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SPLIT HOUSING FOR CIRCUIT BREAKERS HELD TOGETHER BY RESILIENT CLIP

Original Filed March 31, 1951

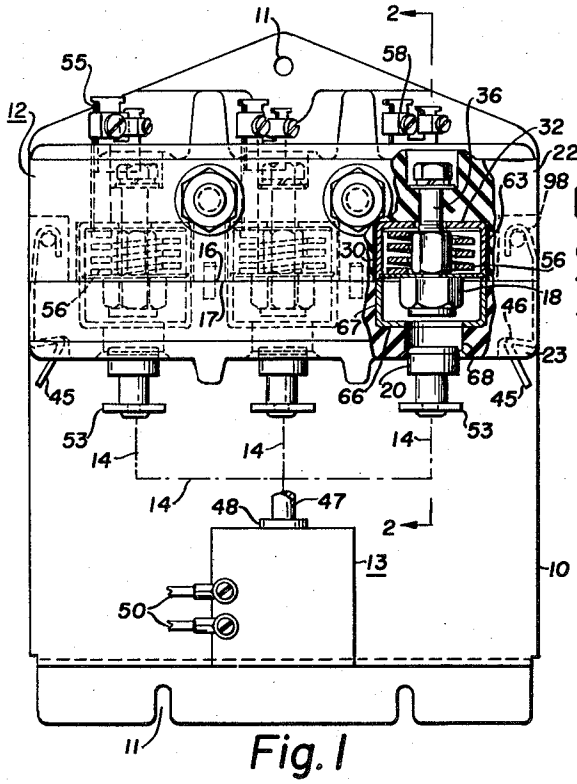


Fig. 1

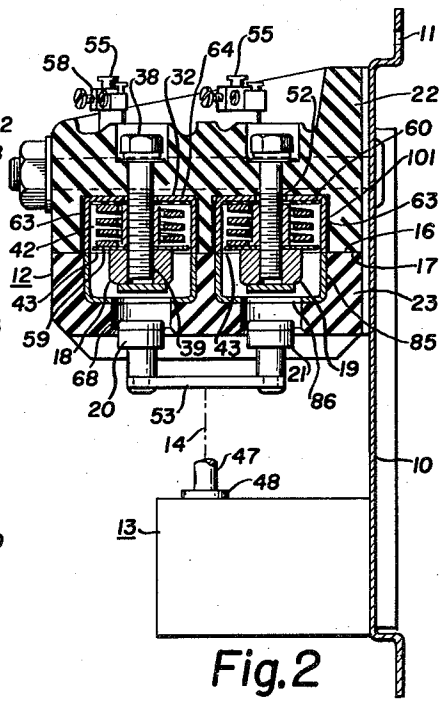


Fig. 2

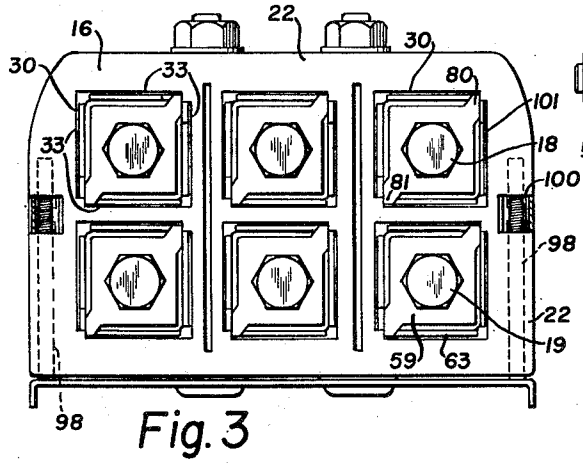


Fig. 3

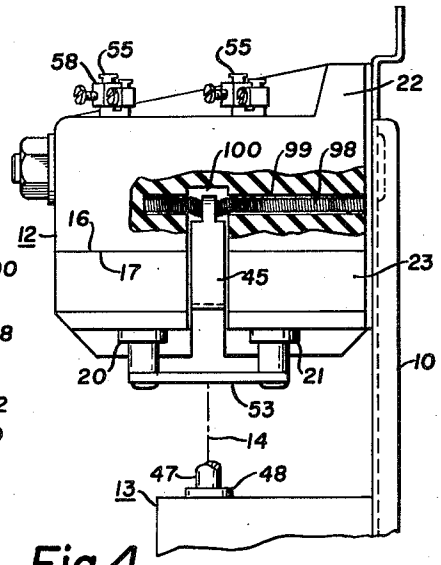


Fig. 4

INVENTORS,
WILLIAM FEW AND
ARALD B. PEARSON
BY
Woodling and Krost attys

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SPLIT HOUSING FOR CIRCUIT BREAKERS HELD TOGETHER BY RESILIENT CLIP

William Few, Goshen, Ind., and Arald B. Pearson, East Cleveland, Ohio, assignors to The Clark Controller Company

Original application March 31, 1951, Serial No. 218,626, now Patent No. 2,692,318, dated October 19, 1954. Divided and this application April 13, 1954, Serial No. 422,748

4 Claims. (Cl. 200—168)

This invention relates in general to electric circuit breakers or switches and more particularly to the construction of a split insulating housing or arc chamber held together by resilient clip. This application is a division of application, Serial No. 218,626, filed March 31, 1951 for Arc Chamber for Circuit Breakers, now Patent No. 2,692,318, October 19, 1954.

An object of the invention is the provision of a split insulating housing comprising an insulating support member and a readily removable insulating body member having an arc chamber for an electric switch taken in combination with a resilient clip means for holding the removable insulating body member to the insulating support member.

Another object of the invention is the provision of resilient clip means for holding the removable insulating body member to the insulating support member in which the resilient clip means comprises a coil spring supported between two spaced locations on the insulating support member and engaged between said two spaced locations by a latch member which removably engages the removable insulating body member.

Another object of the invention is the combination of a latch member mounted to a portion of a coil spring supported between two spaced locations whereby the resiliency of the combination is obtained by the lateral "give" of the portion of the coil spring between the two spaced locations.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a front elevational view of the invention with certain parts broken away to illustrate more clearly the construction of the arc chamber and the contact means, the resilient clip being shown in dotted lines;

Figure 2 is a side elevational view of the device shown in Figure 1, taken along the line 2—2 thereof;

Figure 3 is a view taken along the split between the insulating support member and the readily removable insulating body member, and showing the face of the insulating support member with the stationary contact means appearing thereon; and

Figure 4 is a side elevational view of the device shown in Figure 1, and shows particularly the arrangement of the resilient clips for holding the removable insulating body member against the insulating support member.

With reference to the drawings, the circuit breaker or switch is designated generally by the reference character 12 and is arranged to be operated by an actuating electromagnet indicated by the reference character 13.

The switch 12 and the actuating electromagnet 13 may be mounted on a base 10 having holes 11 therein to facilitate the anchoring of the entire assembly to a suitable support or closure box or housing. The actuating electromagnet 13 may be of any suitable design or construction and is arranged to be electrically energized by

the conductors 50, and acts to close the circuit breaker 12 when energized. The electromagnet 13 has an operating member 47 extending upwardly from the upper side thereof. As illustrated, the operating member 47 is in its lower or retracted position, being the position when the electromagnet is de-energized and the switch open. The downward travel of the operating member 47 opens the contacts and is arrested by means of a collar 48 engaging the upper surface of the electromagnet.

In the drawings, the switch 12 or circuit breaker is arranged to interrupt a three-phase circuit by three sets of contacts designated, respectively, as A, B and C, disposed in a split insulating housing. The set of contacts A, B and C for the respective phases of the electric circuit are of the same construction and corresponding parts bear the same reference characters. As shown, each set of contacts is arranged to produce a "double break" in the electrical circuit and comprises two stationary contact means 18 and 19 and two movable contact means 20 and 21. The contact means 18 and 20 comprise one pair of contacts and the contact means 19 and 21 are disposed closer to the base 10 than the contact means consisting of the contact means 18 and 20. The movable contact means 20 and 21 are connected together by a bridge member 53. As illustrated best in Figure 1, the bridge members 53 for the respective sets of contacts A, B and C are arranged to be simultaneously actuated by a motion transmitting means, which is illustrated by the dash-dot lines 14 and which is actuated by the operating member 47 of the actuating electromagnet 13.

Each of the pairs of contacts is arranged to be interrupted in a split insulating housing comprising two parts 22 and 23. The part 22 comprises an insulating support member and the part 23 comprises a removable insulating body member adapted to be detachably connected to the insulating support member by means of resilient clips 45. The insulating support member and the insulating body member have mating wall surfaces 16 and 17, respectively, abutting each other and forming tne split between the members. The insulating split housing has individual arc chambers for each of the pair of separable contacts. The arc chambers are all identical and the construction is such that a part of the arc chamber is in the insulating support member 22 and the other part is in the insulated body member 23. Inasmuch as the construction of the arc chambers are all identical, the description will be in the singular for one of the chambers.

The insulating support member 22 has six cavities 30, one each for the arc chambers. The cavity 30 has a back wall 32 and an annular wall 33, comprising four sides defining a first portion of the chamber on the rear side of the split between the insulating support member 22 and the insulating body member 23. The removable insulating body member 23 has six cavities 66, one each for the arc chambers. Each of the cavities 66 comprises an annular wall 67 having four side surfaces defining a second portion of the chamber on the opposite side of the split between the insulating support member and the removable insulating body member. The four sides of the cavity 30 and the cavity 66 are respectively of the same size and register with each other to form the arc chamber. The removable insulating body member 21 also has an opening 68 extending from the second portion of the arc chamber to the outside thereof in which the movable contact means moves.

Mounted within the cavity 30 of the insulating support member 22 is a cup-shaped member 63 having a bottom or end portion 64 abutting against the back wall 32 of the cavity. The cup-shaped member 63 is constructed of magnetic material and comprises a shell mounted in the cavity 30. On the inside bottom of the cup-shaped member 63 is an insulating plate 60 having

a centrally disposed hole which is in alignment with a hole 52 in the back end wall of the cup-shaped member 63.

A post element 36 constructed of magnetic material and being in the form of a bolt having a head 38 is mounted on the insulating support member 22 and has a projection portion 39 extending through the hole 52 of the cup-shaped member 63 and the hole of the insulating plate 60 into the arc chamber. The post element 36 is smaller than the hole 52 in the back wall of the cup-shaped member 63 and is radially spaced and electrically insulated therefrom. Upon the end of the projection portion 39 is mounted the stationary contact means. The projection portion 39 of the post element 36 supports the stationary contact means in the second portion of the chamber beyond the split between the insulating support member 22 and the insulating body member 23, whereby the stationary contact means is readily accessible upon removal of the insulating body member 23 from the insulating support member 22. The post element 36 defines, in combination with the first annular internal wall 33 of the cavity 30, an annular recess 42 having an open end 43 terminating substantially at the split between the insulating support member 22 and the insulating body member 23. Mounted within the annular recess 42 is a magnetizable winding or blow-out coil 56 which surrounds the post element 36. The magnetizable winding 56 has a terminal lead 55 which extends rearwardly through an opening in the back wall of the insulating support member 22. The terminal 55 extends to the outside of the insulating support member 22 and on the end thereof is mounted a terminal screw clamp 58 constituting a conductor terminal for connecting the magnetizable winding to an external circuit. The forward end of the magnetizable winding 56 which is in the form of a flat coil is electrically and mechanically connected to the rear side of a plate 59 by soldering, brazing or other means. The area of the plate 59 is greater than that of the stationary contact means and thus it restricts the entrance to the annular recess 42 whereupon foreign particles caused by the arc are prevented from entering the recess and coating the inside surface therein, particularly the insulating plate 60. An object of preventing the foreign particles from entering the recess is to keep the inside of the arc chamber and the insulating plate 60 clean.

The plate 59 on diagonally opposite corners is provided with lateral portions 80 and 81 having ends that contact the inside surface of the cavity 30. The ends of the laterally disposed extension portions 80 and 81 which engage the inside surface of the cavity 30 align the post element 36 and the magnetizable winding 56 within the annular recess so that when the stationary contact means is screwed onto the end of the post element, the parts are maintained in straight and fixed alignment. The stationary contact means can be removed from the end of the post element without removing the magnetizable winding or blow-out coil 56. The plate 59 is permanently connected to the end coil of the magnetizable winding 56, so that when the stationary contact means is screwed tightly against the outer face of the plate 59, a low resistance contact is established. In addition, the plate 59 constitutes a heat radiation member to keep the contact means cool.

Mounted within the cavity 66 of the insulating body member 23 is a cup-shaped member 85. The cup-shaped member 85 is of the same general construction as the cup-shaped member 63 and is constructed of magnetizable material. The cup-shaped member 85 is securely mounted or molded within the cavity 66 of the insulating body member 23 so that upon removal of the insulating body member 23 from the insulating support member 22, the cup-shaped members 85 remain permanently fixed therein. The end wall of the cup-shaped member 85 is provided with a hold 86 in alignment with the opening 68 in which the movable contact moves. The cup-shaped member 85 and the cup-shaped member 63 constitute a portion of the magnetic circuit along with the post member 36 for providing the flux for controlling the arc. The action of the flux is such to keep the inside of the arc chamber clean so that the insulating plate 60 is kept clean.

The removable insulating support body member 23 may be easily removed by operating the resilient clips 45 which have at their forward ends a hook 46 for engaging a ledge in the front side of the removable insulating body member 23. The other ends of the clips 45 are hingedly connected respectively to coil springs 98 which are mounted in longitudinally extending holes 99 in opposite sides of the insulating support member 23. The sides of the insulating support member 23 are provided with slots 100 to receive the hinged ends of the clips 45 which means that the coil springs 98 are held between two spaced points at the hinged connection so that there is a certain amount of resiliency to that portion of the coil springs between the spaced points when operating the clips 45.

The insulating housings 22 and 23 are preferably constructed of material which will withstand high temperatures caused by the heat from the arc. However, if the arc is permitted to come directly in contact with the insulating material there might be a tendency for the material to decompose and form fine foreign particles of carbon which might tend to work their way into the arc chamber. In the event that fine carbon particles are formed by the temperature of the arc deteriorating the insulating members, the two metal cup-shaped members 63 and 85 which fit within the arc chamber formed by the insulating materials will constitute a mechanical barrier to make it difficult for the fine carbon particles to work their way into the arc chamber. In addition, the two metal cup-shaped members are in themselves good heat conductors and thus any heat from the arc is well distributed throughout the entire surface areas thereof, so that there is no one point of high concentration of heat directly affecting the insulating material.

It is to be observed that a small peripheral clearance 101 exists between the outside surface of the cup-shaped member 63 and the inside annular surface of the cavity 30. This clearance may be in the order of .002 of an inch up to substantially .015 of an inch. One object of this annular clearance between the outside surface of the cup-shaped member 63 and the internal wall of the cavity 30 is to prevent the heat of the arc which is transmitted to the metal cup-shaped member from being directly transmitted to the inside surface of the walls of the insulating housing of the cavity 30.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A split housing having a chamber for a switch comprising stationary contact means and movable contact means, said split housing comprising an insulating support member and a readily removable insulating body member having mating wall surfaces extending transversely of said chamber and constituting the split between said member, said insulating support member having a first annular wall defining a first portion of said chamber on one side of said split, said removable insulating body member having a second annular wall defining a second portion of said chamber on the opposite side of said split, said removable insulating member also having an opening extending from the second portion of said chamber to the outside thereof in which the movable contact means moves, clip means for holding said insulating members together, said clip means including a latch element engaging one of said members and a hinge support

means carried by the other member, said hinge support means comprising a coil spring held between two spaced portions on said other member, said latch element engaging said hinge support means between said two spaced portions, a post element of magnetic material mounted on the insulating support member and having a projection portion extending into said chamber, said projection portion of said post element supporting said stationary contact means on the end thereof beyond said split in the second portion of said chamber, whereby said stationary contact means is readily accessible upon removal of the insulating body member from the insulating support member, said post element defining in combination with the first annular internal wall of the chamber an annular recess having an open end terminating substantially at said split, magnetizable winding means mounted in the annular recess and surrounding the post element, a member constituting a shell of magnetic material mounted in the annular recess and surrounding the magnetizable winding means and the post element, and a plate for said open end of said annular recess, said plate comprising an area greater than the area of said stationary contact means and restricting the entrance to said annular recess.

2. A clip for holding two body members together, said clip having a latch member having first and second end portions, said first end portion having means for removably engaging one of said body members, resilient means for connecting said second end portion of the latch member to the other body member, said resilient means comprising a coil spring supported between two spaced locations on said other body member, said second end portion of the latch member engaging the coil spring between said two spaced locations.

3. A split housing having a chamber for a switch comprising stationary contact means and movable contact means, said split housing comprising an insulating support member and a readily removable insulating body

member having mating wall surfaces extending transversely of said chamber and constituting the split between said member, said insulating support member having a first annular wall defining a first portion of said chamber on one side of said split, said removable insulating body member having a second annular wall defining a second portion of said chamber on the opposite side of said split, said removable insulating member also having an opening extending from the second portion of said chamber to the outside thereof in which the movable contact means moves, and clip means for holding said insulating members together, said clip means including a latch element engaging one of said members and a hinge support means carried by the other member, said hinge support means comprising a coil spring held between two spaced portions on said other member, said latch element engaging said hinge support means between said two spaced portions.

4. A split housing having a chamber for a switch comprising stationary contact means and movable contact means, said split housing comprising an insulating support member and a readily removable insulating body member having mating wall surfaces extending transversely of said chamber and constituting the split between said member, and clip means for holding said insulating members together, said clip means including a latch element engaging one of said members and a hinge support means carried by the other member, said hinge support means comprising a coil spring held between two spaced portions on said other member, said latch element engaging said hinge support means between said two spaced portions.

References Cited in the file of this patent

UNITED STATES PATENTS

2,240,007	Power	Apr. 29, 1941
2,518,256	Schall	Aug. 8, 1950