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VACUUM SWITCH

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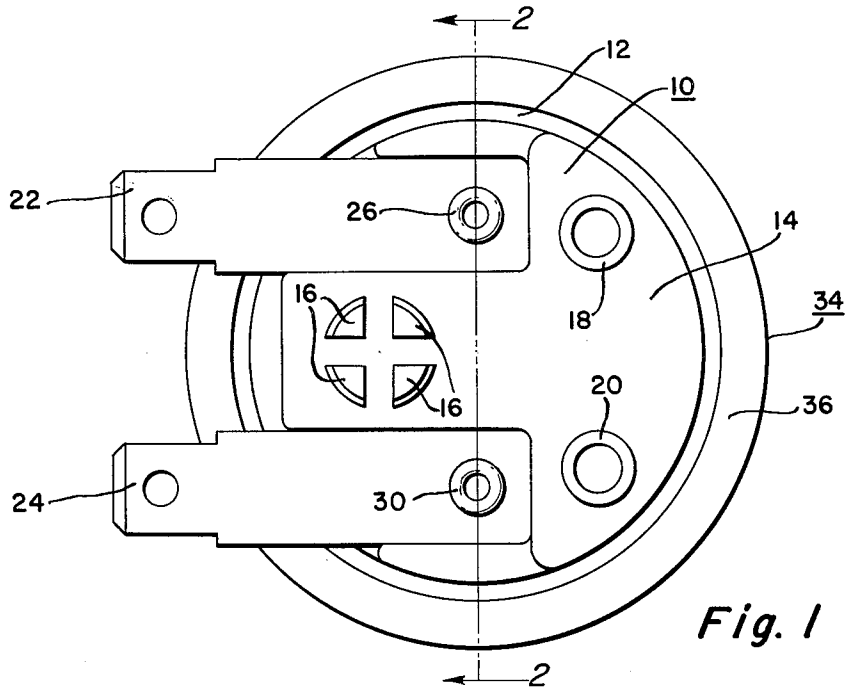


Fig. 1

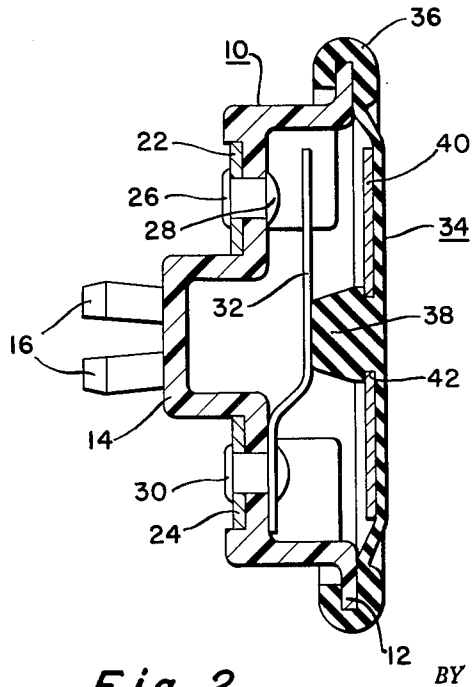


Fig. 2

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VACUUM SWITCH

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This invention relates to electric switches and more particularly to switches that are actuated by differential fluid pressure.

It is an object of this invention to provide a fluid pressure switch that is comprised of a minimum number of parts and which is simple to assemble and durable in operation.

Another object of this invention is to provide a pressure switch that includes a case or housing formed of moldable plastic material, a diaphragm having a portion snapped over a flanged portion of the case or housing and switching mechanism enclosed by the case and diaphragm.

Still another object of this invention is to provide a vacuum switch that includes a housing, a diaphragm and a movable spring metal contactor supported by the housing that is adapted to engage a fixed contact also supported by the housing, the diaphragm having a projecting portion which moves the spring metal contactor into engagement with the fixed contact with sufficient force to bow the spring metal contactor to thereby cause a wiping action of the spring metal contactor on the fixed contact.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein preferred embodiments of the invention are clearly shown.

In the drawings:

FIGURE 1 is a plan view of a switch made in accordance with this invention.

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

Referring now to the drawings, it is seen that the switch of this invention comprises a case or housing generally designated by reference numeral **10** which is formed of a plastic moldable insulating material such as nylon. The case or housing **10** has a circumferentially extending flange **12** and a wall portion **14** as is clearly apparent from the drawings. The wall portion **14** is formed with integral outwardly directed projecting portions **16** which serve as a means for supporting the switch on a mounting plate. The portions **16** are simply snapped into an aperture formed in a mounting plate and then spread out to hold the switch assembly in place once the projecting portions **16** have been snapped into a mounting plate aperture. The housing **10** also has integrally formed tubes **18** and **20** which connect the interior of the housing with the exterior thereof. These tubes, as will become more apparent hereinafter, are adapted to be connected with vacuum pressure to actuate the switch and to also serve as a connecting chamber for vacuum pressure. The housing **10** carries a pair of male connectors **22** and **24** as is clearly apparent from FIGURES 1 and 2. The connector **22** is held to the housing **10** by a rivet **26** having a head portion **28** which serves as a fixed contact for the switch. The male connector **24** is held to the housing **10** by a rivet **30** which also serves to hold a thin spring metal contactor **32** in place. It is seen that the spring metal contactor **32** is supported in cantilever fashion with one end overlying the fixed contact **28**. The spring metal contactor **32**, due to its own resilience, is normally out of contact with the fixed contact **28**.

The switch assembly has a diaphragm designated in its entirety by reference numeral **34** that is formed of a suitable elastomeric material such as rubber. This diaphragm has a portion **36** formed with a groove that snaps

over the annular flanged portion **12** of housing **10**. The diaphragm **34** has a projecting portion **38** which engages the spring metal contactor **32** as is clearly apparent from FIGURE 2. An annular metal plate **40** has a central opening receiving the projecting portion **38** and serves to lend rigidity to the diaphragm. The inner edge of the plate fits within a groove **42** as is apparent from FIGURE 2.

In operation of the switch, one of the tubes **18** is connected with a vacuum source while the other tube **20** is connected to some other device that is operated by vacuum. It will of course be appreciated that only one tube is necessary in order to operate the switch but in the particular embodiment shown, the chamber defined by the housing and diaphragm also forms a junction or connection for another vacuum operated device. When the chamber defined by the housing **10** and diaphragm **34** is connected with vacuum, the diaphragm moves leftwardly in FIGURE 2 toward the housing, and the projecting portion **38** moves the spring metal contactor **32** into engagement with the fixed contact **28**. In moving leftwardly, the diaphragm not only moves the spring metal contactor **32** into engagement with fixed contact **28** but flexes or bows the contactor **32** so that a wiping action is provided between the spring metal contactor and the fixed contact **28**. When the switch is no longer connected with vacuum, the spring metal contactor **32** moves by its own resilience out of engagement with the fixed contact **28** to open the circuit between male terminals **22** and **24**. The contactor **32** also serves to aid in moving the diaphragm back to its FIGURE 2 position.

When the projecting portion **38** of the diaphragm **34** forces the spring metal contactor into engagement with fixed contact **28**, there is no impediment to the flexing of the spring metal contactor **32** as the wall **14** is spaced sufficiently away from the spring metal contactor to allow it to bow or flex.

It will be apparent from the foregoing that a switch has been provided that is economical to manufacture and simple to assemble. The switch is formed essentially of two parts namely the casing or housing **10** that carries the switch elements and the diaphragm **34** which is simply snapped over the flanged portion of the housing. In addition, the switch provides durable operation since an effective wiping action is provided between the movable contactor **34** and the fixed contact **28**.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A vacuum operated switch comprising, a generally cup-shaped housing formed of a plastic molding material, said housing having first and second integral conduit portions and a lug means extending from one wall thereof, said lug means being adapted to be inserted into an opening to support said switch, a diaphragm formed of elastomeric material having an outer circumferentially extending slot receiving an outer marginal portion of said housing, said diaphragm and housing providing a chamber that is in communication with the interior of said first and second conduit portions, a spring metal contactor capable of being bowed positioned within said chamber, first and second male terminals having flat sides engaging an outer wall of said housing and fitted respectively within open ended slots formed in said outer wall of said housing, said slots and male terminals being located normal to the longitudinal axis of said housing, a first rivet securing said first male terminal in one of said slots and securing an end of said spring metal contactor to an inner wall of said housing whereby said contactor is supported in cantilever fashion, a second rivet securing the second male terminal in the other of said

slots and having a portion forming an electrical contact that is engageable with said spring metal contactor, said diaphragm having an integral axially extending portion engaging said spring metal contactor with a point located between said rivets, a groove formed in the axially extending portion of said diaphragm, and a plate member having a central opening the marginal edge of which fits within said groove, said plate member engaging an inner wall of said diaphragm.

2. A vacuum operated switch comprising, a generally cup-shaped housing formed as a one-piece plastic molded part, said housing having an integral conduit portion and having a projecting lug means both of which extend from an outer wall thereof, said lug means being adapted to be inserted into an opening in a support member, a diaphragm formed of elastomeric material having an outer circumferentially extending slot receiving an outer marginal portion of said housing, said diaphragm and housing providing a chamber that is in communication with the interior of said conduit portion, a spring metal contactor capable of being bowed positioned within said chamber, said spring metal contactor being secured to an inner wall of said housing at one end thereof and having an opposite end overlying a fixed contact, said diaphragm having an integral axially extending switch actuating portion engaging said spring metal contactor at a point located between said fixed contact and the point of securement of said spring metal contactor with the inner wall of said housing, a groove formed in said switch actuating portion of said diaphragm, and a plate member having a central opening, the marginal edge of said central opening fitting within said groove, said plate member engaging an inner surface of said diaphragm.

3. A vacuum operated switch comprising, a one piece generally cup-shaped molded housing formed of insulating material, said molded housing having an integral conduit portion extending from an outer wall thereof and having walls defining first and second open ended slots,

a diaphragm formed of elastomeric material having an inner circumferentially extending slot receiving an annular marginal portion of said housing, said diaphragm being snap-fitted to said housing and being secured to said housing solely by the fitting of the marginal portion of said housing within said circumferentially extending slot of the diaphragm, said diaphragm and housing forming a chamber that is in communication with said conduit portion, a spring metal contactor located within said chamber, first and second male terminals located within said first and second open-ended slots, said male terminals being positioned normal to the longitudinal axis of said housing, first fastener means for securing said first male terminal in said first open ended slot and securing one end of said spring metal contactor to an inner wall of said housing, second fastener means securing said second male terminal in said second open ended slot and having a head portion defining an electrical contact that is engageable with an opposite end of said spring metal contactor, and an axially extending switch actuating portion integral with said diaphragm engaging said spring metal contactor at a point located between said first and second fastener means.

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