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⑤④ **A moving contact assembly for a civil range electric equipment circuit breaker.**

⑤⑦ A moving contact assembly (26) for a civil range electric equipment circuit breaker has a simple lightweight construction and comprises a contact holding body (31), at least one moving contact (19,23), and means (32) of attachment for spring mounting said moving contact (19,23) on the contact holding body (31), which means comprise a pin (48) jutting out of the contact holding body (31) and engaging in a hole (49) formed in the moving contact (19,23), a forked spring (51) having prongs (53,54) wound into a spiral around the pin (48) on opposed sides of the moving contact (19,23), the base (52) of the forked spring (51) constantly biasing the moving contact (19,23) toward the fixed contact, and the ends (55, 56) of the prongs (53,54) engaging against the contact holding body (31), and retainer means (60) for retaining the moving contacts (19,23) axially on the pin (48).

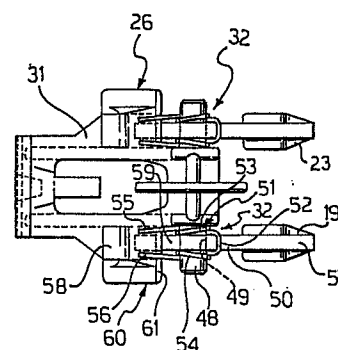


Fig-5

Description

This invention relates to a moving contact assembly for a civil range electric equipment circuit breaker, being of a type which comprises a contact holding body and at least one moving contact, and means of attachment for spring mounting said moving contact on the contact holding body.

It is the object of this invention to provide a moving contact assembly of straightforward lightweight construction suitable for automated manufacturing processes.

This object is achieved by a moving contact assembly of the kind specified above being characterized in that said means of attachment comprise a pin jutting out of the contact holding body into engagement with a hole formed in the moving contact, a forked spring having prongs wound into a spiral around the pin on opposed sides of the moving contact, the base of the forked spring acting on the moving contact to constantly bias it toward the fixed contact and the prong ends being engaged against the contact holding body, and retainer means effective to retain the moving contact axially on the pin.

Further features and the advantages of the contact holder assembly according to this invention will become apparent from the following detailed description of a preferred embodiment thereof, given by way of illustration and not of limitation with reference to the accompanying drawings, where:

Figure 1 is an exploded perspective view of a circuit breaker incorporating a moving contact assembly according to the invention;

Figure 2 is a perspective detail view of the circuit breaker, as viewed in the direction of the arrow II;

Figure 3 is an elevation detail view of the circuit breaker of Figure 1, as viewed in the direction of the arrow III;

Figure 4 is an elevation view of the same detail as shown in Figure 3 but at a different stage of its operation; and

Figure 5 is an enlarged scale plan view of the moving contact assembly of the circuit breaker shown in Figure 1.

With reference to the drawing figures, the numeral 1 denotes generally a circuit breaker according to the invention, which is intended for mounting in a small frame, not shown, of enclosed boxes for civil range electric equipment. Of course, such circuit breakers as this would also lend themselves for jutting installations and exchanges.

The circuit breaker 1 of this invention comprises a core member 2 of substantially parallelepipedal shape, which is formed of a substantially rectangular central diaphragm 3 bounded along one side and the two sides adjoining said one side by a framing member 4. The circuit breaker 1 further comprises a pair of cheek pieces, namely a first cheek piece 5 and a second cheek piece 6, as well as fasteners 7 for securing the cheek pieces 5 and 6 on the core member 2, thereby providing a box-type body 8

adapted for mounting on a frame from the MAGIC civil range and constituting a module, its cross dimensions being preferably of 23-25 mm. To this aim, the cheek pieces 5 and 6 are provided with means of attachment 5a and 6a, respectively, which are formed of blocks of a preset size adapted to engage with mating means of attachment associated with the carrier frame from the MAGIC range.

The fasteners 7 for securing the cheek pieces 5 and 6 on the core member 2 comprise four screws 9 extending from the cheek piece 5 through the core member 2 to the cheek piece 6 in threaded engagement therein.

The circuit breaker 1 also comprises a further pair of cheek pieces 10 and 11, respectively interchangeable with the cheek pieces 5 and 6 in the first-mentioned pair and securable on the core member 2 by means of like fasteners 7. In this instance, the circuit breaker 1 will fit in a carrier frame from the LIVING civil range. To this aim, the cheek pieces 10 and 11 are provided with respective means 10a and 11a of attachment in the form of blocks of a preset size adapted to engage with mating attachment means associated with the carrier frame from the LIVING range.

The circuit breaker 1 also comprises a further pair of cheek pieces 12 and 13, also respectively interchangeable with the cheek pieces 5 and 6 in the first-mentioned pair and being also securable on the core member 2 by means of like fasteners 7. In this instance, the circuit breaker 1 would fit in a carrier frame from the TEKNE range. To this aim, the cheek pieces 12 and 13 are provided with hook-up dogs 12a and 13a which engage in corresponding seats associated with the carrier frame from the TEKNE range.

The body 8 of the circuit breaker 1 accommodates a pole pair, namely a protected pole 14 and a neutral pole 15. The protected pole 14 is received between the core member 2 and the cheek piece 5, and extends between an input terminal 16 and an output terminal 17. Provided along the pole 14 are a fixed contact 18, located on the input terminal 16 side, and a moving contact 19, located on the output terminal 17 side. The neutral pole 15 is received between the core member 2 and the cheek piece 6, and extends between an input terminal 20 and an output terminal 21. Provided along the pole 15 are a fixed contact 22, located on the input terminal 20 side, and a moving contact 23, located on the output terminal 21 side.

The circuit breaker 1 further comprises circuit breaking linkages, comprehensively designated 24, which are supported on the core member 2. The linkages 24 include a key 25 and a moving contact holder assembly 26. Between the key 25 and the moving contact holder assembly 26, there is provided a toggle mechanism, known per se, as indicated at 27.

The circuit breaking linkages 24 also include a spring loaded lever 28 for hooking the moving contact holder assembly 26 in the make position of

the circuit breaker. The lever 28 is pivoted on the diaphragm 3 astride it and has two lugs 29 and 30 placed on opposed sides of the diaphragm 3, the lug 29 being on the cheek piece 5 side and the lug 30 being on the cheek piece 6 side.

The moving contact holder assembly 26 includes a contact holding body 31 being a unitary construction from a non-conductive material, such as a plastics material, which straddles the diaphragm 3 of the core member 2. Spring mounted to the contact holding body 31 are the two moving contacts 19 and 23 through respective means of attachment 32, to be explained hereinafter.

The two moving contacts 19 and 23 extend on opposed sides of the diaphragm 3 into two respective arcing chambers 33 and 34 formed in the body 8 between the core member 2 and the cheek pieces 5 and 6, respectively. The arcing chambers 33 and 34 are formed with respective venting slits 33a and 34a which open outwards and are formed partway in the cheek pieces and partway in the framing member 4 of the core member 2, on opposed sides of the central diaphragm 3. The moving contacts 19 and 23 are movable through equal paths T toward and away from their respective fixed contacts 19 and 22, facing the interiors of said chambers 33 and 34, respectively.

In the diaphragm 3 of the core member 2 there is formed a throughgoing socket 35 having an L-shaped cross-section. The reference numeral 36 denotes a metal crosspiece, preferably made of copper-plated iron, which has an L-shaped cross-section matching the L-shaped cross-section of the throughgoing socket 35.

The crosspiece penetrates, with a middle portion 37 thereof, the throughgoing socket 35, in a substantially force fit relationship, and has opposed end portions 38 and 39 overhanging into said chambers 33 and 34.

The socket 35, and hence the crosspiece 36, is positioned relatively to the moving and fixed contacts such that the crosspiece is at a preset distance, preferably of 2-3 mm, from the path T, and such that the back of the "L" is facing the path T.

The key 25 of the circuit breaker 1 according to the invention is adapted to receive as by snap action a key capping 40 appropriate for the MAGIC civil range. It should be noted that the cheek pieces 5 and 6 are formed with respective seats 5b and 6b mating with the key 25. Indicated at 41 is a yoke which extends all around the key 25 and the capping 40 and is provided with means of mechanical connection interacting between the attachment means 5a and 6a and the carrier frame from the MAGIC civil range.

The key 25 is adapted to receive as by snap action, and in an interchangeable manner with the capping 40, a key capping 42 appropriate for the LIVING civil range, as well as a key capping 43 appropriate for the TEKNE civil range, again interchangeably with the capping 40.

The cheek pieces 10 and 11, and the cheek pieces 12 and 13, are also formed with respective seats 10b, 11b, and 12b, 13b mating with the key 25.

The circuit breaker 1 of this invention further

comprises, within the body 8, an amperometer coil 44, formed of large cross-section wire, which is accommodated on the core member 2, on the same side as the cheek piece 5 at the protected pole 14. The amperometer coil 44 has a respective pusher 45 adapted to engage with the lug 29 on the hooking lever 28 to release the moving contact holder assembly 26 on the occurrence of shorting currents, thereby the circuit breaker is caused to break.

The circuit breaker 1 also includes a bimetal strip thermal relay 62 mounted close to the amperometer coil 44 between the core member 2 and the cheek piece 5. It is arranged to act on the lever 28 for releasing the moving contact holder assembly 26.

In addition, the circuit breaker 1 according to the invention comprises, within the body 8, a voltmeter coil 46 of thin wire which is mounted on the core member 2, on the same side as the cheek piece 6, at the neutral pole 15. The voltmeter coil 46 has a respective pusher 47 adapted for engagement with the lug 30 on the hooking lever for releasing the moving contact holder assembly 26 on the occurrence of an intentional remote control command or by differential operation, thereby the circuit breaker is caused to break.

Thus, the circuit breaker 1 can be either operated manually, by acting on the key capping, or automatically by operation of the amperometer and voltmeter coils and the thermal relay.

The means 32 of attachment for spring mounting the moving contact 19 on the contact holding body 31 will be next described. The attachment means 32 include a pin 48 jutting out of the contact holding body 31 toward the cheek piece 5. The pin 48 engages in a hole 49 formed in a middle portion 50 of the moving contact 19. The means 32 of attachment also include a forked spring 51 having a base 52 and two prongs 53 and 54 with free ends 55 and 56. The forked spring 51 has a base 52 straddling the moving contact 19 at a forward active portion 57 thereof, has its prongs 53 and 54 extending from the opposed sides of the middle portion 50 and being wound into a spiral with turns taken in opposite directions, and has the free ends 55 and 56 of the prongs 53 and 54 in engagement with a lug 58 formed on the contact holding body 31.

The spring 51, with its base 52, will constantly urge the moving contact 19 to rotate around the pin 48 toward the fixed contact 18. A rearward tail portion 59 of the moving contact 19 engages with the lug 58 to stop rotation.

Retainer means 60 are provided to retain the moving contact 19 axially on the pin 48. The retainer means 60 comprise an elevation 61 formed on the lug 58 of the contact holding body 31, against which the free end 56 of the prong 54 of the spring 51 engages laterally.

The attachment means 32 for spring mounting the moving contact 23 on the contact holding body 31 are symmetrical of the ones described above for securing the contact 19 relatively to the diaphragm 3, and accordingly, not described herein in detail.

The moving contact assembly of this invention affords the principal advantage of a simple and lightweight construction. It only includes, in fact,

additionally to the moving contact holding body, just one spring for each moving contact, which ensures at one time constant spring biasing of the moving contact toward the fixed contact, positioning of the moving contact along the pin, and axial retention of the moving contact on the pin itself.

A further advantage is that the moving contact assembly according to the invention can be readily assembled on automated manufacturing equipment.

Lastly, it is to be expected that, by virtue of its simple construction, this assembly can improve the reliability of operation of the circuit breaker.

Understandably, the moving contact assembly disclosed hereinabove may be variously altered and modified by a skilled person in the art, in order to meet specific contingent requirements, within the protection scope of the invention as set forth in the appended claims.

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Claims

1. A moving contact assembly (26) for a civil range electric equipment circuit breaker, of a type which comprises a contact holding body (31) and at least one moving contact (19, 23), and means (32) of attachment for spring mounting said moving contact (19,23) on the contact holding body (31), and characterized in that said attachment means (32) comprise a pin (48) jutting out of the contact holding body (31) into engagement with a hole (49) formed in the moving contact (19,23), a forked spring (51) having prongs (53,54) wound into a spiral around the pin (48) on opposed sides of the moving contact (19,23), the base (52) of the forked spring (51) acting on the moving contact (19,23) to constantly bias it toward the fixed contact and the prong (53,54) ends (55,56) being engaged against the contact holding body (31), and retainer means (60) effective to retain the moving contact (19,23) axially on the pin (48).

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2. A moving contact assembly (26) according to Claim 1, characterized in that said retainer means (60) comprise an elevation (61) formed on the contact holding body (31) and being engaged by one end (55,56) of a prong (53,54) of the forked spring (51).

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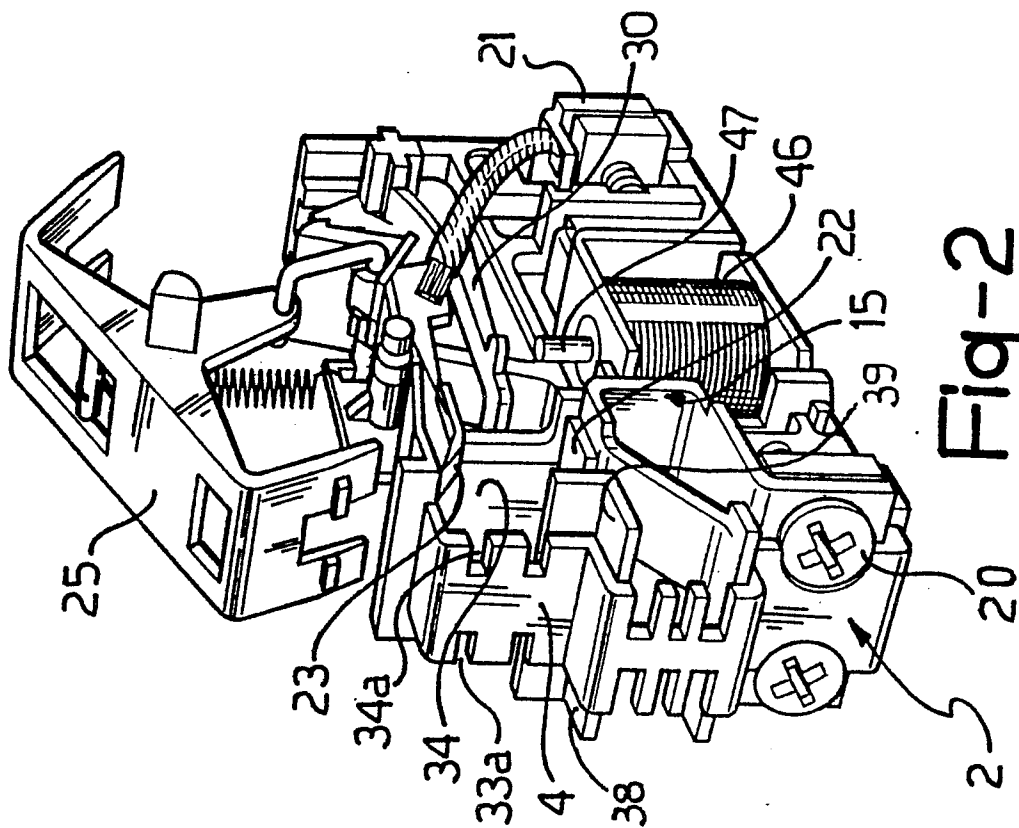


Fig-2

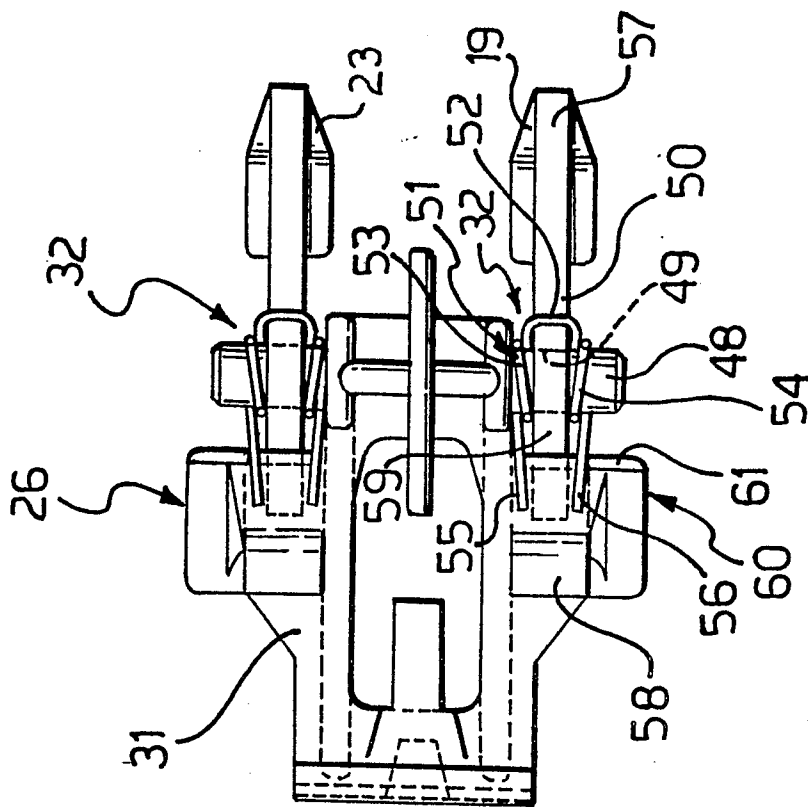


Fig-5

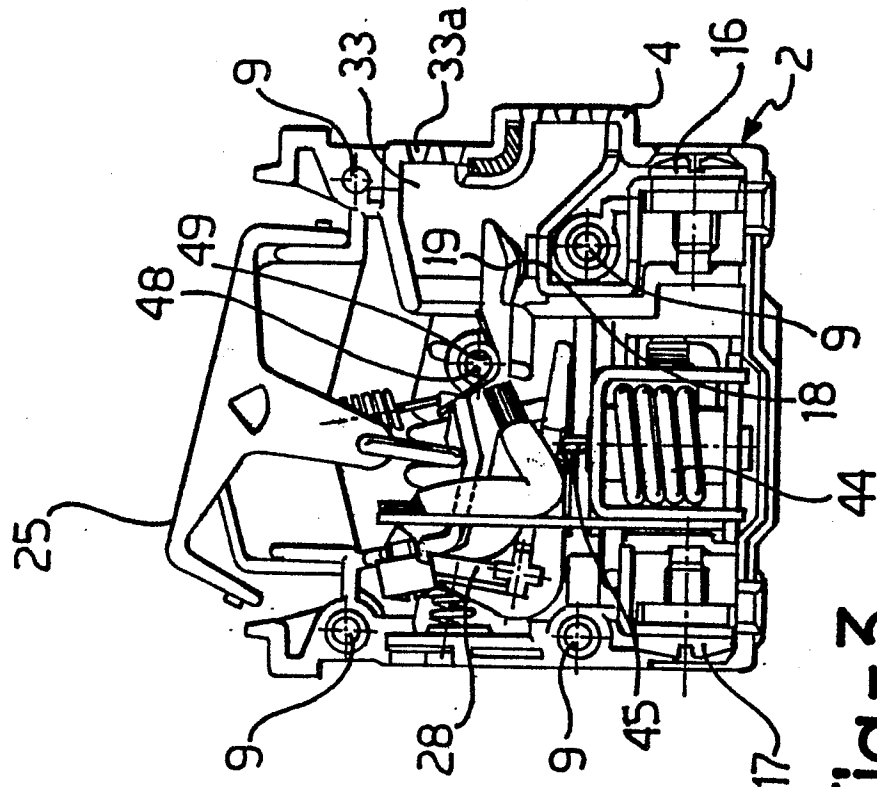


Fig-3

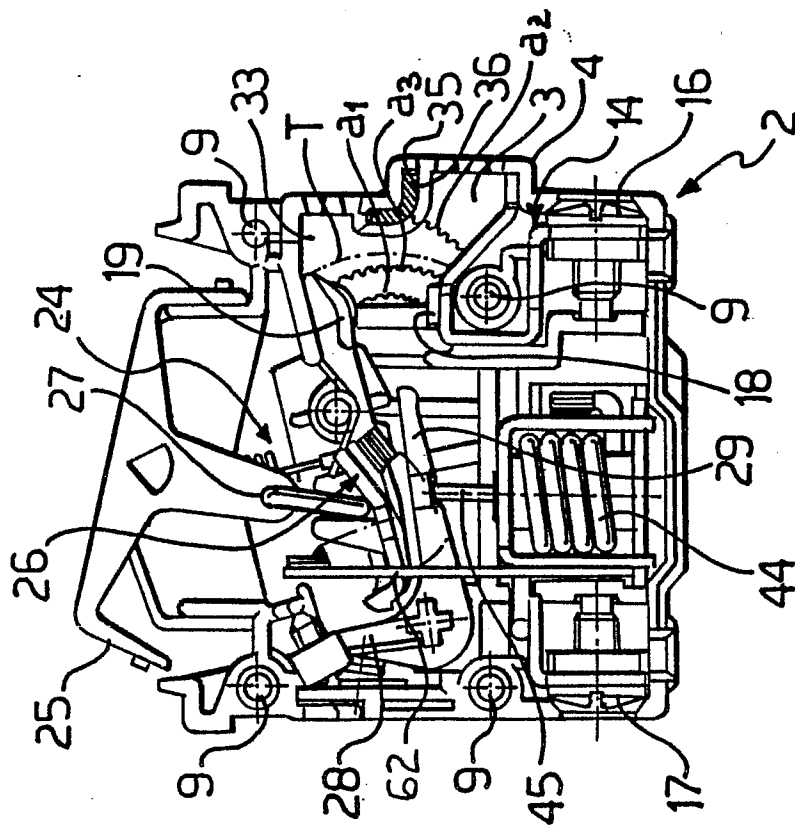


Fig-4