

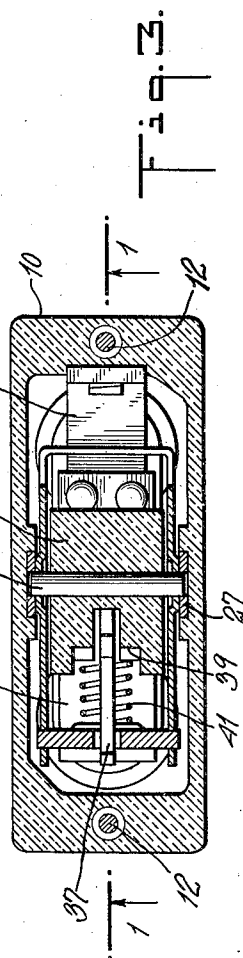
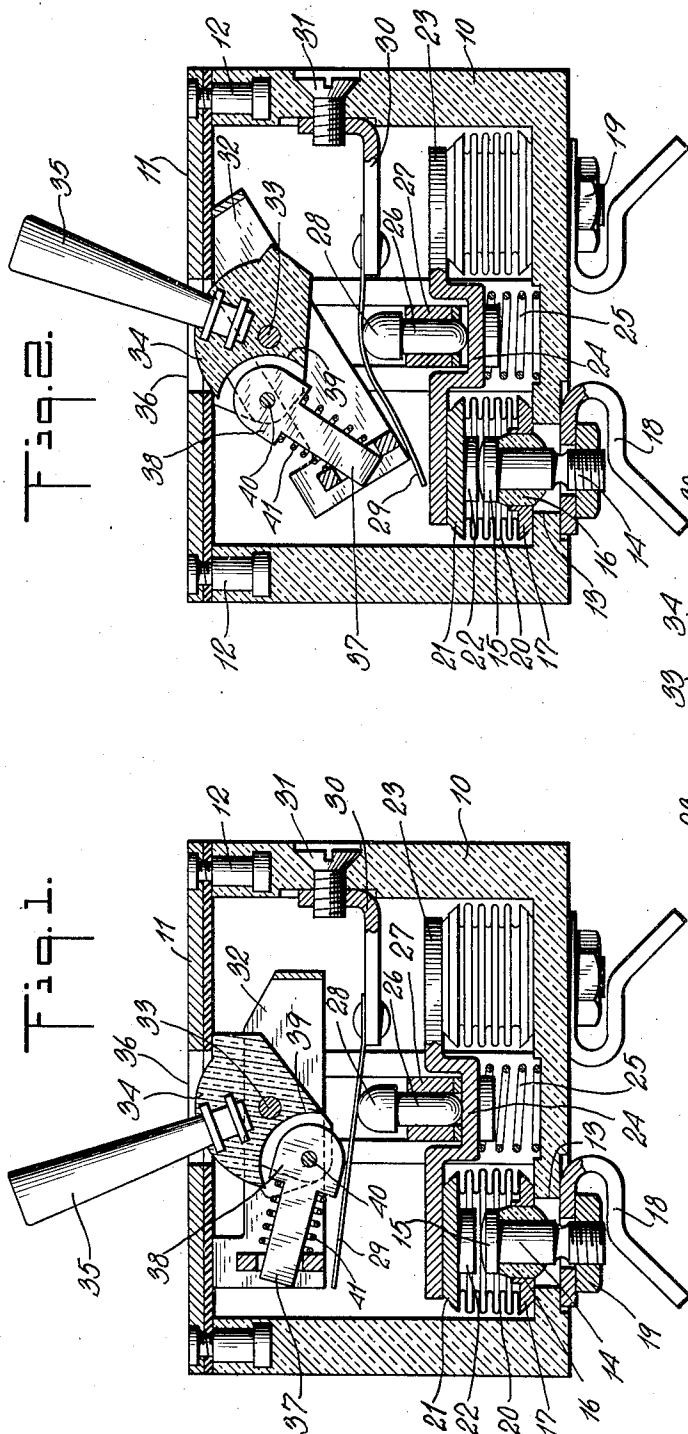
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E. G. MILLER ET AL

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SWITCH

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INVENTORS
Edward G. Miller
Ralph E. Engberg
BY
Kerison Kerison
ATTORNEYS

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SWITCH

Edward G. Miller and Ralph E. Engberg, New York, N. Y., assignors, by mesne assignments, to Allied Control Company, Inc., New York, N. Y., a corporation of New York

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2 Claims. (Cl. 200—144)

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This invention relates to switches and more especially to switches for use in electrical appliances for airplanes.

As is well known, the pressure within an airplane varies to a considerable extent dependent upon the elevation at which the plane is flown. At certain pressures below normal surface level atmospheric pressure, sparking between contacts is materially increased. Thus, a switch which operates without appreciable sparking between its contacts at ground level will be characterized by considerable sparking between the contacts at elevations normally attained by airplanes.

An object of this invention is a switch having provision for satisfactorily suppressing arcing between the contacts when the switch is carried by an airplane to high elevations.

A further object of this invention is a switch which may safely be used in an atmosphere containing explosive vapors or gases.

A still further object of this invention is a mounting for two relatively movable contacts of such nature that the atmosphere surrounding the contacts is maintained of the same composition and at substantially uniform pressure.

In one type of switch embodying the invention, a pair of relatively movable contacts are arranged within an air-tight flexible wall chamber and a suitable gas, for example, air, nitrogen, etc., is provided within the container at pressure which will satisfactorily suppress arcing between the contacts. Means are provided for effecting relative movement of the contacts toward and away from each other. The chamber is so mounted in the switch that at atmospheric pressure it is under slight compression tending to maintain the maximum gap permissible between the two contacts. Thus, irrespective of the elevation to which the switch is carried, the pressure of the atmosphere surrounding the contacts remains substantially constant. Each chamber may contain an arc inhibiting vapor, thereby minimizing arcing. Such a switch may also be used in an atmosphere containing explosive gases or vapors as any arcing which may develop between the contacts will be wholly retained within the chamber.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawing, wherein:

Fig. 1 is a vertical section through one embodiment of the invention, the switch being in open condition and parts thereof being shown in elevation;

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Fig. 2 is a view similar to Fig. 1 with the switch in closed condition, and

Fig. 3 is a section on the line 3—3 of Fig. 1.

A box-like casing 10 of insulating material is provided with a removable cover 11 attached to the casing by fasteners 12. In the bottom of the casing 10 are two apertures 13 through each of which extends a threaded binding post 14 having a head 15 constituting a contact. The binding post 14 is hermetically sealed in a glass bead 16 which in turn is hermetically sealed in the bore of a metal bush 17. The assembly just described is a commercial product obtainable on the open market.

A metal member 19 has an aperture through which the binding post extends and a nut 19 threaded onto the end of the bolt 14 holds the binding post with the bush 17 engaging the inner surface of the casing bottom and the member 19 engaging the outer surface of the casing bottom. A Sylphon bellows 20 of either metallic or non-metallic flexible material has one end hermetically sealed to the bush 17 and its other end hermetically sealed to a metal plate 21 supporting a contact 22. The flexible wall chamber thus formed may contain an arc suppressing atmosphere or may be evacuated to a degree sufficient satisfactorily to suppress arcing.

A metal bridge member 23 contacts each of the plates 21 and is provided with a central depression 24 between which and the bottom of the casing is arranged a spring 25. A pin 26 is slidably mounted in a frame 27 with one end engaging the portion 24 of the bridge 23 and with the other end enlarged to form a head 28 engageable with the frame 27 to limit downward movement of the pin. A leaf spring 29 is carried by a bracket 30 attached to the wall of the casing 10 by a screw 31 and engages the head 28. A cradle 32 is pivotally supported by a shaft 33 journaled in the legs of a U-shaped member 42 supported by the side walls of the housing 10 and having its bight portion extending between the lower surface of the frame 27 and the upper surface of the depression 24 in the bridge member 25, there being an aperture in said bight portion for the pin 26 to project through. The relationship of the U member bight to the bellows members 29 is such that when the bellows members are assembled in the switch at surface level atmospheric pressure the bellows 20 are slightly compressed. A block of insulating material 34 likewise is pivotally supported by the shaft 33 and is provided with an operating handle 35 extending through an aperture 36 in the cover 11.

A plunger 37 extends through an aperture in the cradle 32 and is provided with a head 38 pivoted to the block 34 in a recess 39 provided in the block by means of a pin 40. A spring 41 surrounds the plunger 37 with one end abutting the head 38 and the other end abutting the end wall of the cradle. The cradle 32 and the parts associated therewith directly overlie the spring 29.

In Fig. 1, the parts are shown with the switch in its open condition. The spring 29 rests against the head 28 and the pin 26 together with the bridge 23 and contacts 22 are held in elevated position by the spring 25 and the expansive force of the bellows 29. Clockwise rotation of the block 34 by operation of the handle 35 lifts the pivot pin 40 to reverse the position of the plunger 37 relative to horizontal with the result that the cradle 32 is rocked counterclockwise from the position shown in Fig. 1 to the position shown in Fig. 2. The left end of the spring 29 is thereupon forced downwardly to apply pressure to the head 28 of the pin 26 thereby forcing the bridge 23 and contacts 22 downwardly against the action of the spring 25 into engagement with the contacts 15 to close a circuit between the two binding posts 14. The switch remains closed so long as the handle 35 is left in its Fig. 2 position. Upon counterclockwise movement of the handle 35, the switch returns to the position shown in Fig. 1.

In the event that the flexible chamber contains an arc-suppressing atmosphere, the atmosphere may be air under substantially atmospheric pressure or higher or an inert gas such, for example, as nitrogen under substantially atmospheric pressure or higher. As an alternative, the flexible chamber may be evacuated to such degree that the residual gas in the chamber has an ionizing potential greater than the potential to be applied between the contacts or that arcing is satisfactorily suppressed under operating conditions for which the device is designed. The condition of the atmosphere surrounding the con-

tacts therefore remains constant irrespective of the pressure surrounding the casing 13. Sparking between the contacts is thus satisfactorily suppressed irrespective of the elevation at which the switch may be operated. Also, the switch may be made use of in an atmosphere containing explosive mixture as any sparks that may be generated upon opening of the contacts are retained within the chamber.

We claim:

1. A switch comprising a contact bridging member arranged for rectilinear movement, a stop, resilient means biasing said bridging member toward said stop, a pivotally supported hollow rocker, a reciprocable pin having one end engaging said bridging member, a leaf spring fixed at one end and extending across the remaining end of said pin in position to be engaged by said rocker, an oscillating member within said rocker coaxial therewith, a stud pivoted at one end to said oscillatable member and extending through an aperture in said rocker, a shoulder on said stud and a resilient member interposed between said shoulder and rocker, said pin being effective upon operation of said oscillatable member to move said bridging member away from said stop.

2. A switch according to claim 1 characterized by a pair of air-tight chambers each comprising two rigid metal end members interconnected by a metal bellows member, means supporting said chambers with one end member of each chamber fixed and the other end member capable of movement toward and away from the fixed end member and arranged for engagement by said bridging member, a contact supported by each member of a chamber within said chamber with one contact of each chamber insulated from its supporting member, and a conductor leading through each stationary end member to the contact supported thereby.

EDWARD G. MILLER.
RALPH E. ENGBERG.