May 4, 1954 W. T. WEIDENMAN, SR 2,677,730

THUMB SWITCH

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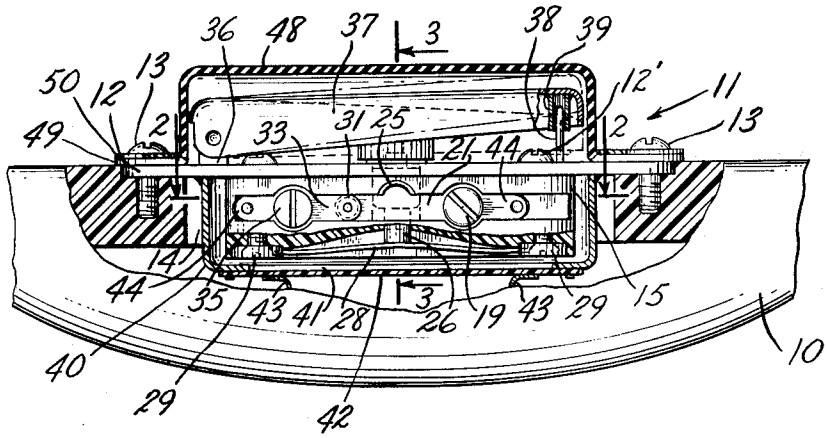


FIG. 1.

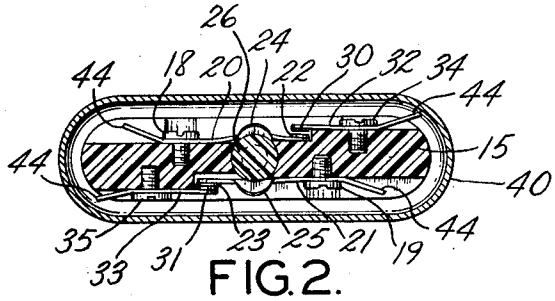


FIG. 2.

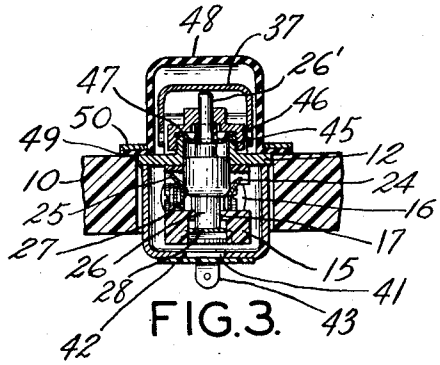


FIG. 3.

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THUMB SWITCH

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2 Claims. (Cl. 200—5)

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This invention relates to switches, and has particular reference to the on-and-off type of switch used in hand microphones or telephones, although the invention is not limited to that use.

In aircraft, naval and military field communications, it is desirable that the microphone be disconnected except during period of use, and it is also desirable that the transmisison power unit be kept out of service except when in actual use. Accordingly, it has become the general practice to provide a thumb or other finger switch button in the handle of the microphone or telephone handset so that it may be conveniently pressed to successively close two circuits and successively reopen the circuits in reverse order when the button is released. The first circuit closure activates the transmission power unit, and the second circuit closure energizes the microphone and, when the button is released, the microphone is first disconnected and then the transmission power unit is cut out of service. An example of a switch performing these functions in a satisfactory manner is disclosed by Patent No. 2,066,022, issued December 29, 1936 to applicant, and the present invention is an improvement on the switch of said patent.

In accordance with the present invention, a switch particularly adapted for thumb or finger operation in hand microphones or telephone handsets is provided which is compact, moisture-proof, and positive in its operation during most rigorous usage in the field.

In a preferred embodiment of the invention, the two successively operated switches are mounted on opposite sides of an elongated block of insulating material carried on the underside of the mounting plate which fits flush with the surface of the microphone or handset handle with the block recessed within the handle. Leaf spring blades carrying one of the contacts of each switch are normally urged to contact disengaging position by reason of their self springiness, but are spread apart to engage the corresponding opposite contacts by a plunger extending through the mounting plate and into the insulating block between the leaf spring contact blades and normally urged outwardly to contact disengaging position. Spaced different distances from the leaf spring contact blades so as to be successively engaged thereby are fixed contacts mounted on the block. Pivoted on the outer surface of the mounting plate and extending across the plunger so as to move the same into the block, is a press lever shaped to be comfortably engaged by a thumb or finger of the hand holding the microphone or handset.

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Preferably, the aforementioned switch is sealed against moisture and to that end, the insulating contact block normally recessed within the handle is enclosed within a casing moisture-tightly sealed against the underside of the mounting plate. Connection to the switch contacts is made by means of terminals on the outside of the casing which are connected to the contacts within the casing. Extending over the external thumb- or finger-operated lever is a hood of flexible rubber which is secured moisture-tightly to the outer surface of the mounting plate and of the surrounding handle surface by means of the washer held by the mounting screws of the plate. The rubber hood is flexible and pressure on it actuates the thumb or finger lever. The hood may be omitted when another improvement of this invention is incorporated in the switch, and that is the separation of the switch actuating plunger into two axial sections and sealing the outer one moisture-tightly in the mounting plate opening through which the plunger extends for engagement by the thumb- or finger-actuated lever.

It will be seen that the thumb switch of this invention is compact, efficient and fool-proof for performing its intended functions reliably under the most adverse operating conditions, including rain, fog, and even when submerged in water for a substantial period of time.

For a more complete understanding of the invention, reference may be had to the accompanying drawings, in which:

Figure 1 is a side view of the switch of this invention, portions being broken away to expose operating parts for clarity;

Fig. 2 is a transverse section thereto as seen along the line 2—2 of Fig. 1; and

Fig. 3 is a vertical section through the switch as seen along the line 3—3 of Fig. 1.

Referring to Fig. 1, numeral 10 designates the handle of a telephone handset, although it may be the handle of a microphone or the like, on which is mounted at a point where the fingers or thumb of the hand holding the handset or microphone engages the surface of the handle, is the switch of this invention, generally designated 11.

As shown in Figs. 1 and 3, a mounting plate 12 is recessed into the surface of the handle 10 so as to be flush and it is generally rectangular in shape, being secured to the handle 10 by screws 13 or other suitable fastening means. The handle 10 is provided with an opening 14 immediately below the mounting plate 12 which accommodates the insulating block 15 secured to

the under surface of the mounting plate 12 by means of screws 12' or other suitable fastening means. As shown especially in Fig. 3, the center portion of the block 15 is provided with a transverse passage 16 and also by a vertical passage 17.

Secured to opposite sides of the block 15 by screws 18 and 19 are respective cantilever leaf spring contact blades 20 and 21, the former carrying contact 22 at its free end, and the latter carrying contact 23 at its free end. The blades 20 and 21 are self-biased toward the corresponding flat surfaces of the insulating block 15 that lie immediately behind the corresponding contacts 22 and 23. Blade 20 is provided at its upper edge with the outwardly flaring ear 24 and blade 21 is similarly provided at the upper edge with the outwardly flaring ear 25.

The ears 24 and 25 are located opposite the vertical passage 17 through the block 15 and a plunger 26 is mounted within the passage 17 and provided with an enlarged flared portion 27 adapted to engage the ears 24 and 25 as shown particularly in Fig. 3. Downward pressure on plunger 26 causes the enlarged portion 27 thereof to force the ears 24 and 25 and consequently corresponding contacts 22 and 23 in opposite, outward directions away from the block 15.

Plunger 26 is normally urged in an upward or outward direction so as to normally release pressure against ears 24 and 25, this urging action being effected by a spring 28 extending across the bottom of the insulating block 15 and secured at its opposite ends thereto by clamping means 29. Spring 28 is shaped with an inwardly-directed hump engaging the lower end of plunger 26 and has concave portions at either side of the central hump. A spring so shaped has the characteristics described in said patent of presenting a maximum resistance to the downward movement of the plunger 26 upon initial movement thereof, and decreasing such resistance on continued movement of the plunger 26, so as to afford an initial resistance of the pressure of the thumb or finger and to restore the plunger rapidly and positively when the pressure thereon is released.

The contacts 22 and 23 are normally spaced from cooperating fixed contacts 30 and 31, respectively, carried on contact springs 32 and 33 secured to the insulating block 15 by screws 34 and 35, as shown particularly in Figs. 1 and 2. Stationary contact 31 is spaced closer to movable contact 23 than is stationary contact 30 from movable contact 22, so that on downward movement of the plunger 26, contact 23 engages contact 31 before contact 22 engages contact 30. Contacts 23 and 31 close the power circuit and closure of contats 22 and 30 close the microphone circuit a fraction of a second thereafter with the reverse operation taking place when the pressure is released and spring 28 urges the plunger 26 upwardly. The resiliency of stationary contact springs 32 and 33 causes them to retract when their respective contacts 30 and 31 are engaged, and the resulting wiping movement between the contacts keeps them clean.

Pivoted at one end on suitable ears 36 on the outer surface of mounting plate 12 is the thumb or finger lever 37 whose free end is guided by a vertical pin 38 extending upwardly from mounting plate 12 and telescoped in a cylindrical guide 39 on the underside of lever 37. As shown particularly in Fig. 3, lever 37 is channel-shaped and presents a smooth, comfortable

surface to the operator's finger or thumb. The under surface of lever 37 at approximately its longitudinal and transverse center engages the extension 26' of the plunger 26 which is shown in substantially mid-position in Figs. 1 and 3. In this position of the lever 37, contacts 23 and 31 have been closed, but contacts 22 and 30 remain open. In normally disengaged position, lever 37 lies as shown in phantom in Fig. 1.

Preferably, switch 11 is rendered moisture-proof in accordance with this invention. Secured as by soldering or brazing to the under surface of mounting plate 12 is a rectangular housing 40 having a central opening 41 which is sealed moisture-tightly by an insulating plate 42. Insulating plate 42 carries the terminals 43 to which the corresponding terminals 44 within the casing 40 are suitably connected in a well-known manner, so that the contacts within the casing 40 are properly connected into the circuits which they control. In this manner, the insulating block 15 and its appurtenant parts, including the contacts 22, 23, 30 and 31 are moisture-tightly sealed to the underside of the mounting plate 12.

The entire switch is not completely moisture-proof because plunger 26' extends upwardly through the mounting plate 12. However, the mounting plate 12 is provided with a threaded collar 45 on which is screwed the cap 46 through which projects the plunger extension 26' which, in this case, preferably is separated from the main plunger 26 and is bonded to a rubber sealing diaphragm 47 moisture-tightly clamped between the upper edge of the collar 45 and the inner surface of the cap 46. Plunger 26' is thus completely sealed in the openings through the mounting plate 12 and in this way, the entire switch is effectively sealed against moisture.

Ingress of moisture to the cavity 14 in the handle 10 as well as freezing of moisture on the thumb or finger lever 37 is precluded by a flexible rubber hood 48 overlying the lever 37. The flange 49 of the hood is larger than the mounting plate so that flange 49 overlaps the surface of the handle 10 beyond the perimeter of the mounting plate 12 as shown particularly in Figs. 1 and 3. A metal washer or collar 50 overlies the rubber flange 49 of the hood 48 and clamps it against the outer surface of the mounting plate 12 and the overlapped surface of the handle 10 so as to seal the flange 49 moisture-tightly thereto. Pressure on the flexible hood 48 by the thumb or finger actuates the lever 37 and when the pressure is released, the resiliency of hood 48 causes it to restore itself to the normal shape shown in Figs. 1 and 3.

Operation of the thumb or finger switch of this invention is readily understood from the foregoing description and although a preferred embodiment of the invention has been illustrated and described herein, it is to be understood that the invention is susceptible of changes in form and detail within the scope of the appended claims.

I claim:

1. In a switch for hand microphones and the like, the combination of an insulating member having first and second intersecting and mutually perpendicular passages, a pair of cantilever blades respectively mounted at one end on opposite sides of said member in spaced parallel relation, said blades being disposed adjacent opposite ends of said first passage, a contact at the free end of each said blade, a pair of relatively

stationary contacts mounted respectively on opposite sides of said member and normally spaced from the corresponding said blade contact, a plunger mounted in the second passage and movable in said member transversely of said blades and between the same, an enlarged portion on said plunger disposed within the member and also disposed at least partially in said first passage and adapted on movement thereof in one direction to deflect said blades to engage said blade contacts with the corresponding said stationary contact, a handle connected to said plunger for moving the same in said one direction, means defining an elongated channel in the underside of said insulating member intercepted near its center by said second passage, and spring means comprising an elongated metallic strip member attached at opposite ends to said insulating member to overlie said second passage to be disposed in the path of movement of the plunger, said strip member being bowed inwardly in the direction of the plunger for normally urging said plunger in the opposite direction toward contact-disengaging position.

2. In a switch for hand microphones and the like, the combination of a mounting plate secured to the hand grip of the microphone, an insulating member on the underside of said plate, a cantilever blade mounted at one end on said member, a contact at the free end of said blade, a relatively stationary contact mounted on said member and normally spaced from said blade contact, a plunger movable in said member transversely of said blade, an enlarged portion on said plunger adapted on movement thereof

in one direction to deflect said blade to engage said blade contact with said stationary contact, a pin aligned with said plunger and projecting through an opening in said plate and beyond the outer surface thereof, a flexible sealing means interposed between said pin and said plate and joined in sealing the relationship to each to seal the opening in the plate against the passage of moisture, a cup enclosing said member and appurtenant contacts and sealed to the underside of said mounting plate, a handle connected to said pin for moving said plunger in said one direction, a flexible, moisture-impervious hood enclosing said handle and pin and attached in moisture sealing relationship to the top side of said mounting plate, whereby the switch and appurtenant contacts are enclosed in a moisture tight housing sealed by means of said flexible sealing means, plate and cup and whereby said handle and pin are sealed by said plate and hood and spring means normally urging said plunger in the opposite direction toward contact-disengaging position.

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