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(54) **FUSE DISCONNECTOR**

SICHERUNGSTRENNSCHALTER

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Description

[0001] The subject of the invention is a fuse disconnecter intended to protect a wiring system from short-circuits and overcharging, easy to assemble that is the main protection and the main breaker as the protection of a meter and following units in the system.

[0002] DE-U-92 11 229 (corresponding to EP-A-0 584 587), on which the preamble of claim 1 is based, discloses a disconnecter, which contains a fuse-socket, and a contact-system started by a hand-moved trip lever placed on a frontal surface of disconnecter. The Disconnecter has two current terminals: one for connecting a conductor supplying voltage from a network and the other for connecting an offtake of energy to a receiver. A current circuit in a disconnecter linking two terminals consists of a contact-system and a fuse-element connected in series. Moving contacts are coupled by means of a stiff pusher with a trip lever whose hand-shifting from one operation position to another causes a change of circuit's state: closed or open: Shifting of moving contacts when closing as well when opening takes place with a speed dependent on speed of trip lever's shifting. In the whole range of angular shifting of a trip lever, the end of a pusher follows a recess in this lever. While switching on circuits with a low power factor or with significant powers it has an unfavourable effect on disconnecter's life as well as on a run of transient currents in a circuit. Disconnection of a current circuit enables safe removing of a fuse element from disconnecter's socket because it stays in a voltageless and currentless state.

[0003] In on-position of a trip lever, a replacement of a fuse-element is not possible because a fuse-head is covered by lever's arm.

[0004] Shift of a trip lever into an on-position, when a fuse-head is totally or partly screwed out, is impossible because of a blocking mechanism started by a moving contact of a fuse-element. Under the force of a push-spring the contact shifts when the fuse-head is being screwed out. Correct functioning of a blocking mechanism is dependent on the precision of elements that a mechanism is composed of, because most of them are not fixed to a housing and they are movable. Apart from a switching-on function, fuse disconnectors serve also as a protection against the results of short-circuit and overcharging. This function is performed by a built-in fuse-element. Disconnectors are protected by additional metal limiter-rings and thus installation of a fuse-element with a rated current greater than a disconnecter's rated current is impossible, otherwise it could be dangerous for a protected circuit, and it could arise, for example, from an operator's error. Every rated current needs a different size of a ring.

[0005] EP 0 242 664 also discloses an electric connector, hand-operated, with a double-arm trip lever seated in a rotary bearing of a housing. Shifting of this lever between an opening position and a closing position causes closing and opening out of a contact bridge. A

contact bridge in this connector is shifted by means of a toggle formed by a trip lever's arm linked by a rotary-slidable joint with a slider. A tail end of a slider presses a contact bridge. A slider has got a latch-nose between its ends. After shifting a trip lever to a closing position a nose shifts behind a mesh with a latch-cog, stationary towards a housing. After crossing toggle's straightening position towards closing of contacts, a slider can move freely in a trip lever. Pressure of a spring placed under a contact bridge causes that a slider, together with a contact bridge is percussively shifted to contacts' closing position. So intermittent switching on is obtained, no matter how quickly a trip lever is shifted by the operator.

[0006] The purpose of this invention is designing a simple fuse disconnecter where contacts of a current circuit close dynamically, no matter how quickly a trip lever is shifted, and protection against switching a lever on when a fuse-head is screwed out is simple, not demanding a special precision in construction of many elements. Besides this, its task is to simplify the protection system against installation of a fuse-element with rated current greater than rated current of a disconnecter.

[0007] The essence of the invention lies in the fact that a moving contact is switched on by hand-operation which has a stiff tension member with one arm seated in rotary bearing in traverse and with the other arm co-operating with a port in a trip lever with a longitudinal axle situated on a radius attached in the rotation-point of a trip lever. A blocking lever is doublearmed, seated in a bearing of an axle which is fixed permanently in a disconnecter's body and its one end co-operates with a notch of a trip lever and the other end co-operates with a shaped side-surface of a limiter-insert. Insert's inner diameter's size (made of a homogeneous material) depends on the value of a rated current of a disconnecter. An additional disconnection of a current circuit is achieved by a pressure pad, seated in a limiter-insert. The pad is pressed down by a flat spring to a terminal.

[0008] The port in a trip lever is a hole in the shape of an arc resting on an angle of approximate 90, and the radius of the arc is attached in a rotation axis of a trip lever and lies on the opposite side of a trip lever's arm.

[0009] Resistance in the body reduces the tension member's pressure in the port on a trip lever. A blocking lever is pressed down to a trip lever by a spring.

[0010] A pressure pad is seated in a slidable bearing situated in a limiter-insert. The end of the pad, forming a contact with a terminal, is bent at an angle corresponding to an angle of terminal's bend.

[0011] One of the advantageous results of this invention is a lesser wear of contact tips in a disconnecter and a better transient currents' run when switching on a circuit, and also a simplicity and low costs of blocking mechanism and limiter-insert as well as a reliability of additional contact gap's system.

[0012] A fuse disconnecter is presented in a drawing, where figure 1 shows a disconnecter in on-position, figure 2 a disconnecter in open-state, figure 3 shows the

action of disconnecter's blocking mechanism.

[0013] The housing of disconnecter with a fuse-socket is made of plastics and consists of two parts: body 1 and cover 2. The two parts are connected with each other by rivets 27.

[0014] In the middle part of disconnecter's housing there is a fuse-socket with a fuse-element 10 which is fixed by a cylindrical head of the fuse 8.

[0015] In a trip lever 3 there is a sight-hole 18 which enables to look into a round window 28 protected by a pane 9 and it is used to control the state of a fuse-element 10. A fuse-element 10 is surrounded by a round thread 25 connected with a fuse-head 8. A free part of a round thread 25 is connected with a holder 24 (permanently seated in the body 1 of disconnecter 24) of a fuse element 10, and it enables an electric run from a holder 24 through a thread 25 to a fuse-element 10.

[0016] A holder 24 is linked with a left terminal 21 through a moving contact 23. From the other side, an electric run takes place from a fuse-element 10 on - seated in a slidable bearing 33 a pressure pad 26 to a right terminal 22, and a required connecting power is obtained by a flat spring's pressure 13.

[0017] A current circuit in on-state closes from a left connecting terminal 19 through a left terminal 21 on a moving contact 23, and then from a contact on a holder 24 of a fuse-element 10, from where-through a round thread 25 on a fuse-head 8, a fuse-element 10, its pressure pad 26 and a right terminal 22 to a right connecting terminal 20.

[0018] A movement of a trip lever 3 around an axle 11 to an open-position causes opening of a moving contact 23 and disconnecting of a circuit.

[0019] A hole 30 situated in a trip lever 3 enables the transfer of a drive on a tension member 31. A stiff tension member 31 has one arm seated in a rotary bearing 32 in traverse 4 and the other arm co-operating with a port 30 in trip lever 3. A rotary movement of a lever 3 around an axle 11 causes shifting of a tension member 31 which overcomes spring's force 14 and shifts a traverse 4 together with a moving contact 23 and thus a disconnection of circuit between a terminal 21 and a holder 24 takes place. A resistance 29 situated in a body 1 enables keeping a trip lever 3 in an open-state. A spring 15 protects against clearances between a tension member 31 and a trip lever 3 as contact tips get worn out in a disconnecter.

[0020] Additionally, screwing a fuse-head 8 out causes shifting of a limiter -insert 6 together with a pressure pad 26 under the operation of a pressure spring 17 in its upper position, what forms an additional break in a contact between a pressure pad 26 and a terminal 22.

[0021] A blocking mechanism of a disconnecter works in an off-state; when a fuse-element is missing 10 or when it is not turned tight, the disconnecter cannot work. While screwing a fuse-head out 8 a limiter-insert 6 is shifted under the operation of a spring 17 and blocking is released. Under the force of a blocking spring 16 it

turns around an axle 12 and the trip lever 3 is blocked by its end 5a and the notch of the lever 3a.

[0022] After the fuse-head 8 is screwed in together with fuse-element 10 the limiter-insert 6 is shifted at the same time to its bottom position. In the course of shifting the insert's 6 prong 6a operates the end 5b of blocking lever 5 and after reaching a specified contact -force between the pressure pad of insert 26 and terminal 22 there occurs the release of blocking and possibility of reinforcing the disconnecter.

[0023] The disconnecter has bistable latches 7 which enable easy assembly on the rail.

15 Claims

1. A fuse disconnecter comprising a fuse socket (6, 25), a double-break contact system, placed within the disconnecter (1) disconnecting a current line and hand-driven by a trip lever (3) coupled to a tension member (31), a blocking mechanism (3a, 5a) for said lever, a pressure pad (6) for said fuse element placed in a current line, which is arranged under a fuse element (10) and additionally disconnects a current circuit when said fuse element (10) is removed, a moving contact (23) coupled to a stiff tension member (31) with one arm seated in a rotary bearing (32) in traverse (4) and with the other arm cooperating with a port (30) in said trip lever (3) with a longitudinal axle situated on a radius attached in the rotation-point of a trip lever (3), a blocking lever (5), which is seated in a bearing of an axle, which is fixed permanently in a disconnecter's body (1) and whose one end cooperates with a notch (3a) of said trip lever (3), wherein the inner diameter of an insert (6) depends on the value of a rated current of said disconnecter, whereas a pressure pad (26) seated in a bearing (32) formed as an insert is made of a homogeneous material (6) and is pressed down by a flat spring (13) to a terminal (22), **characterized in that** said blocking lever (5) is double-armed and seated in a bearing of an axle (12), which is fixed permanently in a disconnecter's body (1), one end cooperating with a notch (3a) of said trip lever (3) and the other end cooperating with a shaped side surface of said limiter insert (6), and **in that** said pressure pad (26) is seated in a bearing (32) formed as an insert and made of a homogeneous material, wherein said pressure pad (26) is pressed down by flat spring (13) to a terminal (22).
2. A fuse disconnecter according to claim 1, **characterized in that** the port (30) of said trip lever (3) is a hole in the shape of an arc resting with an angle of approximately 90°, the radius of the arc being attached in a rotation axis of said trip lever (3) and lying on the opposite side of said trip lever's arm.

3. A fuse disconnecter according to claim 1, **characterized in that** a resistance (29) in the body (1) reduces the pressure of an arm of said tension member (31) in the port on said trip lever (3).
4. A fuse disconnecter according to claim 1, **characterized in that** said blocking lever (5) is pressed down to said trip lever (3) by means of a spring (16).
5. A fuse disconnecter according to claim 1, **characterized in that** said pressure pad (26) is seated in a slidable bearing (32) situated in a limiter insert (6), wherein an end of the pad, forming a contact with a terminal (22), is bent at an angle corresponding to an angle of the terminal's bend (22).

Patentansprüche

1. Sicherungstrennschalter, umfassend einen Sicherungssockel (6, 25), ein Kontaktsystem mit doppelter Unterbrechung bzw. zwei Polen, das innerhalb des Trennschalters (1) angeordnet ist, eine Stromleitung unterbricht und von einem Auslöse- bzw. Schalthebel (3) handbetätigt wird, der mit einem Spannelement (31) gekoppelt ist, einen Blockier- bzw. Sperrmechanismus (3a, 5a) für den Hebel, eine Druckkufe (6) für das Sicherungselement, das in einer Stromleitung angeordnet ist, welche unter einem Sicherungselement (10) angeordnet ist und zusätzlich einen Stromkreis unterbricht, wenn das Sicherungselement (10) entfernt wird, einen beweglichen Kontakt (23), der mit einem steifen Spannelement (31) gekoppelt ist, mit einem Arm, der in einem Drehlager (32) in einem Balken (4) sitzt, und mit dem anderen Arm, der mit einer Öffnung (30) in dem Auslöse- bzw. Schalthebel (3) zusammenwirkt, wobei ein länglicher Bolzen, der auf einem Radius angeordnet ist, in dem Drehpunkt eines Auslöse- bzw. Schalthebels (3) angebracht ist, einem Blockier- bzw. Sperrhebel (5), der in einem Lager eines Bolzens sitzt, der bleibend in einem Körper (1) des Trennschalters angeordnet ist und dessen eines Ende mit einer Kerbe (3a) des Auslöse- bzw. Schalthebels (3) zusammenwirkt, wobei der Innendurchmesser eines Einsatzes von dem Wert eines Nennstroms des Trennschalters abhängt, wohingegen eine Druckkufe (26), die in einer Einkerbung (32) sitzt, als ein Einsatz ausgebildet ist und aus einem homogenen Material (6) hergestellt ist und von einer Federscheibe (13) zu einem Anschluss (22) abwärts gedrückt wird, **dadurch gekennzeichnet, dass** der Blockier- bzw. Sperrhebel (5) doppelarmig ist und in einem Lager eines Bolzens (12) sitzt, der bleibend in einem Körper (1) des Trennschalters fixiert ist, wobei ein Ende mit einer Kerbe (3a) des Auslöse- bzw. Schalthebels (3) zusammenwirkt und das andere Ende mit einer ge-

formten Seitenfläche des Begrenzereinsatzes (6) zusammenwirkt, und dass die Druckkufe (26) in einer Einkerbung (32) die als ein Einsatz ausgebildet ist und aus einem homogenen Material hergestellt ist, wobei die Druckkufe (26) von einer Federscheibe (13) zu einem Anschluss (22) runtergedrückt wird.

2. Sicherungstrennschalter nach Anspruch 1, **dadurch gekennzeichnet, dass** die Öffnung (30) des Auslöse- bzw. Schalthebels (3) ein Loch in Form eines Bogens ist, der unter einem Winkel von etwa 90° ruht, wobei der Radius des Bogens in einer Drehachse des Auslöse- bzw. Schalthebels (3) angebracht ist und auf der gegenüberliegenden Seite des Armes des Auslöse- bzw. Schalthebels aufliegt.
3. Sicherungstrennschalter nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Widerstand (29) in dem Körper (1) den Druck eines Armes des Spannelements (31) in der Öffnung des Auslöse- bzw. Schalthebels (3) verringert.
4. Sicherungstrennschalter nach Anspruch 1, **dadurch gekennzeichnet, dass** der Blockier- bzw. Sperrhebel (5) mit Hilfe einer Feder (16) zu dem Auslöse- bzw. Schalthebel (3) runtergedrückt wird.
5. Sicherungstrennschalter nach Anspruch 1, **dadurch gekennzeichnet, dass** die Druckkufe (26) in einer Gleiteinkerbung (32) sitzt, die sich in einem Begrenzereinsatz (6) befindet, wobei ein Ende der Kufe, das einen Kontakt mit einem Anschluss (22) ausbildet, um einen Winkel gebogen ist, der einem Winkel der Krümmung des Anschlusses (22) entspricht.

Revendications

1. Disjoncteur - fusible comprenant une douille de fusible (6, 25), un système de contact à double rupture disposé à l'intérieur du disjoncteur (1), débranchant une ligne de courant et entraîné à la main par un levier de déclenchement (3) accouplé à un organe de tension (31), un mécanisme de blocage (3a, 5a) pour ledit levier, un tampon de poussée (6) pour ledit élément de fusible placé dans une ligne de courant, qui est agencé en dessous d'un élément de fusible (10) et qui de plus débranche un circuit de courant lorsque ledit élément de fusible (10) est enlevé, un contact mobile (23) de tension raide (31) dont un arbre est logé dans un palier rotatif (32) dans une traverse (4) et dont l'autre bras coopère avec un orifice (30) ménagé dans ledit levier de déclenchement (3) et avec un axe longitudinal situé sur un rayon relié au centre de rotation d'un levier de déclenchement (3), un levier de blocage (5) logé

dans un palier d'un axe qui est fixé de manière permanente dans un corps de disjoncteur (1) et dont une extrémité coopère avec une entaille (3a) dudit levier de déclenchement (3), le diamètre intérieur d'une garniture (6) dépendant de la valeur d'un courant nominal dudit disjoncteur, un tampon de poussée (26) logé dans un palier (32) configuré comme garniture réalisée en un matériau (6) homogène étant repoussé vers le bas par un ressort plat (13) en direction d'une borne (22), **caractérisé en ce que** ledit levier de blocage (5) est à double bras et est logé dans un palier d'un axe (12) qui est fixé de manière permanente dans un corps (1) du disjoncteur, une extrémité coopérant avec une entaille (3a) dudit levier de déclenchement (3) et l'autre extrémité coopérant avec une surface latérale configurée de ladite garniture de limiteur (6), et **en ce que** ledit tampon de poussée (26) est logé dans un palier (32) configuré comme garniture et réalisé en un matériau homogène, ledit tampon de poussée (26) étant repoussé vers le bas par un ressort plat (13) en direction d'une borne (22).

2. Disjoncteur - fusible selon la revendication 1, **caractérisé en ce que** l'orifice (30) dudit levier de déclenchement (3) est un trou configuré comme arc d'un angle d'environ 90°, le rayon de l'arc étant relié à un axe de rotation dudit levier de déclenchement (3) et étant situé du côté opposé dudit bras du levier de déclenchement.
3. Disjoncteur - fusible selon la revendication 1, **caractérisé en ce qu'**une résistance (29) du corps (1) réduit la pression d'un bras dudit organe de tension (31) dans l'orifice dudit levier de déclenchement (3).
4. Disjoncteur - fusible selon la revendication 1, **caractérisé en ce que** ledit levier de blocage (5) est repoussé vers le bas vers ledit levier de déclenchement (3) au moyen d'un ressort (16).
5. Disjoncteur - fusible ce moment revendication 1, **caractérisé en ce que** ledit tampon de poussée (26) est logé dans un palier coulissant (32) situé dans une garniture de limiteur (6), une extrémité du tampon formant un contact avec une borne (22) étant inclinée sous un angle qui correspond à un angle d'inclinaison de la borne (22).

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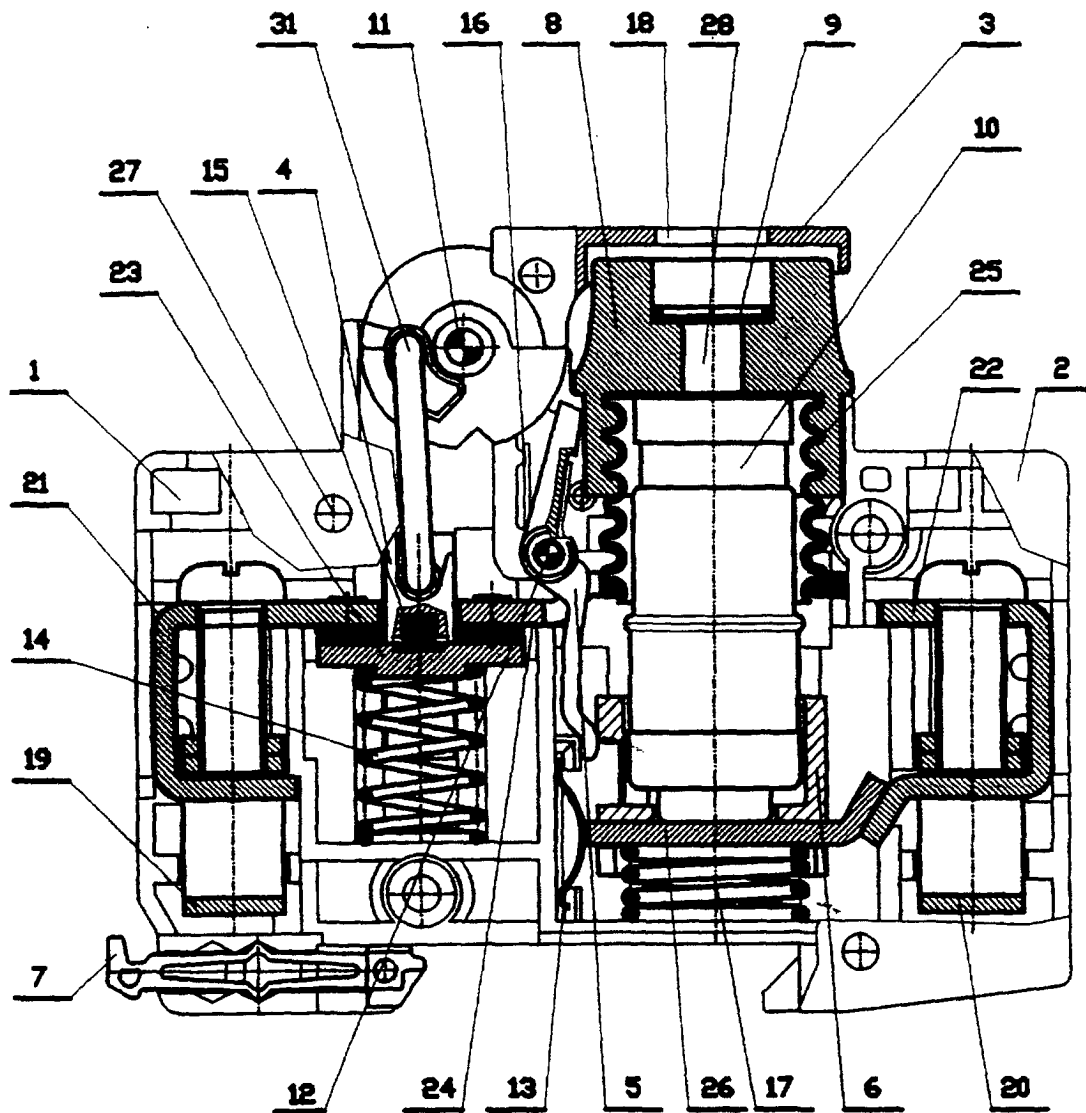


Fig.1

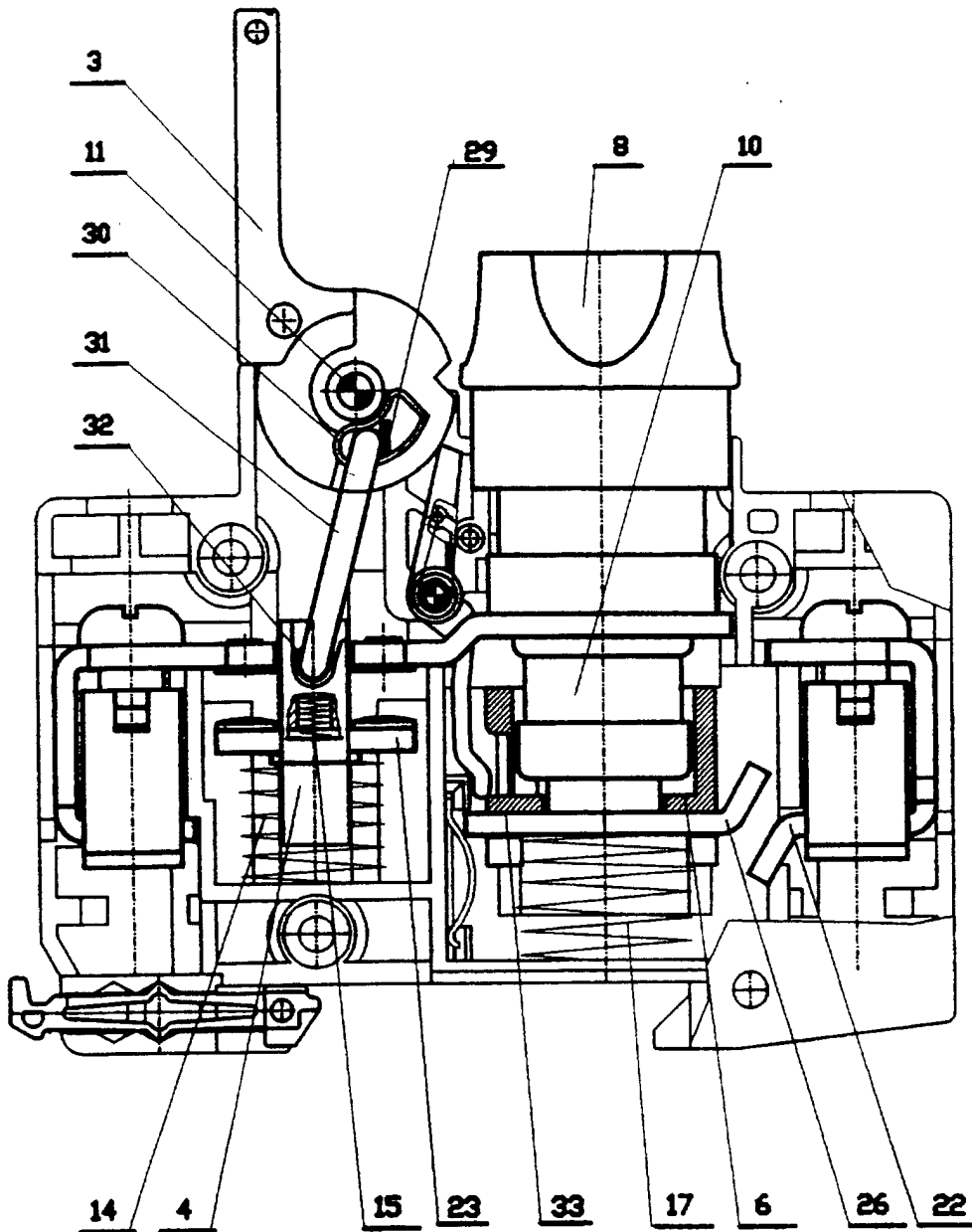


Fig.2

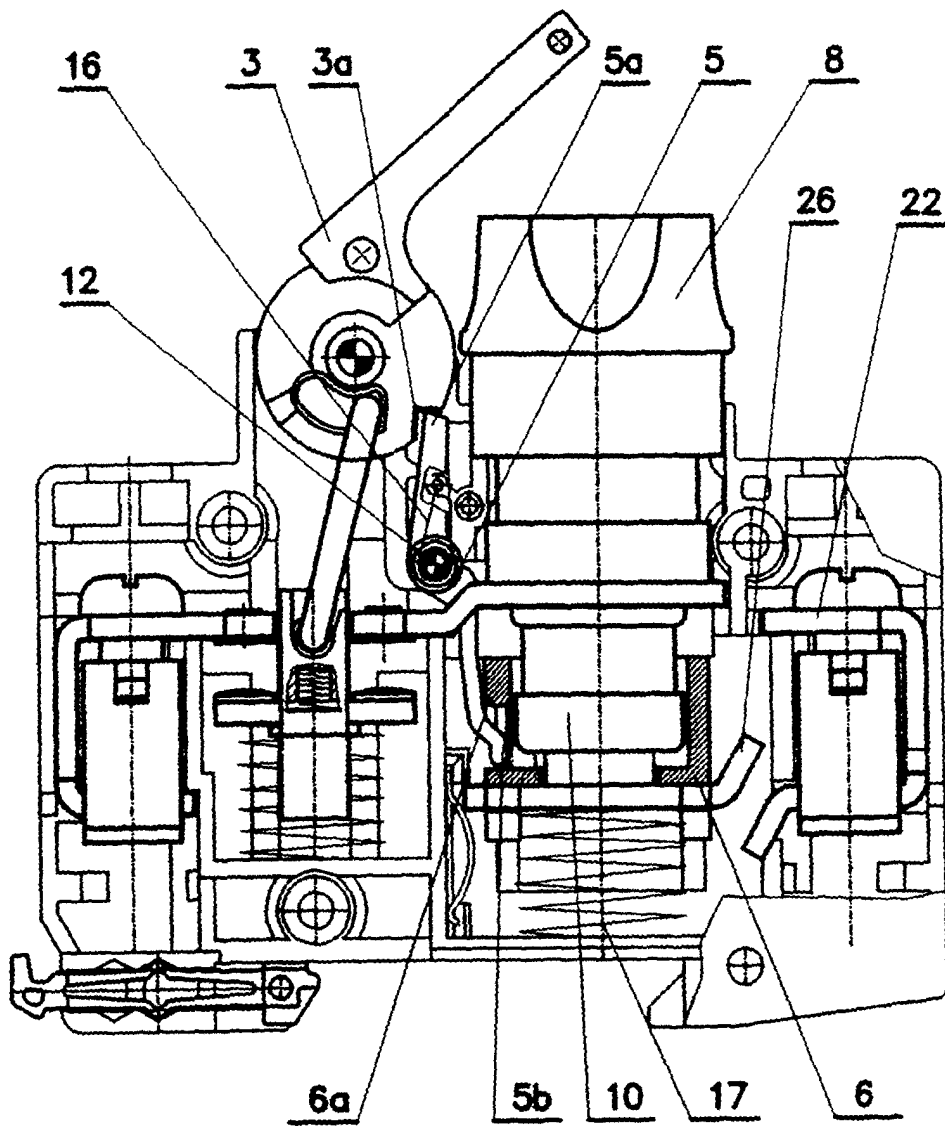


Fig.3