

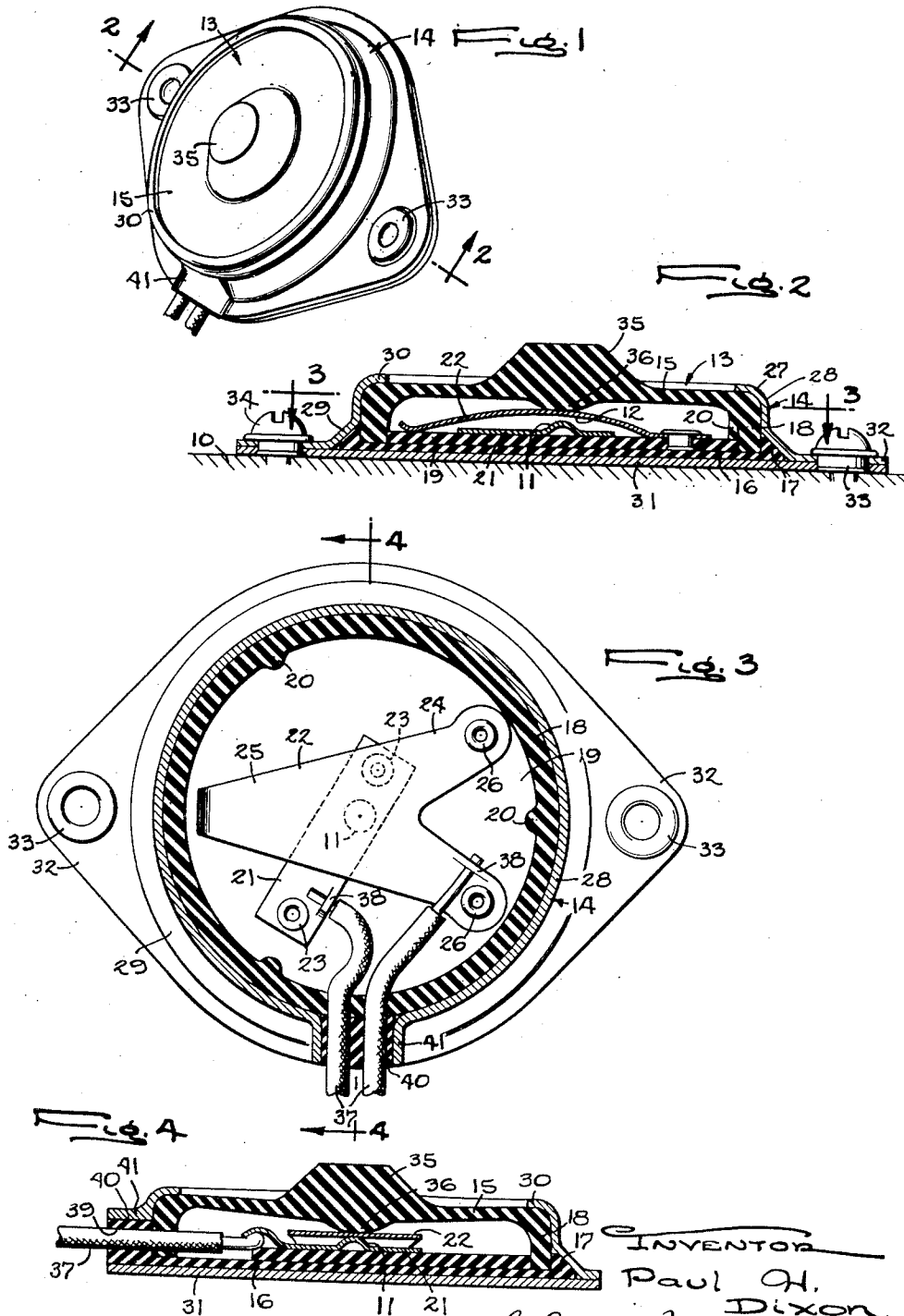
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ELECTRICAL SWITCH CONSTRUCTION

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ELECTRICAL SWITCH CONSTRUCTION

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1 Claim. (Cl. 200—86.5)

This invention relates generally to electrical switches and, more particularly, to switches of the pressure type having relatively movable contacts of conducting material which are continuously urged away from each other to open positions.

One object of the invention is to provide a novel pressure switch which is of simple, rugged construction especially adapted for foot actuation, which may be formed easily by high production molding and stamping operations, and which is resistant to moisture or other foreign matter liable to cause faulty operation.

Another object is to enclose the contacts in a novel casing having easily assembled parts which grip each other frictionally to define a substantially moisture proof enclosure.

A further object is to hold the casing parts in assembled relation by a novel cover which overlies the joint between the casing parts for further resistance to the passage of foreign matter into the casing.

The invention also resides in the novel construction of the contacts and the arrangement of the same within the casing to insure separation of the contacts upon release of pressure therefrom.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a perspective view of an assembled pressure switch embodying the novel features of the present invention.

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 3 and showing the parts in different positions.

The invention is shown in the drawings for purposes of illustration embodied in a heavy duty pressure switch which is especially adapted to be attached to the floor board 10 of an automotive vehicle and to be actuated by downward pressure of the vehicle operator's foot. Generally, the improved switch comprises a pair of contacts 11 and 12 which are yieldably urged apart to open positions shown in Fig. 2, a casing 13 enclosing the contacts, and a cover or mounting member 14 by which the casing may be attached to the vehicle floor board or other external part.

In accordance with one aspect of the present invention, the casing 13 is constructed in a novel manner of two parts which are easily assembled and which have a friction fit tending to hold the parts in assembled relation and resisting passage of moisture or other foreign matter into the casing. When assembled, the casing is generally cylindrical in shape with opposed top and bottom end walls 15 and 16 which are yieldably urged apart into laterally spaced positions (Fig. 2) on opposite sides of

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the contacts 11 and 12, but which are movable toward each other to close the contacts.

Each of the opposed walls 15 and 16 in this instance is a generally flat disk having a flange projecting laterally therefrom around its periphery and telescoping with a similar flange on the other disk. To provide a substantially moistureproof joint between the casing parts, the latter preferably are made of a resilient flexible material and the inner diameter of the outer flange 17 which is formed on the bottom wall 16 in this instance is made slightly smaller than the outer diameter of the inner flange 18 on the top wall 15. Thus, when the flanges are telescoped together, the outer flange 17 is urged radially and inwardly for frictional gripping engagement with the inner flange 18 which is urged outwardly. The axial spacing of the opposed walls 15 and 16 is determined by the axial length of the inner flange 18 whose inner end abuts the bottom wall 16 and which preferably has substantial thickness for rigidity of the side wall of the generally cylindrical casing. To facilitate assembly of the casing parts, the outer flange 17 tapers axially and outwardly as shown in Fig. 2 to permit outward flexing thereof to receive the inner flange 18. The material used in the formation of the casing parts preferably is an easily molded thermosetting plastic such as neoprene which is oil resistant.

Due to the rigidity of the inner flange 18 and the resilient character of the top end wall 15, the center portion of the latter may be depressed under axial pressure to move the contacts 11 and 12 into engagement with each other (see Fig. 4) and, upon release of the pressure, will return to its original position spaced from the bottom wall 16. The contacts 11 and 12 are mounted within the casing on a support 19 formed of suitable stiff insulating material and clamped between the casing parts. Herein, this support is a thin flat disk of slightly larger diameter than the inner diameter of the inner casing flange 18 so as to fit into the outer end of the latter frictionally. Angularly spaced lugs 20 projecting radially from the inner side of the inner flange 18 are spaced from the outer end thereof and abut the inner side of the insulating disk to locate the latter as shown in Fig. 3 with its inner side spaced from the top wall 15 and its outer side flush with the outer end of the flange. The bottom casing wall 16 engages the disk to clamp the same against the lugs when the casing parts are assembled.

The contacts 11 and 12 are parts of two contact elements 21 and 22 secured to the insulating disk 19 at spaced points and yieldably urged apart transversely of the opposed casing walls 15 and 16. In accordance with another aspect of the present invention, the contact elements are constructed in a novel manner to facilitate their formation as sheet metal stampings and to enable one of the elements itself to supply the force yieldably urging the contacts apart. To these ends, one contact element 21 is an elongated flat plate lying along the inner side of the insulating disk 19 and across the center thereof and secured to the disk at spaced points as by rivets 23. The other contact element 22 is an elongated resilient plate which extends transversely of and overlies the first plate 21 at the center of the disk. Intermediate its ends and throughout the major portion of its length, the resilient plate is curved longitudinally or bowed laterally away from the insulating disk and the first plate and normally is spaced from the latter. The contacts 11 and 12 are laterally spaced portions of the two plates located above the center of the disk, the fixed contact 11 preferably being formed as a projection on the first plate 21 to reduce the space between the contacts.

To permit the curved plate 22 to be flattened for move-

ment of the movable contact 12 or center portion thereof into engagement with the fixed contact 11, only one end portion 24 of the plate is secured to the disk 19. The other end portion 25 is free and preferably engages and slides along the disk so that the resilience of both end portions is utilized to urge the movable contact 12 away from the fixed contact, thereby insuring separation of the contacts upon release of pressure from the curved plate. Herein, the fixed end portion of the latter is bifurcated and is riveted to the insulating disk at spaced points as indicated at 26 to avoid turning or the plate relative to the disk. The material used in the formation of the contact elements 21 and 22 in this instance is a bronze alloy.

The parts of the casing 13 are held positively in assembled relation by the cover or mounting member 14 which is constructed in a novel manner to overlie the joint between the flanges 17 and 18 and thereby avoid passage of foreign matter into the casing while leaving the center portion of the top end wall 15 exposed for actuation of the switch. To this end, the cover includes a tubular sheet metal stamping 27 of annular cross section having a cylindrical upper end portion 28 sized to receive the inner casing flange 18 and merging with a downwardly and outwardly flaring lower end portion 29 which receives the tapered outer flange 17 of the casing. An inturned flange 30 on the upper end of the tubular member overlies the periphery of the top end wall 15 to hold the same against outward axial movement while leaving the center portion of the wall exposed for actuation of the switch. At its lower end, the tubular member is substantially flush with the outer side of the bottom end wall 16.

Means secured to the tubular member 27 and forming part of the cover 14 engages the bottom wall 16 of the casing 13 to clamp the latter against the inturned flange 30 of the tubular member. Herein, this means is a flat bottom plate 31 of sheet metal which abuts the lower end of the tubular member and lies against the bottom wall 16. To secure the tubular member and the bottom plate together, outturned flange projections 32 on the lower end of the tubular member are riveted to similarly shaped end portions of the bottom plate 31, the rivets 33 being hollow to receive suitable mounting screws 34 for attachment of the assembly to the vehicle floor board 10.

To facilitate depression of the top casing wall 15 and actuation of the switch, this wall is formed with a thickened portion at its center to provide an outer axial projection 35 extending above the flange 30 of the tubular cover part 27 and an inner axial projection 36 engageable with the upper side of movable contact 12. The inner projection 36 reduces the amount of axial movement of the top wall 15 required to actuate the switch and insures proper engagement of this wall with the movable contact at a point in alignment with the fixed contact lug 11.

Insulated conductors 37 are connected to struck-up portions 38 of the two contact elements 21 and 22 and are extended through suitably located openings in the casing 13 and the cover 14. While these openings may extend axially through the bottom casing wall 16 and the bottom cover plate 31, it is preferred, in order to leave the bottom of the assembly flat, to extend apertures 39 radially through the inner flange 18 of the casing 13 and through a lug 40 integral with and upstanding from the bottom casing wall 16 and enclosed by a radially opening recessed portion 41 of the tubular cover part 27 (Fig. 4). To retain the moistureproof character of the casing, the radial apertures 39 in the casing parts are made slightly smaller in diameter than the exterior of the conductor insulation thereby providing a tight fit between the latter end and the casing.

After the parts of the assembly have been formed in their respective molding and stamping operations, the contact elements 21 and 22 have been riveted to the insulator disk 19, and the conductors 37 have been secured to the contact elements and passed through the apertures

39 in the inner casing flange 18 and the lug 40, the insulating disk is inserted in the lower end of the inner flange 18 and moved into abutment with the lugs 20. Next, the inner flange 18 is fit into the outer flange 17 by spreading the latter slightly as permitted by its taper and pressing the two parts axially together. Finally, the casing 13 is inserted into the tubular cover member 27 and is clamped against the cover flange 30 by riveting the bottom cover plate 31 to the outturned projections 32 on the tubular member. The assembly is then ready for use.

Upon inward movement of the top casing wall 15 by depression of the outer projection 35 thereon, the inner projection 36 engages and flattens the intermediate portion of the curved contact element 22, as permitted by sliding movement of the free end portion 25 thereof, to urge the movable contact 12 into abutting relation with the fixed contact 11 for closure of the switch as shown in Fig. 4. Such closure is maintained only so long as sufficient downward pressure is exerted on the outer casing projection 35. Upon release of this pressure, the projection moves upwardly to its original position due to the resilience of the upper end wall 15 and the movable contact 12 returns to its normal position spaced from the fixed contact to open the switch as shown in Fig. 2, the curved contact element itself constituting the means yieldably urging the contacts proper away from each other.

It will be apparent that the switch construction described above is rugged and is substantially moisture-proof due not only to the friction fit between the casing flanges 17 and 18, but also, to the cover 14 which overlies the joint between the flanges. With one end portion 25 of the curved contact element 22 free to move relative to the fixed end portion 24 thereof and slidable along the insulating disk, both end portions of this element act to urge the contacts 11 and 12 away from each other, thereby insuring proper separation of the contacts. All of the parts are either stamped from sheet stock or molded from plastic and may be assembled easily in a few simple operations so that the resulting cost of the assembled switch construction is low.

I claim as my invention:

In a pressure switch, the combination of, a first casing part comprising a disk of resilient material having an integral tubular flange projecting laterally from the disk around its periphery, a second similar casing part comprising a disk of resilient material having an integral tubular flange projecting laterally from the disk around its periphery and telescoping colsely with the flange of said first disk, the outer one of said telescoping flanges having an inner diameter slightly smaller than the outer diameter of the other flange to grip the latter frictionally and provide a hollow substantially moisture proof casing, a plate of insulating material clamped between said casing parts, a pair of contacts secured to said plate at spaced points and yieldably urged apart transversely of said disk between one of the latter and the plate, and means on said one disk engageable with the adjacent one of said contacts to move the same into engagement with the other contact when said one disk is moved toward said plate and the other of said disks.

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