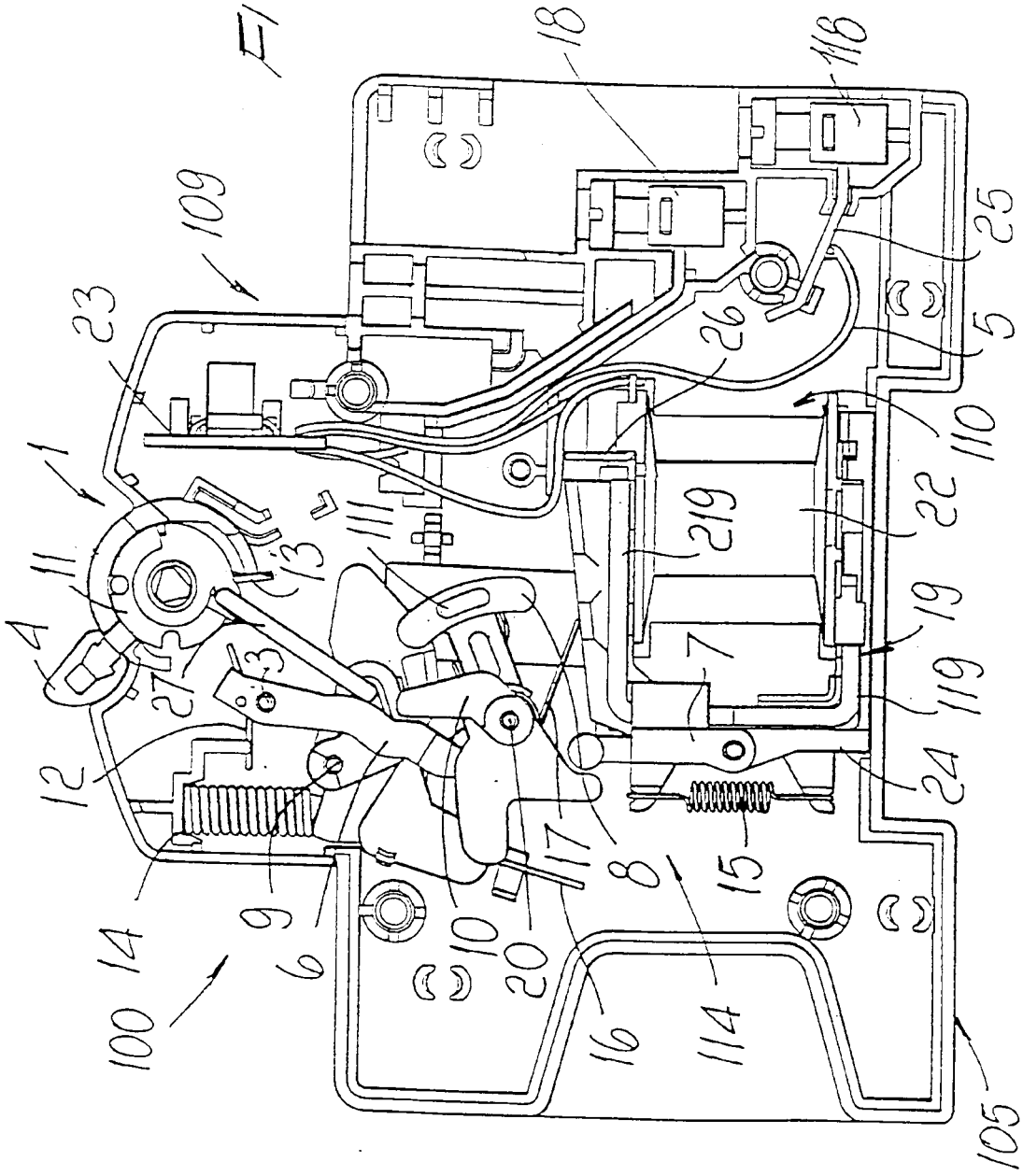
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Fig. 3

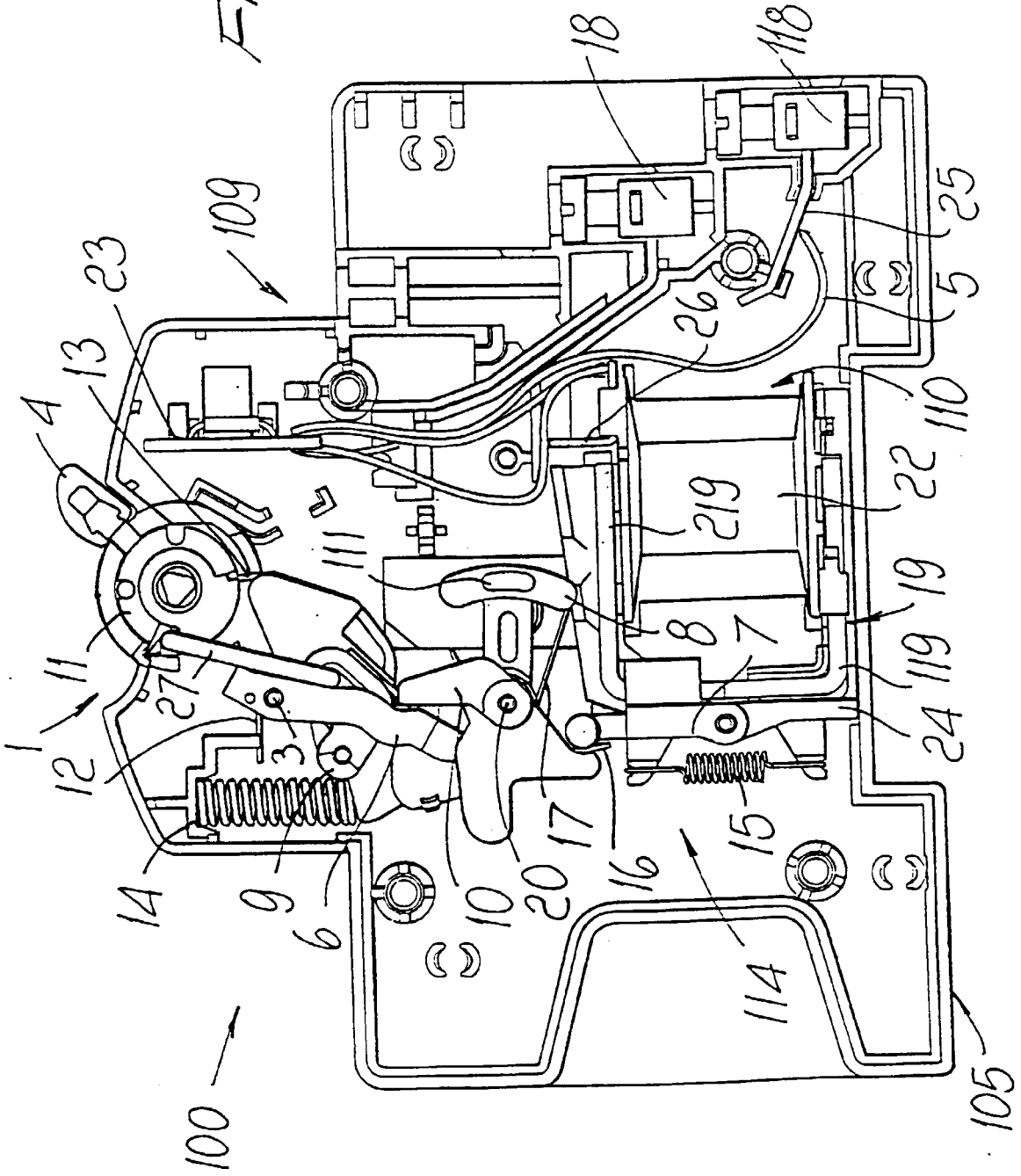
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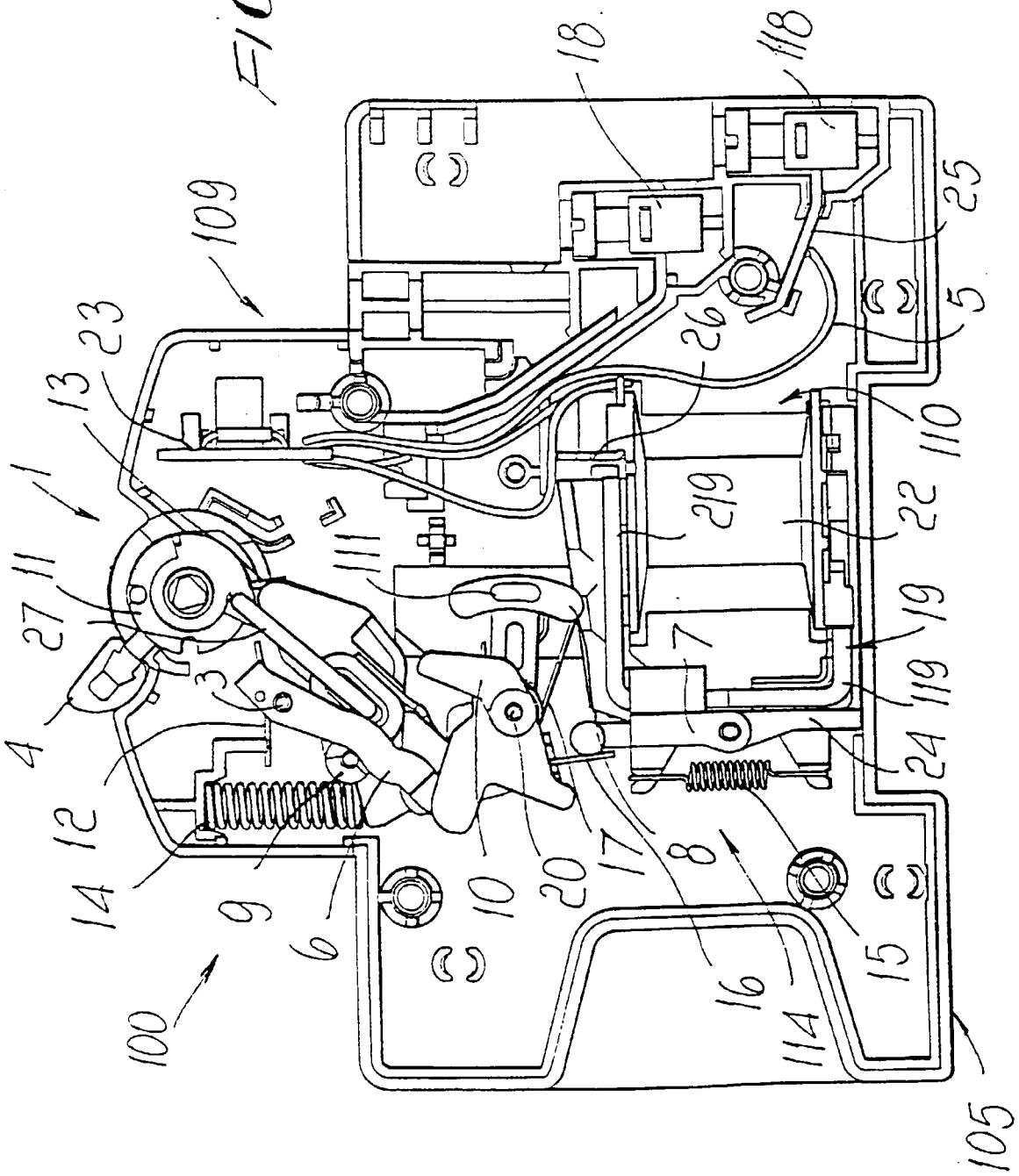
FIG. 4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EUROPEAN SEARCH REPORT

Application Number
EP 00 11 0364

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	US 4 246 558 A (ZUBATY MARTIN V ET AL) 20 January 1981 (1981-01-20) * column 5, line 24 - column 7, line 57; figures 1-8 *	1-4 5	H01H83/12
Y	DE 10 28 670 B (WYS ELEKTROGERÄTEBAU GMBH) 24 April 1958 (1958-04-24) * column 3, line 20 - line 24 *	5	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 July 2000	Ramírez Fueyo, M

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This annex lists the patent family members relating to the patent documents cited in the above–mentioned European search report. The members are as contained in the European Patent Office EDP file on
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31-07-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4246558 A	20-01-1981	NONE	
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