Nov. 1, 1938. R. T. ZWACK 2,135,435

ELECTRICAL APPARATUS

Filed Nov. 5, 1935

Fig. 2

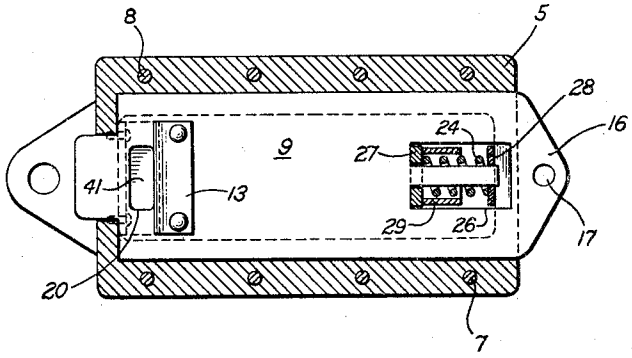


Fig. 1

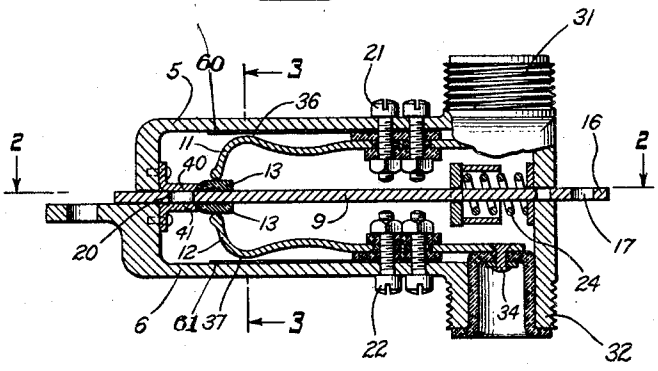
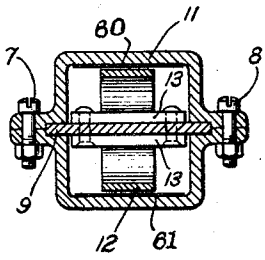


Fig. 3



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ELECTRICAL APPARATUS

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6 Claims. (Cl. 200—161)

This invention relates to electrical apparatus, and particularly to the control of the electrical phenomena incidental to the interruption of current flow in a closed circuit.

In installations of electrical equipment in aircraft, every current carrying device involving a circuit interrupter or switch is a source of possible interference with the perfect reception and transmission of radio signals, as well as being a source of dangerous arcing of current across conducting members on every occasion of interruption of current flow. It is therefore desirable to eliminate both these objections wherever possible, as for example, in the construction and installation of ordinary circuit controlling switches.

The object of this invention is to provide an improved construction and method of control of the operation of a circuit breaker intended for use in aircraft operating equipment, such as ignition circuits, or in any other location wherein it is desired to eliminate either of the sources of trouble above outlined.

In the drawing there is illustrated one embodiment of the invention, but it is to be understood that the drawing is for the purpose of illustration only and is not to be construed as a limitation of the scope of the invention, reference being had for this purpose to the appended claims.

Referring to the drawing:

Fig. 1 is a longitudinal sectional view of a device embodying the invention;

Fig. 2 is a longitudinal sectional view at right angles to the viewpoint of Fig. 1 (along line 2—2 of Fig. 1); and

Fig. 3 is a transverse sectional view along line 3—3 of Fig. 1.

Reference characters 5 and 6 designate the two major casing sections which, when joined as indicated at 7 and 8, coact with the enclosed current conducting, flat plate 9 to form an electrostatic shield for a pair of current conducting fingers 11, 12 adapted to be moved transversely in relation to the plate and casing, into the position indicated in Fig. 1, and held in such position by the non-conducting cams 13 of the plate until such time as the cams are withdrawn by a pull exerted on the outer end 16 of the plate, the said outer end being designed for attachment of an operating member engageable with hole 17.

Fingers 11, 12 are held in, and insulated from, mounting screws 21, 22, respectively, and are of sufficient resiliency to have a constant tendency to snap into contact with each other, and therefore they effect such contact (through slot 20) immediately upon withdrawal of cams 13 in the manner above indicated. A suitable spring 24 is provided to resist withdrawal of the cams 13, the spring being mounted within a sleeve 29 placed in tongued slot 26 in the plate 9, and abutting at its opposite ends on washers 27 and 28. The casing sections 5, 6 have radial projections 31, 32 to receive connections to the insulated terminals 34 of the fingers 11 and 12, respectively. These projections 31, 32 are shown as threaded to receive the threaded coupling nuts, not shown, of the sheathed conduits in which the conducting cables or leads are preferably encased to complete the radio frequency oscillation suppressing, or "shielding" circuit to ground. This exterior grounding circuit includes, of course, the plate 9 and casing sections 5 and 6, and due to the proximity of the latter to the high portions 36, 37 of the fingers 11, 12, there is an opportunity for absorption of an electrostatic charge in the said casing during the breaking of the circuit as the fingers move outward from plate 9 to the position shown. Thus the casing is not only an oscillation suppressor but also, in effect, a condenser or capacitor during the breaking away of the fingers from the plate, and thus reduces the arcing hazard, as between the said fingers and plate, as well as serving to suppress any radio frequency oscillations which may subsequently succeed in passing through the plate 9. It will be noted, however, that plate 9 is, in itself, a practically perfect barrier to such oscillations, since it extends completely across the area between the fingers 11 and 12 when the latter are in open circuit position, and thus substantially eliminates any positive capacitance value across the said fingers; but if an even greater degree of perfection in the matter of radio interference suppression is desired, means may be employed to keep the slot 20 closed while the switch is in the open position. As shown in Fig. 3 such means may take the form of a pair of grounded supplemental shields 40, 41 whose outer ends abut cams 13 when the fingers 11, 12 are separated, but are spaced from said fingers in both the engaged and disengaged position of the fingers. In order to improve the condenser effect of the fingers 11, 12 with respect to the casing 5, 6, the latter may be equipped with thin sheets 60 and 61 of suitable dielectric material such as mica or some organic insulating paper similar to that used in commercial condensers.

It is to be understood that the outward movement of plate 9, when it is desired to close the switch, is just sufficient to bring slot 20 opposite

the ends of the fingers 11 and 12 whereupon said fingers may contact with each other through the said slot. The shielding pieces 40 and 41, being fastened to the casing act as stationary guides for the plate during such movement.

What is claimed is:

1. In a device of the class described, a metallic casing, a pair of terminals within the casing, a pair of contact fingers movable transversely within the casing to make or break the circuit between said terminals, means for controlling the direction of passage of oscillating current of radio frequency from said fingers when in the open circuit position, said last named means including a metallic plate and cooperating metallic shielding members constituting a continuous grounded shield interposed between said fingers in the open position thereof said plate being apertured to enable said fingers to contact with one another upon movement of the plate sufficiently to bring said apertured portion into the path of said fingers, whereby the plate itself remains out of contact therewith, means for insulating said fingers from said metallic casing, and means for moving and holding said fingers in positions spaced apart from said plate, and on opposite sides thereof.

2. In a device of the class described, a metallic casing, a pair of terminals within the casing, a pair of contact fingers movable transversely within the casing to make or break the circuit between said terminals, means for controlling the direction of passage of oscillating current of radio frequency from said fingers when in the open circuit position, said last named means including a metallic plate and cooperating metallic shielding members constituting a continuous grounded shield interposed between said fingers in the open position thereof said plate being apertured to enable said fingers to contact with one another upon movement of the plate sufficiently to bring said apertured portion into the path of said fingers whereby the metal of said plate remains out of contact with said fingers, said apertured portion being covered by said shielding means when said contact fingers are in the open circuit position, means for insulating said fingers from said metallic casing, and means for moving and holding said fingers in positions spaced apart from said plate, and on opposite sides thereof.

3. In a device of the class described, a metallic casing having a pair of radial projections, a pair of terminals to receive current conductors extending through said radial projections, a pair of contact fingers having end portions movable transversely within the casing to complete a circuit between said terminals, and also having intermediate portions movable transversely into close proximity with said casing to by-pass a component of the current in said circuit into said casing upon interruption of current flow between said terminals, means for moving and holding said fingers in the open-circuit position, and means for withdrawing said holding means to enable said fingers to move into circuit completing position.

4. In a device of the class described, a metallic casing, a pair of terminals within the casing, a pair of contact fingers having end portions movable transversely within the casing to complete a circuit between said terminals, and also having intermediate portions movable transversely into close proximity with said casing to by-pass a component of the current in said circuit into said casing upon interruption of current flow between said terminals, means for moving and holding said fingers in the open-circuit position, and means for withdrawing said holding means to enable said fingers to move into circuit completing position.

5. In a device of the class described, a metallic casing having a pair of radial projections, a pair of terminals to receive current conductors extending through said radial projections, a pair of contact fingers having end portions movable transversely within the casing to complete a circuit between said terminals, and also having intermediate portions movable transversely into close proximity with said casing to by-pass a component of the current in said circuit into said casing upon interruption of current flow between said terminals said casing also constituting a shield to suppress electrically produced oscillations of radio frequency, means for moving and holding said fingers in the open-circuit position, and means for withdrawing said holding means to enable said fingers to move into circuit completing position.

6. In a device of the class described, a metallic casing, a pair of terminals within the casing, a pair of contact fingers having end portions movable transversely within the casing to complete a circuit between said terminals, and also having intermediate portions movable transversely into close proximity with said casing to by-pass a component of the current in said circuit into said casing upon interruption of current flow between said terminals said casing also constituting a shield to suppress electrically produced oscillations of radio frequency, means for moving and holding said fingers in the open-circuit position, and means for withdrawing said holding means to enable said fingers to move into circuit completing position.

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