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(54) **Accessory device for a magnetothermal circuit breaker**

Zusatzgerät für thermomagnetischer Schutzschalter

Dispositif annexe pour disjoncteur magnéto-thermique

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## Description

**[0001]** The present invention relates to a driven accessory device for indicating the state of a magnetothermal circuit breaker associated therewith.

**[0002]** In particular, the magnetothermal circuit breaker to which reference is made herein is of the bipolar type with phase and neutral poles and is disclosed in the Italian patent application no. MI97A002544 in the name of the same Applicant.

**[0003]** It is known that magnetothermal circuit breakers are generally constituted by an insulating casing inside which the moving contacts are arranged; said moving contacts mate with corresponding fixed contacts. In the case of bipolar circuit breakers, the moving contacts comprise phase contacts and neutral contacts which are mechanically different from each other and which, depending on the applications and/or on the applicable national statutory provisions, can be located alternatively on the right side or on the left side of said circuit breaker when viewed from the front.

**[0004]** Accessory devices are externally associated with said circuit breakers and are conventionally of two kinds, respectively driving and driven, depending on whether they act on the circuit breaker, actuating an action thereof, or perform an action as a function of a command received from said circuit breaker.

**[0005]** A driving accessory device can be constituted by a relay which, for example, when it detects a network voltage value which is lower than a certain preset threshold, supplies an opening command to the circuit breaker associated therewith. By virtue of this command, the circuit breaker changes state from a condition in which its contacts are closed to one in which its contacts are open, and by means of appropriate lever systems it triggers a kinematic mechanism inside a device for indicating the state of the circuit breaker associated therewith, which accordingly constitutes a driven device. Said driven device then provides the operators with a signal which corresponds to the current state of the circuit breaker.

**[0006]** In order to facilitate users, driving accessory devices are always installed on the same side of the circuit breaker, for example on the left of the associated circuit breaker, while driven devices, to which the present invention relates, are installed on the other side, i.e., on the right.

**[0007]** In the case of bipolar circuit breakers with neutral and phase poles, there is the severe drawback that since the device for indicating the state of the circuit breaker is a driven accessory, it is generally always installed on the same side of the circuit breaker, for example on the right. In the current state of the art, this entails the need to provide two separate series of indicators, depending on whether they must be coupled to circuit breakers in which the neutral pole is on the right or on the left. This leads to increased constructive complexity and higher production costs. Moreover, when the driven accessory device is coupled to a circuit breaker, the kinematic mechanisms for opening the contacts of the circuit breaker can be negatively affected by the corresponding kinematic systems of the accessory device; in particular, the opening speed of the circuit breaker might be reduced, consequently leading to misfunctioning or even breakage of said circuit breaker.

**[0008]** Another inherent drawback of known devices for indicating the state of the circuit breaker associated therewith consists in that when the circuit breaker opens because of an automatic triggering caused by a short-circuit current or a thermal overload, the accessory device, by changing its state from closed to open, sends a corresponding alarm signal, which can be of the visual type, for example by lighting a lamp on a panel, or of the acoustic type, by means of an alarm siren. If the circuit breaker opens, triggering due to a fault, in the current state of the art driven accessory devices are not provided with means for local visual indication which allow an operator to immediately identify which circuit breaker has been triggered and to reset said device in order to stop the alarm signal without acting on the triggered circuit breaker.

**[0009]** Another drawback is the fact that known driven accessory devices are not provided with means which, without coupling them to a circuit breaker, allow to test them in order to check, for example, the true continuity of contact switching, which might occur incorrectly if the contacts are dirty. Moreover, once the accessory device has been installed in any system, the need may arise to test the auxiliary functions of the system of which the device is an integral part. In the current state of the art, in order to meet this need it is necessary to operate the circuit breaker associated with the device, connect power to the system and artificially induce a fault, for example a thermal overload, and this is seldom feasible in the field.

**[0010]** One example of a known accessory device according to the preamble of Claim 1 is described in the European Patent Application EP0394144AI which discloses the presence of a testing mechanism suitable for use only before definitely installing the accessory device inside an electric switchboard. The aim of the present invention is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith, in which coupling to the circuit breaker occurs fully independently of the position of the poles inside said circuit breaker. Within the scope of this aim, an object of the present invention is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith, wherein the coupling to the circuit breaker does not affect at all the kinematic mechanisms of said circuit breaker, accordingly leaving its design characteristics unchanged, particularly in terms of contact opening times.

**[0011]** Another object of the present invention is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith

in which there is a local visual indication of a state of the triggered circuit breaker. Another object of the present invention is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith in which when the circuit breaker is triggered it is possible to reset the accessory device, stopping the alarm signal without directly acting on said circuit breaker.

**[0012]** Another object of the present invention is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith in which it is possible to test said device before coupling to the circuit breaker.

**[0013]** Another object is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith in which, after the device has been installed in a system, it is possible to test the auxiliary functions of said system without having to trigger (artificially and/or electrically) the circuit breaker associated therewith.

**[0014]** Another object of the present invention is to provide an accessory device for indicating the state of a magnetothermal circuit breaker associated therewith which is highly reliable, relatively easy to manufacture and at competitive costs.

**[0015]** This aim, these objects and others which will become apparent hereinafter are achieved by an accessory device for indicating the state of a magnetothermal circuit breaker which is associated therewith, the accessory device comprising an insulating casing which contains fixed contacts and a corresponding moving contact and connection terminals, characterized in that it comprises a mechanism for testing the device, and a kinematic mechanism which comprises means for coupling to the circuit breaker, means for actuating the moving contact, means for the local visual indication of a triggered circuit breaker state, said mechanism for testing the device comprising a test lever which is pivotally mounted inside the casing and has a shaped head accommodated in a corresponding opening of the insulating casing so as, once the accessory device is installed, it can be directly actuated by an operator acting on said shaped head from the outside of the casing, and interacts with the moving contact.

**[0016]** Further characteristics and advantages of the invention will become apparent from the description of preferred but not exclusive embodiments of the accessory device according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic side view of the accessory device according to the present invention in a position which corresponds to the one in which the associated circuit breaker is closed;

Figure 2 is a schematic side view of the accessory device according to the invention, in a position which corresponds to the one in which the associated circuit breaker is open;

Figure 3 is a schematic side view of the accessory device according to the invention, in a position which corresponds to the one in which the associated circuit breaker is triggered;

Figure 4 is a schematic side view of the accessory device according to the invention during intervention due to triggering of the associated circuit breaker;

Figure 5 is a schematic side view of the accessory device according to the invention during testing with the associated circuit breaker closed;

Figure 6 is a schematic side view of the accessory device according to the invention during testing with the associated circuit breaker open;

Figure 7 is an exploded view of some components used in the accessory device according to the invention.

**[0017]** With reference to the above Figures, the accessory device according to the invention comprises an insulating casing 1 inside which there are fixed contacts 17 which operatively couple to the moving contact 3 (changeover contact); said contacts are connected to connection terminals 60. In the illustrated embodiment and merely by way of example, the contact 3 is of the laminar type.

**[0018]** The moving contact 3 is actuated by means of a suitable kinematic mechanism which is generally designated by the reference numeral 100 and is actuated as a consequence of a corresponding change of state of the contacts of the associated magnetothermal circuit breaker, which is not shown in the Figures. Said kinematic mechanism 100 comprises means for coupling to the circuit breaker, means for actuating the moving contact, means for the local visual indication of a triggered circuit breaker state.

**[0019]** In particular, said means for actuating the moving contact comprise a contact actuation lever 13, a transmission lever 10 and an engagement lever 8. The transmission lever 10 is pivoted to a point 101 of the casing 1 and is held in a preset position by a spring 15; the engagement lever 8 is further arranged on the same pivoting point 101 and is kept in a preset position by a projection 26 of the transmission lever 10 which abuts against the surface of the engagement lever 8. A spring 9 further acts on said engagement lever 8. The transmission lever 10 is detachably connected, by means of a U-shaped element 11, to the contact actuation lever 13 and to a disengagement lever 12 which belongs to said means for coupling to the circuit breaker. Said disengagement lever 12 and the contact actuation lever 13 are pivoted in a point 102 of the casing 1; a spring 14 acts on the contact actuation lever 13. In an inactive position, which corresponds to the position in which the circuit breaker is closed, the contact actuation lever 13 has an end 25 which is directly in contact with the lamina 3; moreover, on the contact actuation lever 13 there is

a slot 33 in which the U-shaped element 11 can slide. In particular, said end 25 can have a round-shaped profile as shown in Figure 7, or a polygonal-shaped profile as shown in Figures 1-6.

**[0020]** The disengagement lever 12 comprises a pin 7 for coupling to the mechanism for actuating the circuit breaker and has the peculiarity that it comprises a toothed sector 18, whose function will be described hereinafter.

**[0021]** Said means for actuating the moving contact further comprise a reset and indication lever 4 which is pivoted to a fixed point 103 of the insulating casing 1 and is held in the inactive position by a spring 5. The reset and indication lever 4 has, on its surface, a pin 50 for coupling/uncoupling with respect to the engagement lever 8 and a slot 21 with circular raised portions 22 and 22', in which a portion of the lamina of the moving contact 3 is inserted; the raised portions 22 and 22' can interact alternatively with the lamina as a consequence of a corresponding state of the associated circuit breaker. This interaction helps to keep the reset and indication lever 4 in the inactive position or to turn it respectively in a closed/open state of the associated circuit breaker.

**[0022]** Advantageously, said means for coupling to the circuit breaker comprise an additional coupling lever 6 which is pivoted in a point 103 which has a pin 7' for optional coupling to the mechanism of the associated circuit breaker, and a toothed sector 18', which is operatively coupled to the toothed sector 18 of the disengagement lever 12. In practice, once the kinematic mechanism 100 has been actuated by a corresponding change of state of the associated circuit breaker, the two toothed sectors 18 and 18' mesh together, rotating with respect to each other in mutually opposite directions.

**[0023]** This constructive solution allows the coupling of the accessory device to the circuit breaker to be rendered fully independent of the position of the poles inside it, i.e., regardless of whether the phase pole or the neutral pole is on the right. If the position of the poles in the circuit breaker changes, the coupling between the accessory device and said circuit breaker can in fact be performed alternatively on the pin 7 or on the pin 7'. Moreover, the change in the direction of rotation of the mechanism of the circuit breaker as a function of the position of the poles is rendered irrelevant in terms of the operation of the circuit breaker-device coupling by the presence of the two contrarotating toothed sectors 18 and 18'.

**[0024]** It should be noted that with this solution, the movement of the kinematic system inside the device has no effect at all on the corresponding movement in the circuit breaker, so that the operating performance of said circuit breaker is not altered in any way. Another important advantage of the accessory device according to the invention consists in that the reset and indication lever 4 has a shaped projection 30 which, when the circuit breaker is triggered, protrudes from a corresponding opening 31 formed in the casing 1 and thus allows to provide a local visual indication that the circuit breaker associated therewith was activated due to a fault (the circuit breaker was triggered). Moreover, the projection 30, once it has protruded from the casing, readily constitutes a button on which an operator can act directly and promptly to reset the accessory device; in this manner it is possible to cancel the alarm without having to act on the associated circuit breaker, which thus remains open. The reset and indication lever 4 therefore simultaneously acts as a means for the local indication that the circuit breaker has been triggered and as a reset for said accessory device. In further embodiments, not shown by Figures, said projection might be associated with other levers of the kinematic mechanism 100.

**[0025]** The operation of the device according to the invention is now described starting from the operating condition shown in Figure 1, which corresponds to a position in which the associated circuit breaker is closed.

**[0026]** When the circuit breaker is opened due to the manual intervention of an operator who acts on the actuation knob, the mechanism of the circuit breaker transmits the movement to the transmission lever 10, which rotates in the direction indicated by the arrow 104, pulling the U-shaped body I 1 and reaching, at the end of its actuation, the position shown in Figure 2. The engagement lever 8, no longer retained by the projection 26 and pushed by the spring 9, rotates about the pivoting axis and engages the pin 50 of the reset and indication lever 4, as shown in Figure 2; in this manner, the reset and indication lever 4 is locked and therefore its projection 30 cannot protrude from the casing 1.

**[0027]** The contact actuation lever 13, pushed by the spring 14, turns about its own pivoting axis 102, in the direction indicated by the arrow 105, and reaches the position shown in Figure 2. At the same time, the lamina 3, no longer retained by the projection 25 of the contact actuation lever 13, abuts against the raised portion 22; any further movement of the lamina is prevented by the locking action applied by the engagement lever 8 to the pin 50 of the reset and indication lever 4.

**[0028]** When instead the circuit breaker opens, triggering due to a fault, the disengagement lever 12 which receives the corresponding mechanical actuation from the circuit breaker, either directly by means of the pin 7 or indirectly from the coupling lever 6 by means of the pin 7' and the meshing of the two toothed sectors 18 and 18', rotates in the direction indicated by the arrow 106; by this rotation, the disengagement lever 12 disengages the U-shaped element 11, which becomes free to slide in the slot 33 of the contact actuation lever 13. The contact actuation lever 13, no longer locked by the U-shaped element 11, rotates under the action of the spring 14 in the direction indicated by the arrow 105, as shown in Figure 4. At the end of this actuation the situation shown in Figure 3 is obtained. In this case, the rotation of the transmission lever 10, with the consequent separation of the projection 25 from the surface of the engagement lever 8, occurs in a manner similar

to the one described earlier, but with a delay which allows the reset and indication lever 4 to rotate about its own pivoting axis, avoiding the locking of the engagement lever 8 on the pin 50; this rotation occurs by way of the action of the spring 5 and of the lamina of the moving contact 3 which, disengaged from the projection 25, abuts against the raised portion 22, pushing it downwards. At the end of the rotation as shown in Figure 3, the shaped projection 30 of the reset and indication lever 4 protrudes from the casing 1 through the opening 31, providing a local visual indication that the circuit breaker has been triggered. An operator can then reset the accessory device simply by acting on the projection 30, without acting on the circuit breaker, which remains open.

**[0029]** Advantageously, the accessory device according to the invention further comprises a mechanism for testing the device itself; in particular, said mechanism for testing the device comprises an additional test lever 2 which is pivoted in a point 107 of the casing 1 and is operatively disconnected from the above described kinematic mechanism. Said test lever 2, as shown in particular in Figure 7, has an arc-shaped profile 40, a tip portion of which ends with a head 43 which has a circular shape and can interact directly with the lamina of the moving contact 3. As shown in Figures 5 and 6 (arrow 108), the actuation of the test lever 2 can be performed directly by an operator who, by acting on a shaped head 41 (which constitutes a test button) accommodated in an opening 42 formed in the casing 1, causes the test lever 2 to rotate downwards; the head 43 interacts with the lamina of the contact 3 and forces it to perform a consequent movement from one fixed contact to the other; the test lever 2 is reset simply by way of the elastic return action of the lamina, which returns to the initial situation once the action of the operator on the shaped head 41 has ended.

**[0030]** This operation can be performed both when the associated circuit breaker is open and when it is closed, so that the test lever 2 can perform the important function of test lever, since it allows both to check that the contacts of the device actually switch without first coupling it to the circuit breaker and to test some functions of a system once the device has been installed and without the need to close the circuit breaker associated therewith. Another advantageous aspect of the invention is the fact that the device thus provided allows to stack a plurality of accessories, arranging them mutually side by side, since the mechanism of the circuit breaker is replicated inside each one, particularly by virtue of the transmission lever 10, the disengagement lever 12 and the coupling lever 6; in this manner, the accessory device responds to the device that is located adjacent to it as if it were directly coupled to the circuit breaker itself.

**[0031]** In practice it has been observed that the accessory device for indicating the state of a magnetothermal circuit breaker, particularly of the bipolar type with phase and neutral poles, associated therewith according to the invention fully achieves the intended aim, since it allows to provide a coupling with the circuit breaker in a manner which is independent of the arrangement of the poles inside the circuit breaker and without affecting its performance at all; moreover, by adopting the particular constructive refinements described above, it is possible to directly locally identify any triggering of the circuit breaker, with consequent reset of the device, and to perform tests.

**[0032]** It should also be observed that all the innovative functions and the inventive aspects of the device can be obtained by using commonly commercially available elements and materials, of extremely low costs.

**[0033]** The accessory device thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the claims.

**[0034]** In practice, the materials and the dimensions may be any according to requirements and to the state of the art.

## Claims

1. Accessory device for indicating the state of a magnetothermal circuit breaker which is associated therewith, the accessory device comprising an insulating casing (1) which contains fixed contacts (17), a corresponding moving contact (3), connection terminals (60), and a kinematic mechanism (100) which comprises means (6, 7, 12, 7') for coupling to the circuit breaker, means (13, 10, 8) for actuating the moving contact, means (30, 31) for the local visual indication of a triggered circuit breaker state and a mechanism for testing the device, said mechanism for testing the device comprising a test lever (2) which is pivotally mounted inside the casing (1), **characterized in that** the test lever has a shaped head (41) accommodated in a corresponding opening (42) of the insulating casing (1) so as, once the accessory device is installed, it can be directly actuated by an operator acting on said shaped head (41) from the outside of the casing (1), and interacts with the moving contact (3).

2. Accessory device according to claim 1, **characterized in that** said test lever (2) comprises an arc-like profile (40) a tip portion of which ends with a circular head (43) which interacts with the moving contact (3).

3. Accessory device according to claim 1, **characterized in that** said means for coupling to the circuit breaker comprise a first coupling lever (6) and a second disengagement lever (12) which are operatively connected to each other, said first lever (6) and said second lever (12) each comprising a pin (7', 7) for coupling to the circuit breaker.

4. Accessory device according to claim 3, **characterized in that** the coupling and disengagement levers (6,12) are operatively connected to each other by means of two toothed sectors (18', 18) which are respectively associated with the coupling lever (6) and with the disengagement lever (12) and mutually mesh, rotating with respect to each other in opposite directions.

5. Accessory device according to one or more of the preceding claims, **characterized in that** said means for actuating the moving contact (3) comprise a contact actuation lever (13), a transmission lever (10), and a reset and indication lever (4), a spring (14, 5, 15) being associated with each one of said levers (13, 4, 10).

6. Accessory device according to claim 5, **characterized in that** the transmission lever (10) is connected, by means of a U-shaped element (11), to the contact actuation lever (13) and to the disengagement lever (12).

7. Accessory device according to claim 6, **characterized in that** the contact actuation lever (13) has a slot (33) in which the U-shaped element (11) slides.

8. Accessory device according to claim 6, **characterized in that** the contact actuation lever (13) comprises a projection (25) which can interact directly with the moving contact (3) and a projection which can interact with an engagement lever (8).

9. Accessory device according to claim 8, **characterized in that** the reset and indication lever (4) comprises a pin (50) for coupling to the engagement lever (8) in correspondence of an open state of the circuit breaker.

10. Accessory device according to claim 9, **characterized in that** said reset and indication lever (4) comprises a slot (21) with circular raised portions (22, 22') in which at least one portion of the moving contact (3) is inserted, said raised portions (22, 22') being able to interact alternatively with the moving contact (3).

11. Accessory device according to one or more of the preceding claims, **characterized in that** said means for providing a local visual indication of a triggered circuit breaker state are constituted by a projection of at least one of the levers that belong to the kinematic mechanism, said projection being able to protrude from the casing (1) as a consequence of a triggering of the circuit breaker.

12. Accessory device according to claim 11, **characterized in that** said projection is constituted by an end (30) of the reset and indication lever (4), in correspondence of which the casing (1) has an opening (31).

13. Accessory device according to one or more of the preceding claims, **characterized in that** said transmission, coupling, and disengagement levers (10, 6, 12) allow coupling to a further accessory device.

**Patentansprüche**

1. Zubehörteil zur Anzeige des Zustands eines magnetothermalen Sicherungsautomaten, dem es zugeordnet ist, wobei das Zubehörteil ein isolierendes Gehäuse (1) aufweist, welches feste Kontakte (17) enthält, einen entsprechenden beweglichen Kontakt (3), Verbindungsanschlüsse (60) und einen kinematischen Mechanismus (100), welcher Mittel (6, 7, 12 7') aufweist zum Koppeln an den Sicherungsautomaten, Mittel (13, 10, 8) zur Betätigung des beweglichen Kontaktes, Mittel (30, 31) zur lokalen visuellen Anzeige eines Zustands eines ausgelösten Sicherungsautomaten und einen Mechanismus zur Prüfung der Vorrichtung, wobei der Mechanismus zur Prüfung der Vorrichtung einen Prüfhebel (2) aufweist, welcher drehbar innerhalb des Gehäuses (1) montiert ist, **dadurch gekennzeichnet, dass** der Prüfhebel einen geformten Kopf (41) aufweist, der in einer entsprechenden Öffnung (42) des isolierenden Gehäuses (1) aufgenommen wird, so dass, wenn einmal das Zubehörteil installiert ist, er direkt durch einen Bediener betätigt werden kann, der auf den geformten Kopf (41) von außerhalb des Gehäuses (1) einwirkt, und der mit dem beweglichen Kontakt (3) zusammenarbeitet.

2. Zubehörteil nach Anspruch 1, **dadurch gekennzeichnet, dass** der Prüfhebel (2) ein bogenartiges Profil (40) aufweist, von dem ein spitzes Teil mit einem kreisförmigen Kopf (43) endet, welcher mit dem beweglichen Kontakt (3) zusammenarbeitet.

3. Zubehörteil nach Anspruch 1, **dadurch gekennzeichnet, dass** die Mittel zur Kopplung des Sicherungsautomaten einen ersten Kopplungshebel (6) aufweisen und einen zweiten Ausrückhebel (12), welche betreibbar miteinander verbunden sind, wobei der erste Hebel (6) und der zweite Hebel (12) jeweils einen Stift (7', 7) aufweisen zur Kopplung an den Sicherungsautomaten.

4. Zubehörteil nach Anspruch 3, **dadurch gekennzeichnet, dass** die Kopplungs- und Ausrasthebel (6, 12) betreibbar verbunden sind miteinander mittels zwei gezahnten Abschnitten (18', 18) welche jeweils dem Kopplungshebel (6) zugeordnet sind und dem Ausrückhebel (12) und sich gegenseitig ver-

zahnen, wobei sie in Bezug aufeinander in entgegengesetzte Richhingen drehen.

**5.** Zubehörteil nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Mittel zur Betätigung des beweglichen Kontakts (3) einen Kontaktbetätigungshebel (13) aufweisen, einen Übertragungshebel (10), und einen Rücksetz- und Anzeigehebel (4), eine Feder (14, 5, 15), welche jedem der Hebel (13, 4, 10) zugeordnet ist.

**6.** Zubehörteil nach Anspruch 5, **dadurch gekennzeichnet, dass** der Übertragungshebel (10) mittels eines U-förmigen Elementes (11) mit dem Kontaktbetätigungshebel (13) und dem Ausrückhebel (12) verbunden ist.

**7.** Zubehörteil nach Anspruch 6, **dadurch gekennzeichnet, dass** der Kontaktbetätigungshebel (13) einen Schlitz (33) aufweist, in welchem das U-förmige Element (11) gleitet.

**8.** Zubehörteil nach Anspruch 6, **dadurch gekennzeichnet, dass** der Kontaktbetätigungshebel (13) einen Vorsprung (25) aufweist, welcher direkt mit dem beweglichen Kontakt (3) zusammenarbeiten kann, und einen Vorsprung, welcher mit einem Erfassungshebel (8) zusammenarbeiten kann.

**9.** Zubehörteil nach Anspruch 8, **dadurch gekennzeichnet, dass** der Rücksetz- und Anzeigehebel (4) einen Stift (50) aufweist zur Kopplung an den Erfassungshebel (8) in Entsprechung eines geöffneten Zustands des Sicherungsautomaten.

**10.** Zubehörteil nach Anspruch 9, **dadurch gekennzeichnet, dass** der Rücksetz- und Anzeigehebel (4) einen Schlitz (21) mit kreisförmigen, erhabenen Teilen (22, 22') aufweist, in welchen wenigstens ein Teil des beweglichen Kontakts (3) eingefügt ist, wobei die erhabenen Teile (22, 22') dazu in der Lage sind, wechselweise mit dem beweglichen Kontakt (3) zusammenzuarbeiten.

**11.** Zubehörteil nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Mittel zur Bereitstellung einer lokalen visuellen Anzeige eines Zustands eines ausgelösten Sicherungsautomaten durch einen Vorsprung gebildet werden von wenigstens einem der Hebel, die zum kinematischen Mechanismus gehören, wobei der Vorsprung dazu in der Lage ist, aus dem Gehäuse (1) vorzuspringen als Folge von einer Auslösung des Sicherungsautomaten.

**12.** Zubehörteil nach Anspruch 11, **dadurch gekennzeichnet, dass** der Vorsprung durch ein Ende (30) des Rücksetz- und Anzeigehebels (4) gebildet wird, in Entsprechung wovon das Gehäuse ( 1 ) eine Öffnung (31) hat.

**13.** Zubehörteil nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Übertragungs-, Kopplungs- und Ausrückhebel (10, 6, 12) Kopplung zu einem weiteren Zubehörteil ermöglichen.

**Revendications**

**1.** Dispositif annexe destiné à indiquer l'état d'un disjoncteur magnéto-thermique qui y est associé, le dispositif annexe comprenant un boîtier (1) d'isolation qui contient des contacts (17) fixes, un contact (3) mobile correspondant, des bornes (60) de raccordement, et un mécanisme (100) cinématique qui comprend un moyen (6, 7, 12, 7') de raccordement au disjoncteur, un moyen (13, 10, 8) d'actionnement du contact mobile, un moyen (30, 31) pour l'indication visuelle locale d'un état déclenché du disjoncteur et un mécanisme de test du dispositif dudit mécanisme destiné à tester le dispositif comprenant un levier (2) de test qui est monté avec faculté de pivotement à l'intérieur du boîtier (1), **caractérisé en ce que** le levier de test possède une tête (41) profilée placée dans une ouverture (42) correspondante du boîtier (1) d'isolation afin, une fois que le dispositif annexe est installé, qu'il puisse être directement actionné par un opérateur qui agit sur ladite tête (41) profilée depuis l'extérieur du boîtier (1) et interagit avec le contact (3) mobile.

**2.** Dispositif annexe selon la revendication 1, **caractérisé en ce que** ledit levier (2) de test comprend un profil (40) identique à un arc dont une partie d'extrémité se termine par une tête (43) circulaire qui interagit avec le contact (3) mobile.

**3.** Dispositif annexe selon la revendication 1, **caractérisé en ce que** ledit moyen de raccordement au disjoncteur comprend un premier levier (6) de raccordement et un second levier (12) de désaccouplement qui sont connectés entre eux en fonctionnement, ledit premier levier (6) et ledit second levier (12) comprenant chacun une tige (7', 7) pour un raccordement au disjoncteur.

**4.** Dispositif annexe selon la revendication 3, **caractérisé en ce que** les leviers de raccordement et de désaccouplement (6, 12) sont connectés en fonctionnement entre eux à l'aide de deux secteurs (18', 18) dentés qui sont respectivement associés au levier (6) de raccordement et au levier (12) de désaccouplement et qui s'engrainent mutuellement, effectuant une rotation l'un par rapport à l'autre dans

des directions opposées.

**5.** Dispositif annexe selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit moyen d'actionnement du contact (3) mobile comprend un levier (13) de commande et de contact, un levier (10) de transmission, et un levier (4) de réenclenchement et d'indication, un ressort (14, 5, 15) étant associé à chacun desdits leviers (13, 4, 10).

**6.** Dispositif annexe selon la revendication 5, **caractérisé en ce que** le levier (10) de transmission est raccordé, à l'aide d'un élément (11) en forme de U, au levier (13) de commande de contact et au levier (12) de désaccouplement.

**7.** Dispositif annexe selon la revendication 6, **caractérisé en ce que** le levier (13) de commande de contact possède une fente (33) dans laquelle l'élément (11) en forme de U coulisse.

**8.** Dispositif annexe selon la revendication 6, **caractérisé en ce que** le levier (13) de commande et de contact comprend une saillie (25) qui peut directement interagir avec le contact (3) mobile et une saillie qui peut interagir avec un levier (8) d'accouplement.

**9.** Dispositif annexe selon la revendication 8, **caractérisé en ce que** le levier (4) de réenclenchement et d'indication comprend une tige (50) pour le raccordement au levier (8) d'accouplement en fonction d'un état ouvert du disjoncteur.

**10.** Dispositif annexe selon la revendication 9, **caractérisé en ce que** ledit levier (4) de réenclenchement et d'indication comprend une fente (21) avec des parties relevées circulaires (22, 22') dans lesquelles au moins une partie du contact (3) mobile est insérée, lesdites parties relevées (22, 22) étant capables d'interagir alternativement avec le contact (3) mobile.

**11.** Dispositif annexe selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit moyen destiné à fournir une indication visuelle locale d'un état déclenché du disjoncteur est constitué par une saillie d'au moins un parmi les leviers qui font partie du mécanisme cinématique, ladite saillie étant capable de s'avancer hors du boîtier (1) suite à un déclenchement du disjoncteur.

**12.** Dispositif annexe selon la revendication 11, **caractérisé en ce que** ladite saillie est constituée par une extrémité (30) du levier (4) de réenclenchement et d'indication, avec en correspondance sur le boîtier (1) une ouverture (31).

**13.** Dispositif annexe selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** lesdits leviers (10, 6, 12) de transmission, de raccordement et de désaccouplement permettent un raccordement à un autre dispositif annexe.

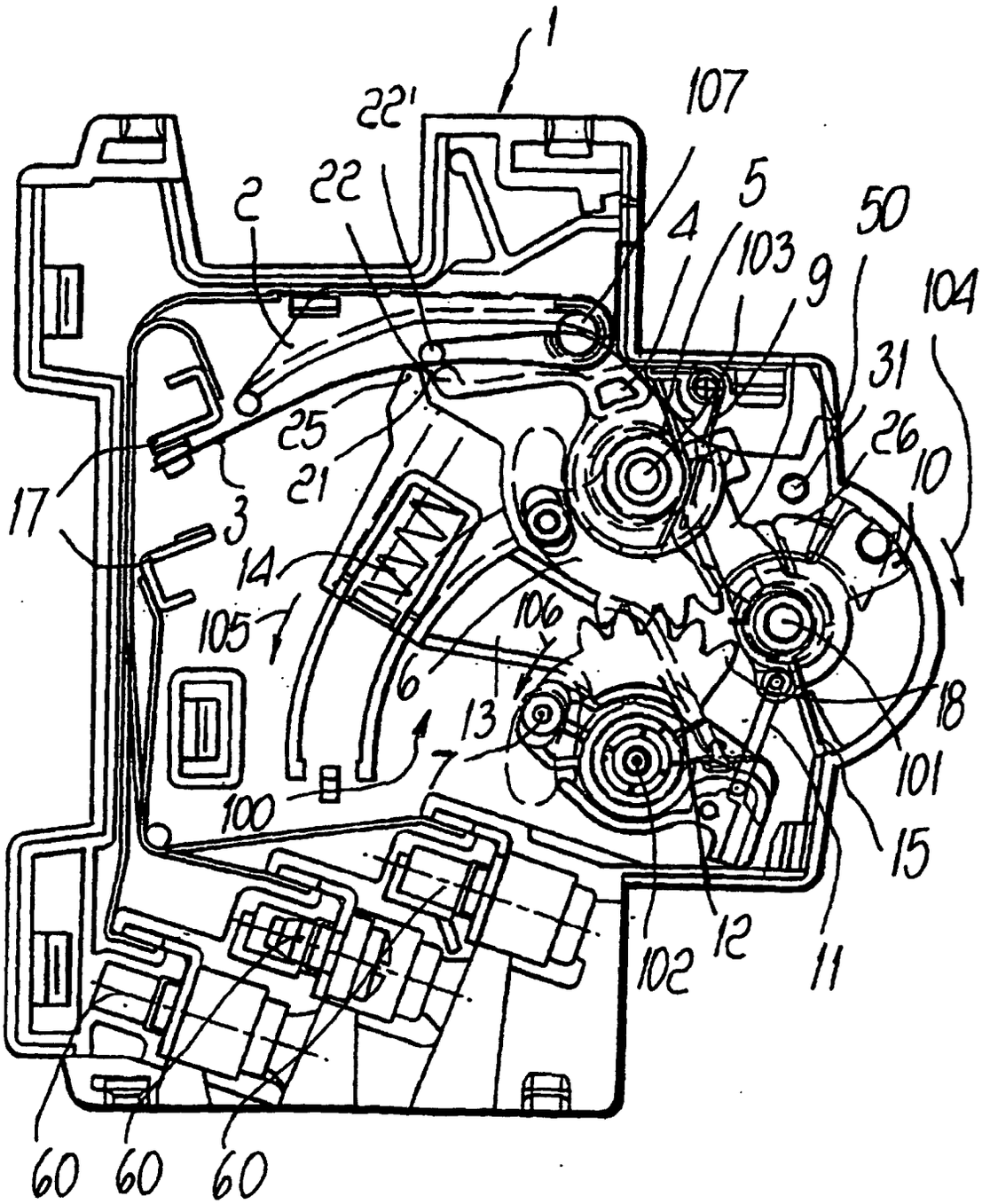

1
22'
107
2
22
5
4
50
103
9
104
31
25
26
21
10
17
3
14
105
106
6
18
13
7
101
100
15
12
11
102
60
60
60

FIG. 1

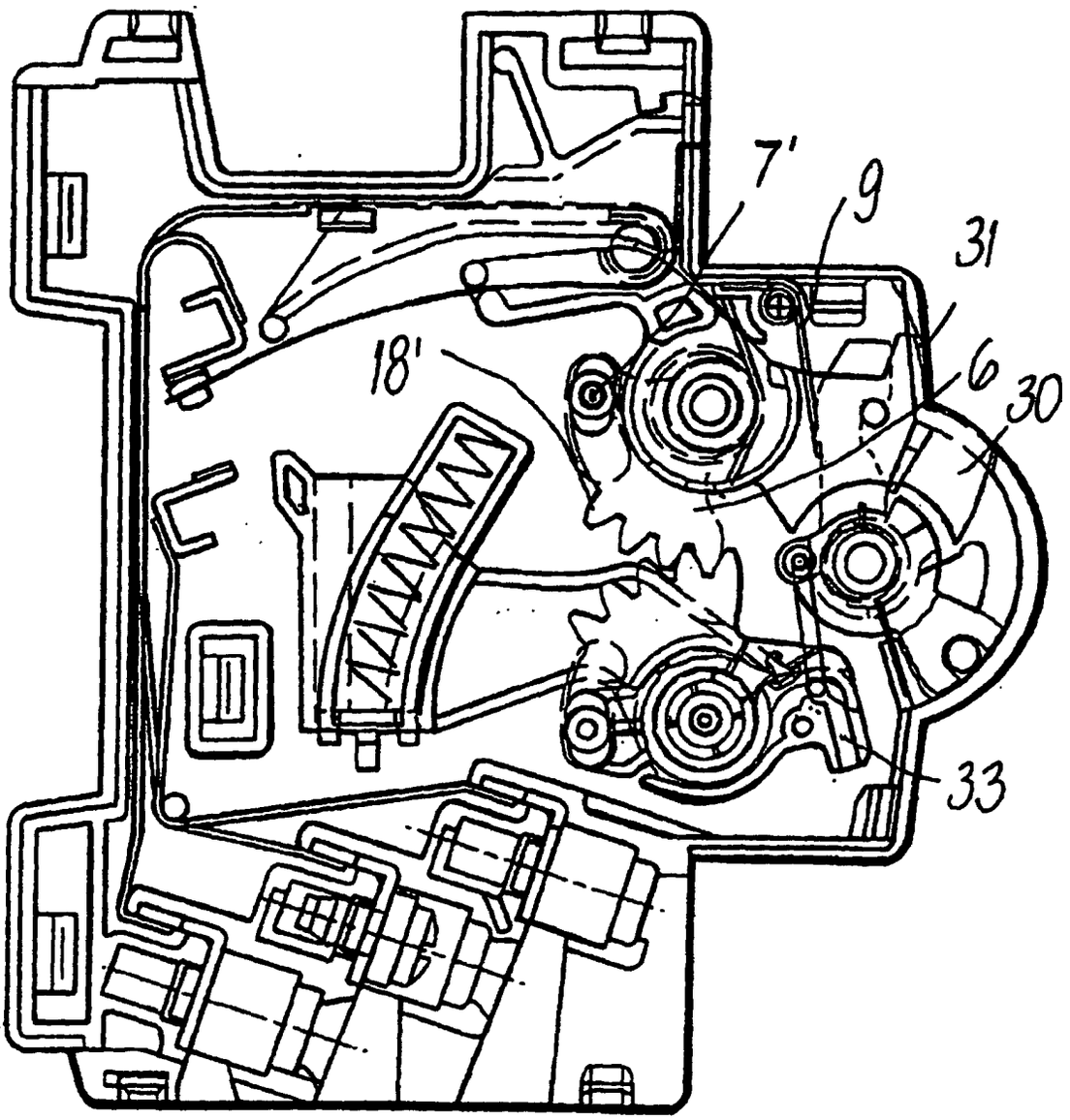



Fig. 2

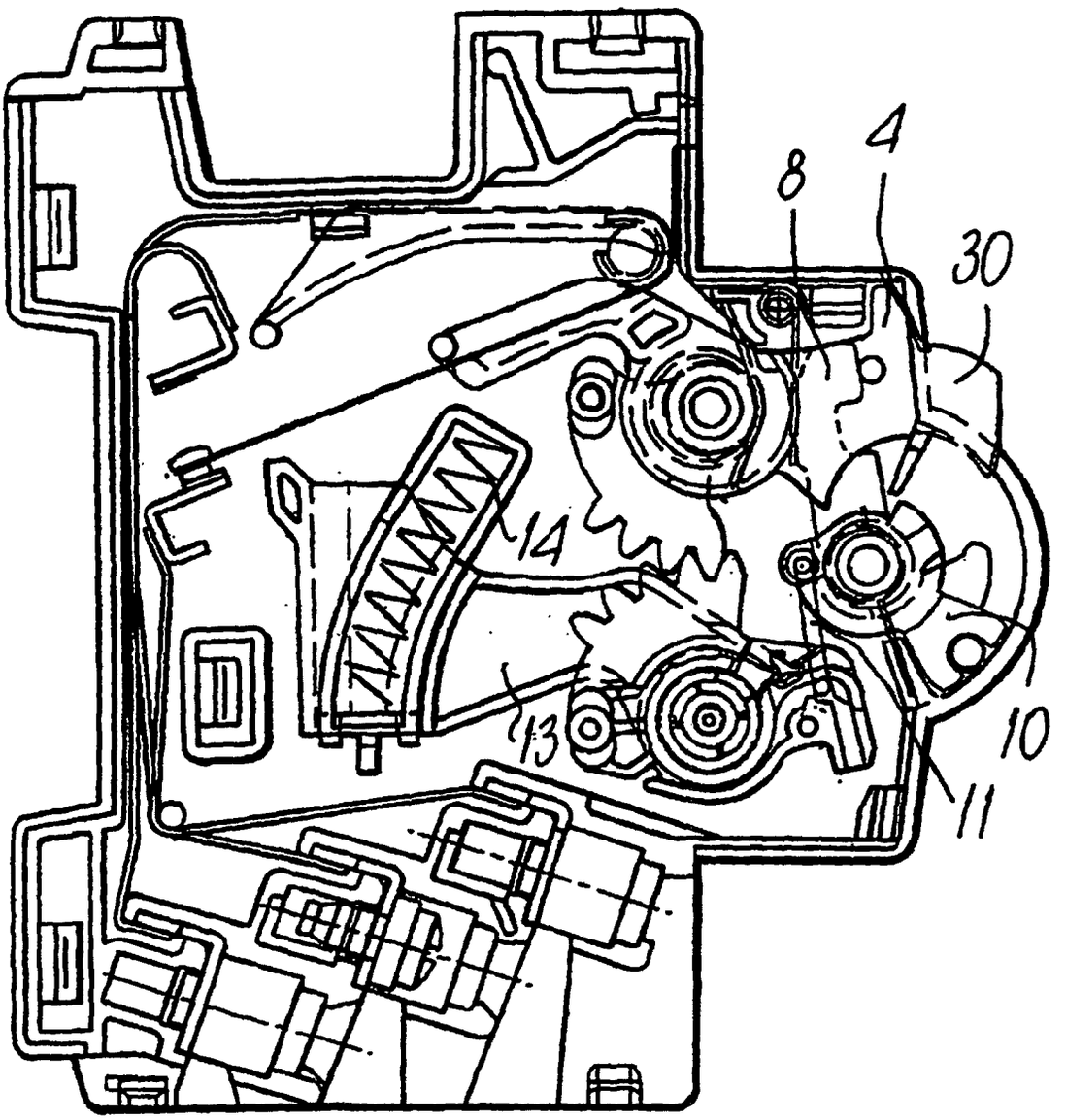



Fig. 3

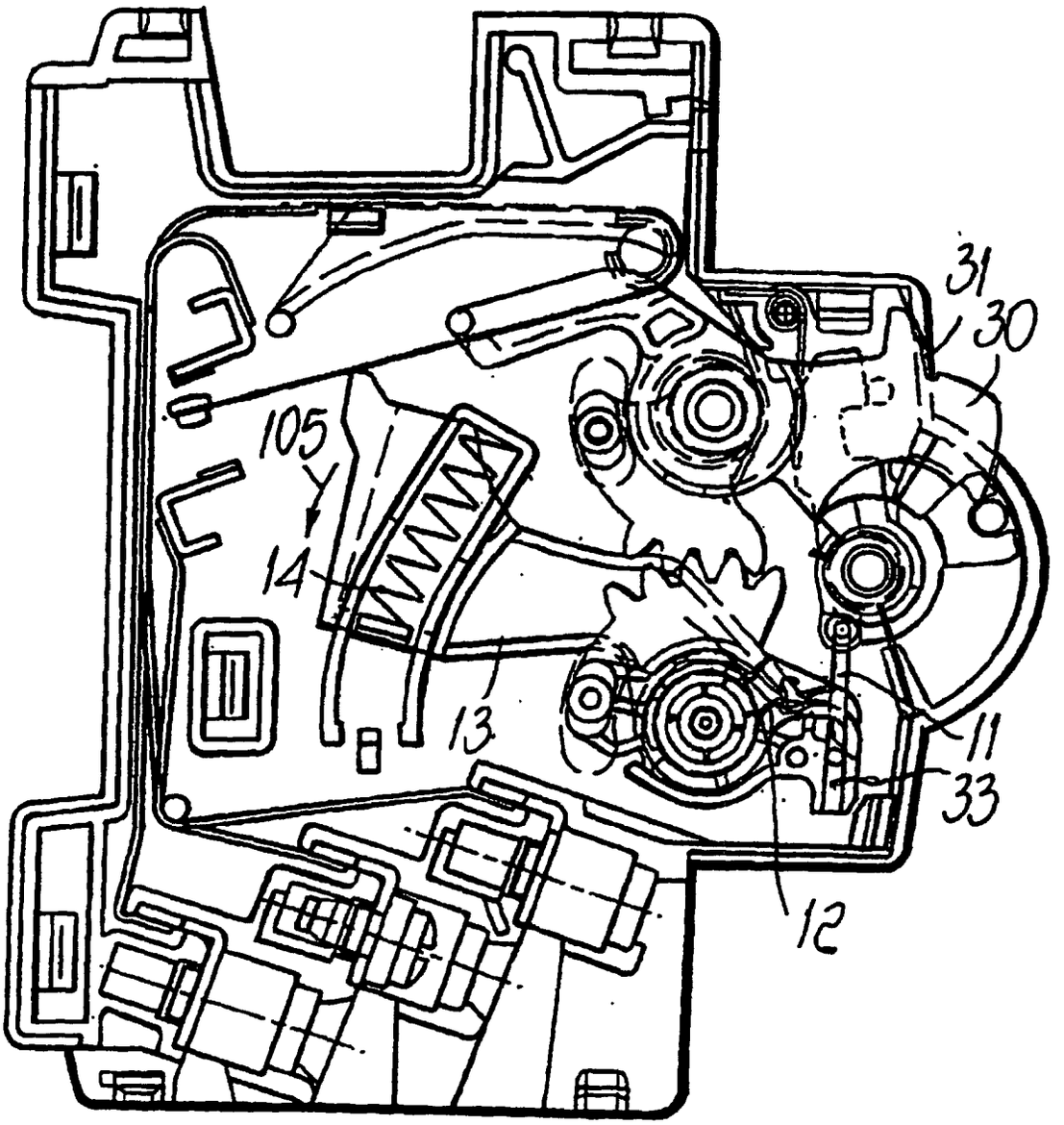



FIG. 4

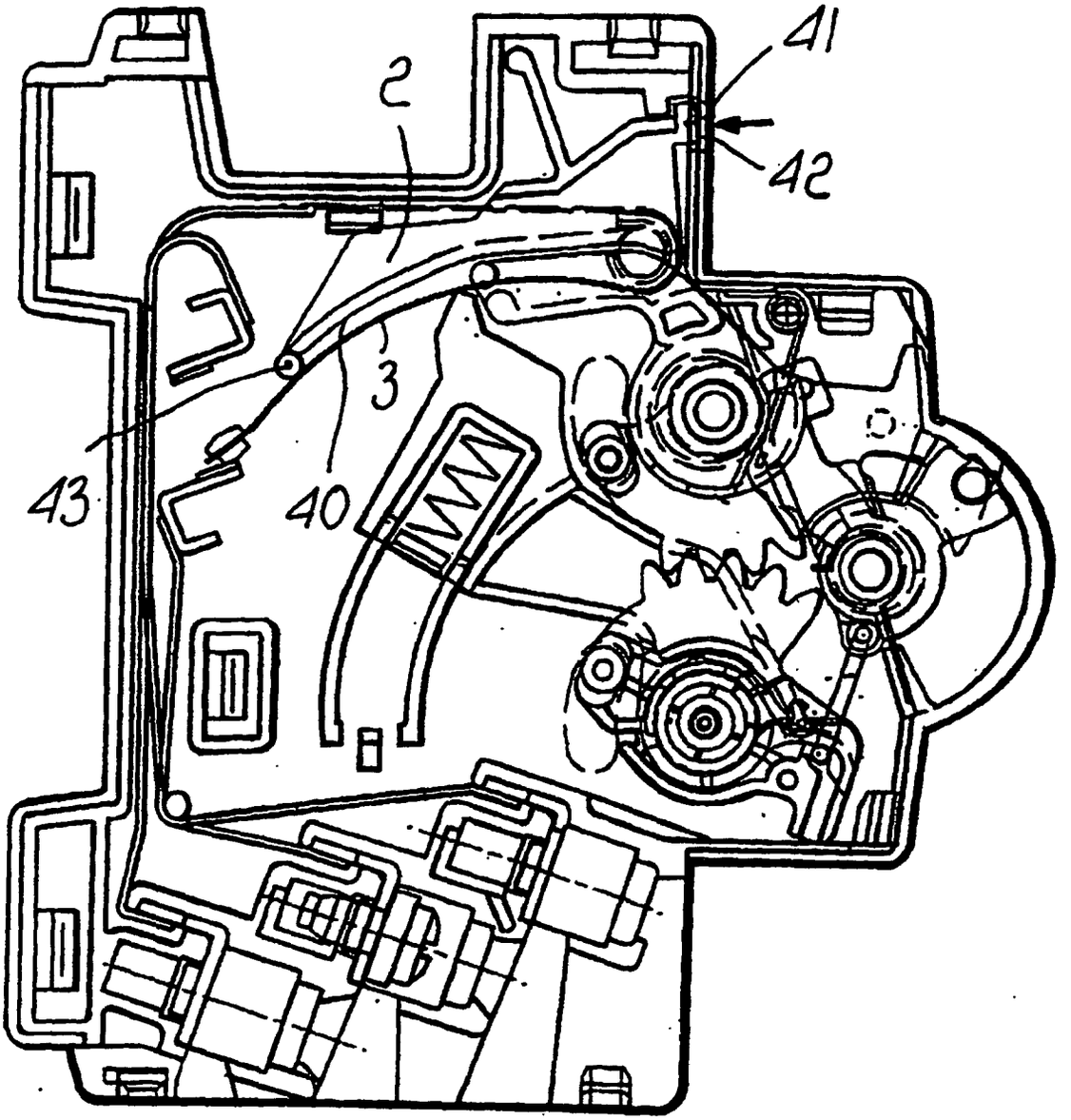



Fig. 5

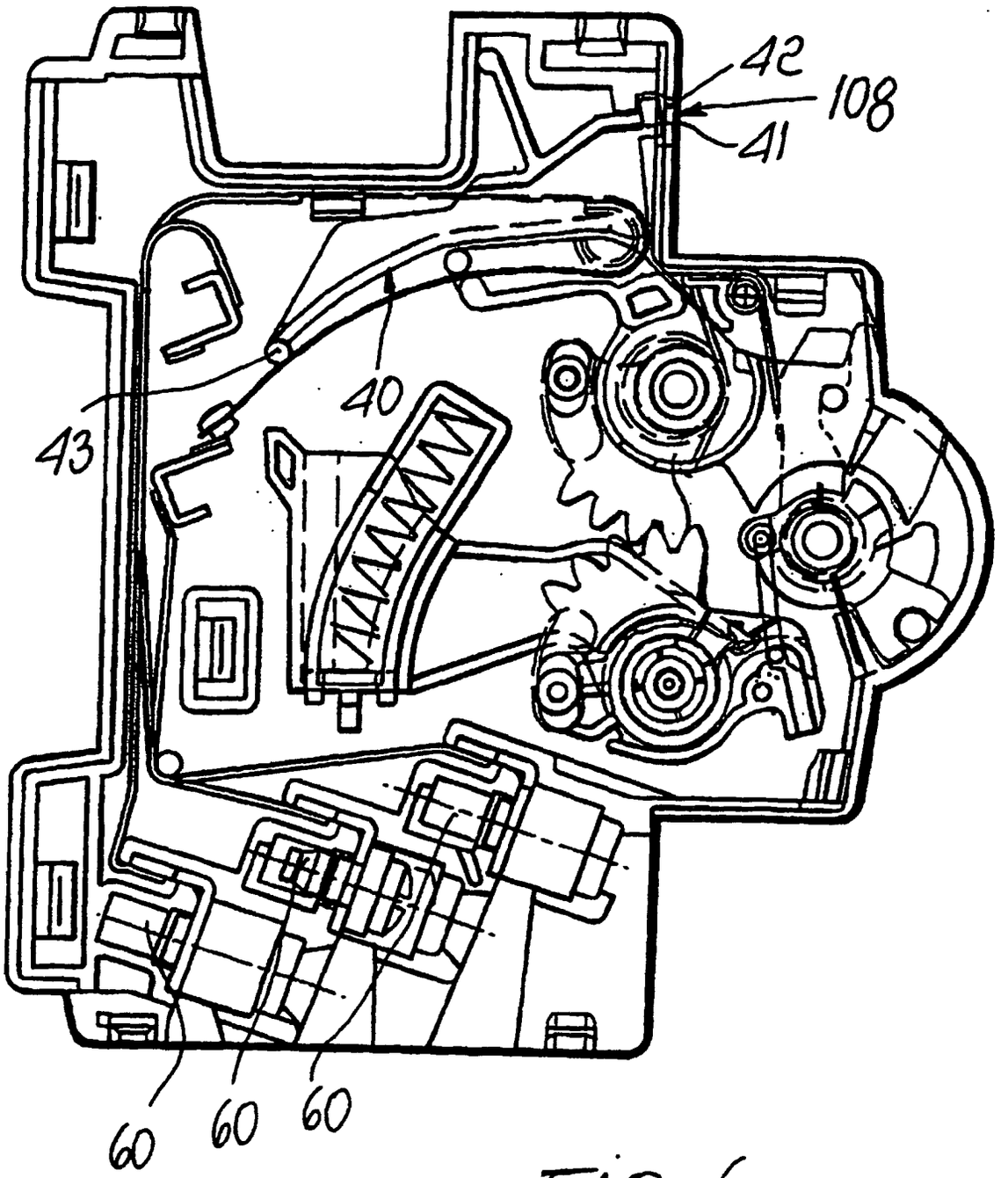



Fig. 6

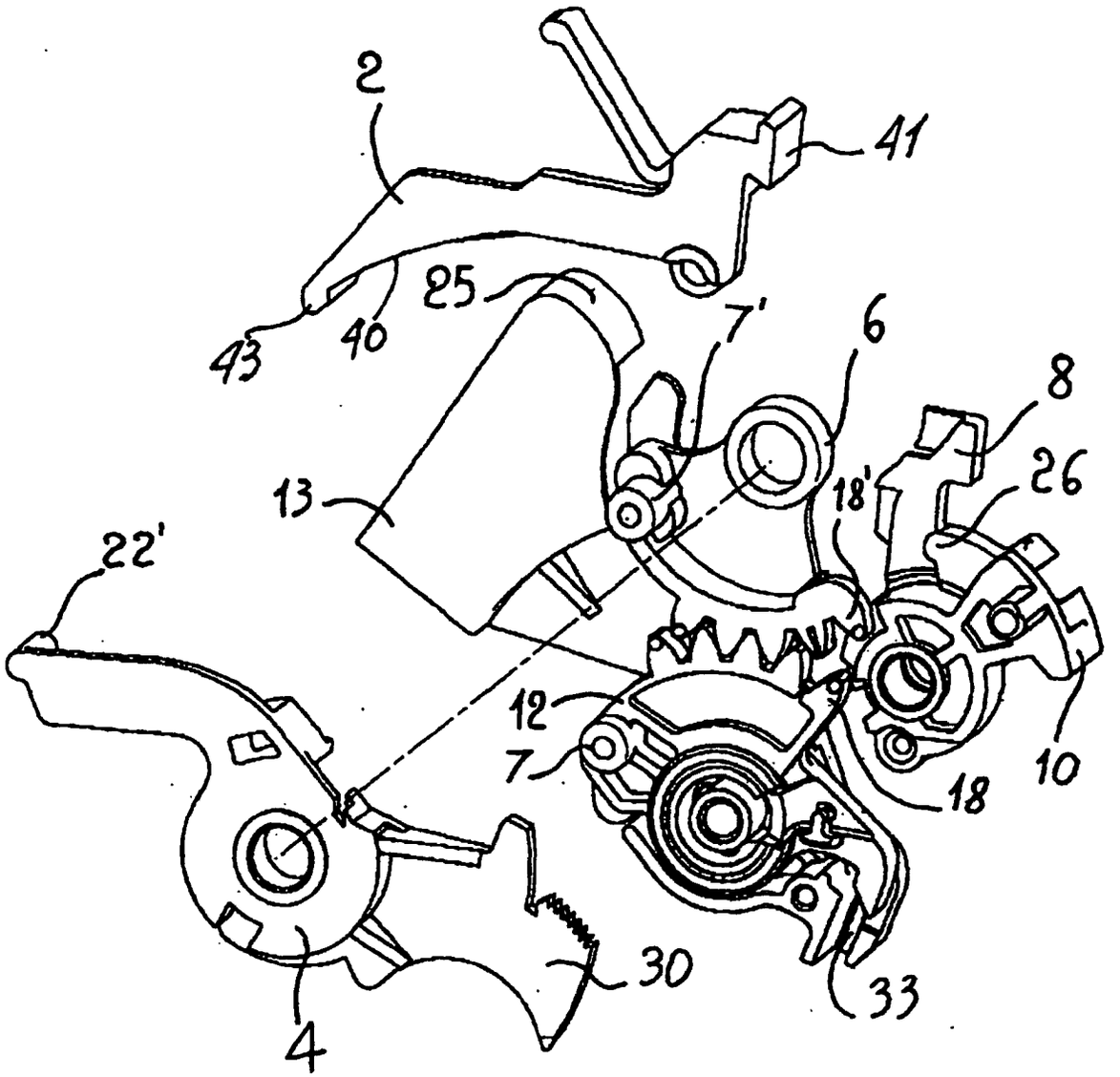



Fig. 7