Dec. 25, 1962 N. E. MOSERES 3,070,676

FLUID PRESSURE RESPONSIVE SWITCH IN FLUID FLOW SYSTEMS

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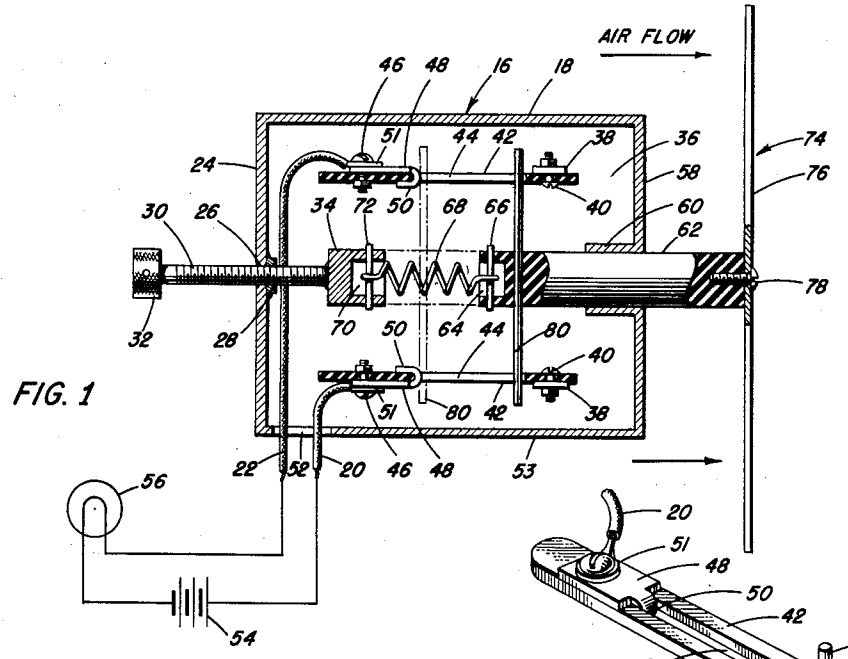



FIG. 1

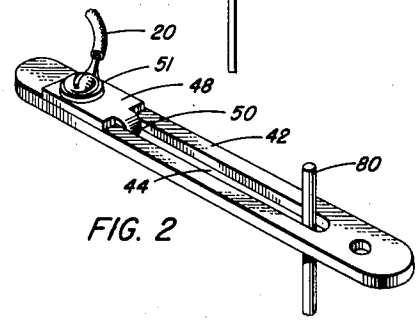



FIG. 2

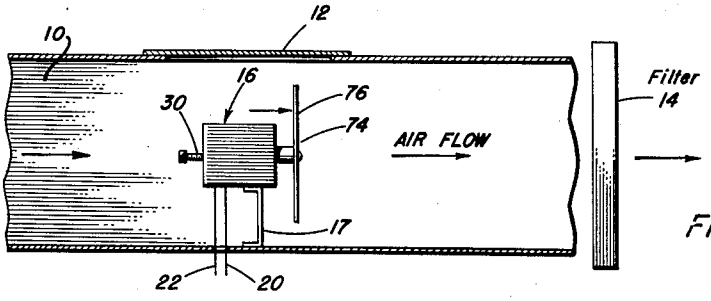



FIG. 3

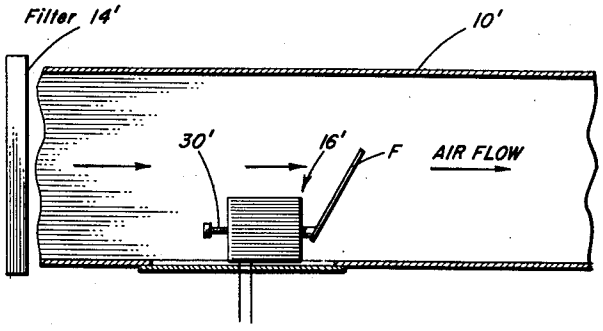



FIG. 4

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# FLUID PRESSURE RESPONSIVE SWITCH IN FLUID FLOW SYSTEMS

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This invention relates generally to fluid flow systems and is more particularly concerned with an improved warning system and fluid pressure responsive switch utilized in the same.

In systems for heating or cooling, for example, certain components such as the compressors, heat exchangers, or the like, depend upon a free flow of air to insure certain operational conditions and a prescribed efficiency. Oftentimes, in systems of the character mentioned, maintenance of filters is neglected or cooling fins of a compressor become impacted, and the system efficiency is reduced to a point where it no longer accomplishes the purpose intended, but is very expensive to operate.

Since systems of the character mentioned may include a plurality of different components adversely affected by the reduction of free flow of air, the warning system of the invention may be utilized in banks on a control panel or the like.

For the purposes of illustration, a relatively simple warning system will be illustrated in relation to a fragmentary portion of a duct of a heating system. It will be observed that the signal means of the system may be readily located remotely from the fluid pressure responsive switch means and the novel system is especially adapted to be used adjacent filters located in a relatively inaccessible position. The novel system may be utilized in any location where forced air flow is critical, and thus is adaptable for use in dryers, air conditioners, air purifiers, etc.

A primary object of the invention is to provide a novel fluid flow-responsive signal system and novel switch means utilized therein.

A further object of the invention is to provide in a system of the character set forth electrically energized signal means operatively connected to fluid pressure responsive switch means normally biased to a signal energizing position and subject to being retained open due to a predetermined fluid flow pressure.

A still further object of the invention is to provide a novel fluid pressure responsive switch including means for providing an adjustable residual force to act in opposition to fluid pressure to which the switch is subjected to.

And yet another object of the invention is to provide a novel system of the character mentioned which is readily and economically installed and maintained and practical for the purpose intended.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a top plan view of the novel switch of the invention, with portions broken away and sectioned for purposes of clarity, showing diagrammatically electrically energized signal means utilized therewith;

FIGURE 2 is an enlarged fragmentary perspective view of one of the insulated guide elements and electrical contacts of the switch in relation to the current conducting element utilized therewith;

FIGURE 3 is a diagrammatic top plan view showing the novel switch in relation to a fragmentary portion of a duct of a system utilizing a transverse filter; and



FIGURE 4 is a view similar to FIGURE 3 showing a slightly modified switch disposed downstream of the filter.

Referring to the drawing, in FIGURE 3 a heating system for example, includes a duct 10 having an access panel 12 and a transverse filter 14 which should be periodically cleaned or replaced. The direction of air flow in the duct 10 is indicated by direction arrows, and a novel fluid pressure responsive switch 16 is shown to be located upstream of the filter 14. The switch 16 is suitably mounted on a support bracket 17 in the duct 10 and current conducting leads 20 and 22 extend through the duct.

As seen in FIGURE 4, the duct 10' includes a suitably mounted switch 16' disposed downstream of a filter 14'. The switch 16' functions in the identical manner as that of FIGURES 1–3, however, a fin or flap F thereof is disposed in a slightly angular relation to the longitudinal axis of the duct 10'.

Referring to FIGURE 1, the switch 16 includes a housing 18 which may be rectangular, and includes a rear end wall 24 transversely apertured at 26 and having a nut 28 overlying the aperture and suitably secured on the inner surface of the wall. Threadedly received in the nut 28 is an adjusting screw 30 having a knurled knob 32 disposed outside of the housing 18 and having a tubular sleeve 34 opening into the housing.

Extending vertically from the bottom 36 of the housing are spaced apertured support elements 38 to which are secured by transverse nut-and-bolt assemblies 40, one end of parallel, elongated guide elements 42 which include a longitudinal slot 44 extending therethrough. The guide elements 42 are constructed from a suitable electrical insulating material. Secured by means of a mounting nut-and-bolt assembly 46 are electrical contact elements 48 which include a reverse-bend tab 50 extending through one end of the slots 44. Also mounted on the assemblies 46 are terminal connectors 51, one of which being connected to each lead 20 and 22 which extend through an opening 52 in the side wall 53 of the housing 18.

The contacts 48 are connected in series by lines 20 and 22 to a source of potential 54 and an electrically activated signal means 56 such as an incandescent bulb as shown, bell or klaxon.

The housing 18 includes through an end wall 58 opposite the end wall 24 an inwardly extending guide sleeve 60 in axial alignment with the screw 30. Reciprocally supported in the sleeve 60 is a rod-like guide portion 62 of a suitable electrical insulating material, which terminates in an inwardly opening socket 64 to which is connected by a pin 66, or in any suitable manner, one end of a tension spring 68. The other end of the spring is anchored in an inwardly opening socket portion 70 integral with the inner end of the screw 30 by means of a transverse pin 72, for example. The rod-like guide portion 62 is part of fluid pressure-responsive means indicated generally at 74 which comprises a flap or fin 76 similar to the flap F of switch 16'. The flap 76 is connected to the guide portion 62 by means of a suitable screw 78, or the like, and the flap is disposed generally normal to the path of travel of air passing through the duct 10 before it passes through the filter 14.

Extending transversely through the inner end of the guide portion 62 is current conducting means 80 comprising an elongated rod having terminal ends thereof extending through the slots 44 of the guide elements for guided rectilinear movement toward and away from the contacts 48. The current conducting means will be effective to close the circuit between the contacts 48 to energize the signal means 56.

*Operation*

In the absence of air flowing through the ducts 10 or 10', the spring 63 will be effective to draw the current conducting means 80 to the dotted line position of FIGURE 1 to close the circuit and cause the signal means 56 to be energized. The screw 30 will be adjusted to impose a predetermined residual pressure on the means 80. If the flow of air is above a predetermined volume, sufficient pressure will be applied on the flap 76 or F to cause the current conducting means 80 to move to the solid line position to open the circuit to signal means 56. The circuit to the signal means will be open when a predetermined volume of air moves through the ducts at a predetermined velocity.

If the velocity of air passing through the ducts is reduced below the predetermined value, due to an impacted filter, for example, the circuit to the signal means will automatically close to apprize one that the system is operating improperly. It is readily apparent that a plurality or bank of the signal switches may be utilized in different locations of an elaborate air flow system whereby one will be able to determine the location of the source of difficulty in the system.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention, and therefore the invention is not to be limited to what is shown in the drawings and described in the specification but only by the scope of the appended claims.

What is claimed as new is as follows:

1. A fluid pressure-responsive switch comprising a housing, a pair of insulated spaced guide elements mounted in said housing, an electrical contact secured to each of said guide elements at one end thereof, a fluid pressure-responsive shaft movably mounted in said housing for reciprocating movement therein, said shaft having an electrically conductive rod transversely thereof guided by said elements for movement in and out of engagement with said electrical contacts, each of said guide elements having an elongated slot with the contact secured to the guide element at one end of the slot, said conductive rod passing thru said slot.



2. A fluid pressure-responsive switch comprising a housing, a pair of insulated spaced guide elements mounted in said housing, an electrical contact secured to each of said guide elements at one end thereof, a fluid pressure-responsive shaft movably mounted in said housing for reciprocating movement therein, said shaft having an electrically conductive rod transversely thereof guided by said elements for movement in and out of engagement with said electrical contacts, each of said guide elements comprising a strip of insulation having an elongated slot with the contact secured to the guide element at one end of the slot, said conductive rod passing thru said slot, a spring secured to said pressure-responsive shaft, and means fastened to said spring and passing thru said housing for adjusting the tension of said spring.

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