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(54) **KINEMATIC SYSTEM FOR ACTUATING THE MOVABLE CONTACT OF AUTOMATIC ELECTRIC BREAKERS**

KINEMATISCHES SYSTEM ZUR ANSTEUERUNG DES BEWEGLICHEN KONTAKTES FÜR EINEN AUTOMATISCHEN LASTSCHALTER

SYSTEME CINEMATIQUE PERMETTANT D'ACTIONNER LE CONTACT MOBILE DE DISJONCTEURS ELECTRIQUES AUTOMATIQUES

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Description

[0001] The present invention relates to a kinematic system for actuating the movable contact of automatic electric breakers.

[0002] Kinematic systems have long been used in automatic electric breakers and allow to open and close the movable contact both by actuating an external handle which can be accessed by the user and by virtue of the automatic intervention of the protection devices provided internally.

[0003] The two constant problems in the design of these kinematic systems are the complexity of the mechanisms and the dimensions.

[0004] There is a constantly felt need to simplify the kinematic system from the constructive point of view in order to achieve low-cost production, and in this regard it is very important to try to achieve simple and automatable assembly.

[0005] EP-A-0224396 discloses a control mechanism for low tension electric breakers wherein a kinematic system actuates the release of the movable contact.

[0006] The aim of the present invention is to provide a kinematic system for actuating the movable contact, particularly for automatic electric breakers, which has a simplified construction with respect to the known art.

[0007] An object of the invention is to provide a kinematic system whose assembly is simplified.

[0008] Another object is to provide a kinematic system which is more reliable than conventional ones.

[0009] This aim, these objects and others which will become apparent hereinafter are achieved by a kinematic system for actuating the movable contact of automatic electric breakers comprising an actuation mechanism which has an actuation means pivoted to the body of a breaker and connected to a cross-member which is in turn connected to an actuation lever operatively associated with an actuation spring coupled to a first common pivot; said actuation lever being further operatively associated with a reset spring coupled to said first common pivot; said system comprising a mushroom-shaped member of a relay of the breaker acting on a reset lever which is in turn kinematically associated with a hook supported by a second common pivot; an engagement lever, retained by said hook, being adapted to act on the rear part of a traction lever allowing the release of said kinematic system; characterized in that it comprises an indicator connected to said engagement lever and pivoted to said actuation means.

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

Fig. 1 is a schematic perspective view of the breaker with a wall of the box-like body removed in order to clearly show the components;

Fig. 2 is an exploded perspective view of the kinematic system for the actuation of the residual current operated breaker;

Figs. 3 and 4 are views, taken from opposite sides, of the kinematic actuation system of the residual current operated breaker in the open position;

Figs. 5 and 6 are views, similar to the preceding ones, of the kinematic system for actuating the residual current operated breaker in the closed position;

Figs. 7 and 8 are views, similar to the preceding ones, of the kinematic system in the tripped position, with the lever still in the closed position;

Figs. 9 and 10 are views, similar to the preceding ones, of the kinematic system in the tripped position and with the contact open;

Figs. 11 and 12 are views, taken from mutually opposite sides, of the mechanism of the test circuit with the breaker in closed position;

Figs. 13 and 14 are views, similar to the preceding ones, of the mechanism of the test circuit with the breaker in tripped position;

Figs. 15 and 16 are views, similar to the preceding ones, of the mechanism of the test circuit with the breaker in the open position.

[0011] With reference to the above figures, a kinematic actuation system, particularly for electric breakers, according to the invention, generally designated by the reference numeral 1, includes a case body 3 which is constituted for example by the ordinary case body of a residual current operated breaker 100 which is adapted to be associated with conventional omega-shaped bars.

[0012] The kinematic system 1 includes an actuation mechanism 5 for the residual current operated breaker, shown in Figs. 3-10, and a test circuit mechanism 7, shown in Figs. 11-16.

[0013] The actuation mechanism includes an actuation means which is constituted for example by a conventional handle 9 which is pivoted to the body 3 and is connected to an actuation lever 11 by a U-shaped cross-member 13. The actuation lever 11 is connected to the kinematic system of the automatic breaker, shown schematically in Fig. 1. The cross-member 13 is connected to an actuation lever 15 which is operatively associated with a reset spring 17 and with an actuation spring 19 on a common pivot 21.

[0014] A mushroom-shaped member 23 of the relay acts on a reset lever 25 which is in turn kinematically associated with a hook 27 which is supported by a second common pivot 29 and is provided with a return

spring 47. An engagement lever 31, retained by the hook 27, is suitable to act on the rear part of a traction lever 33. The engagement lever 31 is connected to an indicator 35 which is pivoted to the handle 9 and is provided with a return spring 49.

[0015] The mechanism 7 of the test circuit is shown in greater detail in Figs. 11-16 and includes a test button 37 which is suitable to act on a test strip 39 which acts on a contact spring 41. The fixed contact 43 is connected to the pivot 21 by means of the actuation spring 19 and to a resistor 45 by means of the contact spring 41. The resistor 45 is in turn connected to the terminal.

[0016] The operation of the kinematic system is as follows.

[0017] By turning the handle 9, the cross-member 13 is moved and turns the actuation lever 11, which acts on the kinematic system of the automatic breaker. The cross-member 13 is also rigidly coupled to the actuation lever 15, which in the closing action turns and loads the reset spring 17 and the actuation spring 19. The reset spring 17, by loading, releases the reset lever 25, which can thus be pushed by the mushroom-shaped member 23 of the relay in case of activation.

[0018] In case of activation, the mushroom-shaped part of the relay pushes the reset lever 25, which by moving down shifts the hook 27. In this manner, the engagement lever 31 is released and turns; by striking the rear part of the traction lever 33, the engagement lever 31 allows the release of the kinematic system of the automatic breaker. The engagement lever 31 also disengages the indicator 35, which in the closed position was rigidly coupled to its rear part. Resetting occurs immediately after tripping: when the handle 9 returns, the actuation spring 19 turns the actuation lever 15 in the opposite direction with respect to the closure rotation. In this manner, the actuation lever repositions the engagement lever 31 by virtue of their physical coupling, returning its lower end into the seat of the hook 27, while the reset spring 17 repositions the reset lever 25, resetting the relay with a force which is linked to the return speed of the handle 9 and is therefore calibrated. It is noted that during resetting the indicator 35 is still active and is deactivated only after the first closure.

[0019] The operation of the test circuit entails the simulation of a residual current in order to check the operation of the relay and of the breaker. When the test button 37 is raised, the circuit is open and the contact spring 41 in fact does not touch the pivot 21. By actuating the test button in the direction indicated by the arrows in the figures, the contact spring 41 is lowered, closing the circuit. It should be noted that when the differential kinematic system has tripped, the test circuit must not be usable, otherwise the resistor 45 would burn out. Disabling of the test circuit is achieved in two ways: either by lifting the contact spring 41 by means of the engagement lever 31, which by rotating lifts the lower part of the contact spring 41, or by virtue of the insulation of the pivot 21 obtained by the rotation of the seat of the pivot

in the actuation lever 15, when the knob 9 is in the open position.

[0020] In practice it has been found that the invention achieves the intended aim and objects.

[0021] The kinematic actuation system of the movable contact, particularly for automatic electric breakers, according to the invention, is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept as defined in the appended claims.

[0022] The materials used, as well as the dimensions, may of course be any according to the requirements and the state of the art.

[0023] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Kinematic system for actuating the movable contact of automatic electric breakers comprising an actuation mechanism (5) which has an actuation means (9) pivoted to the body of a breaker (100) and connected to a cross-member (13) which is in turn connected to an actuation lever (15) operatively associated with an actuation spring (19) coupled to a first common pivot (21); said actuation lever (15) being further operatively associated with a reset spring (17) coupled to said first common pivot (21); said system comprising a mushroom-shaped member (23) of a relay of the breaker acting on a reset lever (25) which is in turn kinematically associated with a hook (27) supported by a second common pivot (29); an engagement lever (31), retained by said hook (27), being adapted to act on the rear part of a traction lever (33) allowing the release of said kinematic system;
characterized in that it comprises an indicator (35) connected to said engagement lever (31) and pivoted to said actuation means.
2. Kinematic system for actuating the movable contact, according to claim 1, **characterized in that** it comprises a test circuit mechanism comprising a test button (37) adapted to act on a contact spring (41), and a fixed contact (43) coupled to said first common pivot (21) by said actuation spring (19) and to a resistor (45) by means of said contact spring (41), said resistor being connected to a terminal of the breaker.

Patentansprüche

1. Kinematisches System zur Betätigung des beweglichen Kontaktes von automatischen Lastschaltern, welches einen Betätigungsmechanismus (5) aufweist, der ein drehbar an dem Körper eines Schalters (100) angelenktes und mit einem Querelement (13) verbundenes Betätigungselement aufweist, wobei das Querelement (13) wiederum mit einem Betätigungshebel (15) verbunden ist, welcher operativ mit einer Betätigungsfeder (19) mit einer ersten gemeinsamen Drehachse (21) verbunden ist, wobei der Betätigungshebel (15) des weiteren operativ mit einer Rückstellfeder (17) verbunden ist, die mit der ersten gemeinsamen Drehachse (21) verbunden ist, wobei das System ein pilzförmiges Element (23) eines Relais des Schalters aufweist, welches auf einen Rückstellhebel (25) wirkt, der wiederum kinematisch mit einem Haken (27) verbunden ist, der durch eine zweite gemeinsame Drehachse (29) getragen wird, wobei ein Eingriffshebel (31), welcher durch den Haken (27) gehalten wird, dazu vorgesehen ist, mit dem rückwärtigen Bereich eines Zughebels (33) zusammenzuwirken, wodurch das Auslösen des kinematischen Systems ermöglicht wird, **dadurch gekennzeichnet, daß** es ein Anzeigeelement (35) aufweist, das mit dem Eingriffshebel (31) verbunden ist und an dem Betätigungsmittel drehbar angelenkt ist.
2. Kinematisches System zur Betätigung des beweglichen Kontaktes nach Anspruch 1, **dadurch gekennzeichnet, daß** es einen Testschaltungsmechanismus aufweist, der einen zum Wirken an einer Kontaktfeder (41) vorgesehenen Testknopfs (37) und einen mit der ersten gemeinsamen Drehachse (21) mittels der Betätigungsfeder (19) und mit einem Widerstand (45) mittels der Kontaktfeder (41) verbundenen festen Kontakt (43) aufweist, wobei der Widerstand mit einem Terminal des Schalters verbunden ist.

me de champignon (23) d'un relais du disjoncteur agissant sur un levier de réarmement (25) qui, à son tour, est associé de manière cinématique à un crochet (27) porté par un deuxième pivot commun (29) ; un levier d'enclenchement (31), retenu par ledit crochet (27), étant adapté pour agir sur la partie arrière d'un levier de traction (33) permettant le déclenchement dudit système cinématique ;

caractérisé en ce qu'il comprend un indicateur (35) relié audit levier d'enclenchement (31) et monté à pivotement sur lesdits moyens d'actionnement.

2. Système cinématique d'actionnement du contact mobile, selon la revendication 1, **caractérisé en ce qu'il** comprend un mécanisme à circuit de test comprenant un bouton de test (37) adapté pour agir sur un ressort de contact (41), et un contact fixe (43) accouplé audit premier pivot commun (21) par ledit ressort d'actionnement (19) et à une résistance (45) au moyen dudit ressort de contact (41), ladite résistance étant connectée à une borne du disjoncteur.

Revendications

1. Système cinématique d'actionnement du contact mobile de disjoncteurs électriques automatiques comprenant un mécanisme d'actionnement (5) qui comporte des moyens d'actionnement (9) montés à pivotement sur le corps d'un disjoncteur (100) et reliés à un élément transversal (13) qui, à son tour, est relié à un levier d'actionnement (15) associé de manière fonctionnelle à un ressort d'actionnement (19) accouplé à un premier pivot commun (21) ; ledit levier d'actionnement (15) étant, en outre, associé de manière fonctionnelle à un ressort de réarmement (17) accouplé audit premier pivot commun (21) ; ledit système comprenant un élément en for-

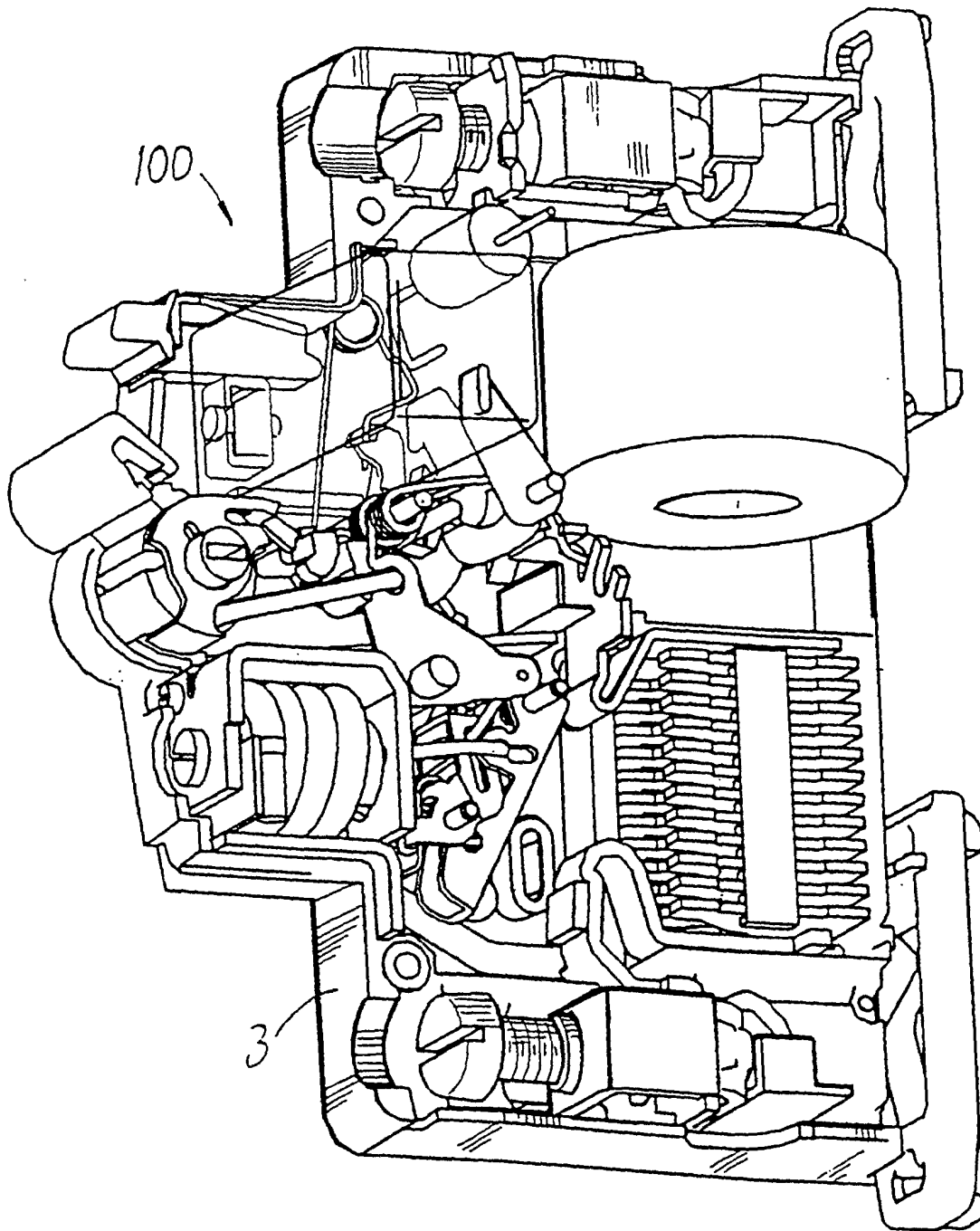


Fig.1

