Oct. 28, 1958 R. HOPKINS 2,858,394

PRESSURE MAT

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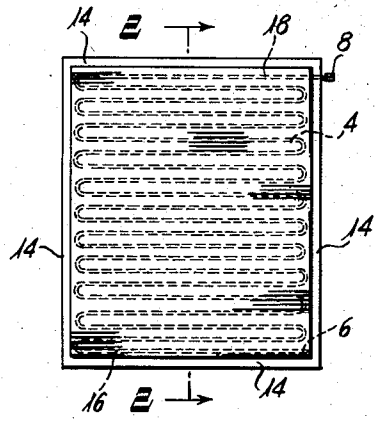


Fig. 1.

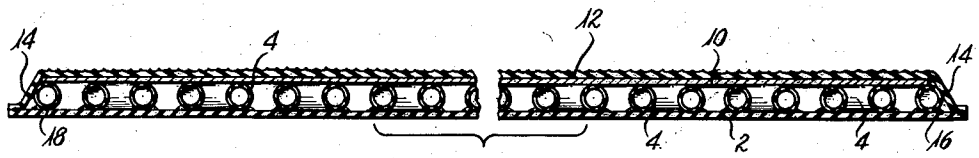
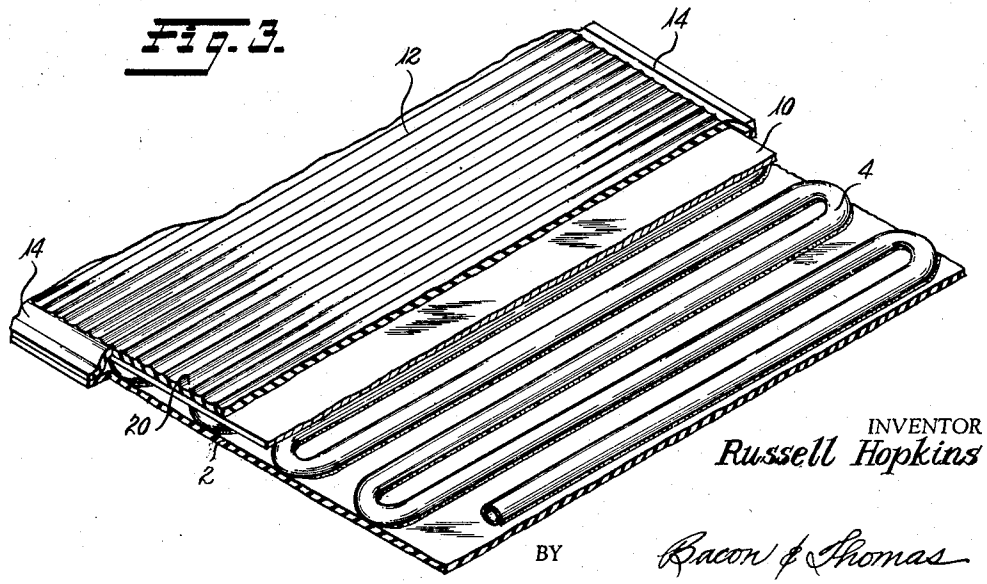


Fig. 2.

Fig. 3.



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PRESSURE MAT

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5 Claims. (Cl. 200—86)

This invention relates to pressure mats, and particularly mats or similar structures responsive to pressure thereon to actuate a control switch or the like.

At the present time automatic door opening devices are coming into wide use. Such devices usually consist of a motor of a suitable type arranged to open or close a door and control means for the motor to start the same upon approach of a person or vehicle within a predetermined distance of the door. The present invention relates to a mat structure designed to respond to the weight of a person, cart, carriage or the like to actuate a motor control switch for opening a door or for performing any other equivalent function. The present invention relates to structure of the mat, per se, without limitation as to the type of switch it actuates or the instrumentality operable in response to switch actuation.

In general, the mat of the present invention comprises a sealed envelope of resilient material having a metal plate therein overlying a sinuously arranged flexible resilient tube. The tube is sealed at one end within the envelope and the other end of the tube extends outwardly of the envelope and is provided with means for connection to a pressure-operated switch or the like. The arrangement is such that the weight of a person, cart or the like on the mat effects compression of the air in the tube to such a degree that the pressure is transmitted to the switch or similar instrumentality. Many arrangements of the mat of the present invention with switches or other control devices will be obvious to those skilled in the art.

It is therefore an object of this invention to provide a pressure-responsive mat of simple construction, yet highly efficient and sensitive in operation.

It is another object of this invention to provide a pressure mat of the type described having means for distributing the weight thereon over a substantial portion of a pressure-responsive conduit therein.

It is still another object of this invention to provide a pressure mat structure capable of being easily and economically fabricated.

Additional objects and advantages will become apparent to those skilled in the art as the description proceeds in connection with the accompanying drawings, wherein:

Fig. 1 is a top plan view of a mat constructed in accordance with the present invention;

Fig. 2 is an enlarged transverse sectional view through the mat of Fig. 1, taken substantially along the line 2—2 of Fig. 1; and

Fig. 3 is a perspective view of a portion of the mat of Fig. 1, shown on an enlarged scale and with parts broken away to more clearly illustrate the construction.

The pressure mat of this invention is completely sealed in a resilient envelope comprising a bottom layer or sheet 2 of suitable material and a top sheet 12. The preferred material for the envelope is "neoprene," since the latter well-known material has the desired characteristics of resilience and is yet impervious to air and liquids and is inert to the action of oils, greases and the like. Overlying

the bottom sheet 2 is a sinuously arranged tube 4 of rubber or neoprene. The tube 4 is, as shown, sinuously arranged with spaced parallel portions closely adjacent each other whereby portions of the conduit or tube 4 are dispersed over substantially the entire area of the mat. One end of the tube 4, as shown at 6 in Fig. 1, is closed and sealed in any suitable manner. The other end of the tube 4 extends outwardly beyond the boundaries of the lower sheet 2 and may be provided with a suitable coupling 8 for attachment to a control switch or the like. A metal plate 10 overlies the sinuously arranged tube 4 and is of substantially the same configuration and area as the bottom wall 2 of the envelope. The metal plate 10 is preferably fairly thin but of sufficient rigidity to transmit or distribute localized pressure to a plurality of adjacent portions of the tube 4 therebeneath.

Overlying the metal plate 10 is the upper or tread sheet 12, also preferably of neoprene, and the edges of which extend downwardly over the boundary edges of the plate 10, as at 14, into overlying relation to the boundary edge portions of the bottom sheet 2. The superposed edge portions of the sheets 2 and 12 are sealed by means of cement, vulcanization, or in any other suitable manner, throughout their peripheries to provide a completely sealed envelope enclosing the tubing 4 and plate 10.

The tubing 4 is arranged to overlie substantially the entire area of the bottom wall 2 and the terminal "runs" 16 and 18 are arranged substantially coincident with opposed edges of the mat so that they constitute substantially the extremities of the mat structure. By arranging the runs 16 and 18 at the extremities of the mat, fairly light pressure such as would be applied by a light carriage or the like, is first applied in its entirety to the one run of the tube it engages first and with such concentration of weight even a light carriage is sufficient to compress the air in the tube to the necessary degree to actuate a sensitive control switch connected thereto.

The tubing 4 is preferably of small diameter, for instance, it may be about 3/16 inch outside diameter with thin side walls. Such a tubing sealed at one end and connected to a pressure switch at the other end is obviously very susceptible to light pressures applied to the plate 10 to compress the air trapped in the tubing or conduit to apply pressure to the switch. Since the tubing is arranged within a sealed envelope, the air trapped in the envelope itself and surrounding the tubing 4 acts as a cushion or support for the tubing, when heavy pressures are applied, to prevent collapse of one portion of the tubing and expansion of another portion without transmitting the necessary pressure through a fitting 8 to the switch being controlled thereby. The air trapped in the envelope gives the mat a "firm" feeling even though the tubing 4 may have very thin walls.

Commercially available rubber or neoprene tubing is normally substantially straight and when arranged in the sinuous formation shown then released, the tubing tends to straighten out. It does not remain in the sinuously arranged configuration unless restrained and held in such shape. Applicant has found it desirable and advantageous to cement the tubing 4 to either the bottom sheet 2 or to the metal plate 10 or both. A method of assembling the mat disclosed was developed and proved highly satisfactory. The method consists of first providing the bottom sheet or panel 2 of the requisite size, then sinuously arranging the rubber tube 4 against one face of an adhesive coated metal plate 10. The rubber tubing was thus cemented to the face of the plate 10 and the assembly was thereupon lifted and manipulated as a unit and brought into the desired position relative to the bottom sheet 2. Thereafter it was a simple matter to place the upper sheet 12 in position and cement the edge 14

to the edge of the bottom sheet **2** to complete the mat.

The upper sheet **12** is preferably provided with a corrugated or non-slip portion **20** defining the uppermost surface thereof.

I have thus described a preferred embodiment of the above invention, which is merely exemplary and not limiting.

I claim:

1. In a control mat, superimposed top and bottom walls of flexible material joined at their edges to define a substantially flat envelope, means defining a flexibly collapsible air conduit in said envelope and arranged to have portions thereof dispersed over substantially the entire area of said bottom wall, a plate of substantially rigid material inside said envelope and overlying said conduit means, said conduit means defining a closed and collapsible air chamber in said envelope, and means for connecting a pressure responsive device to the otherwise closed interior of said conduit means.

2. A control mat as defined in claim 1 wherein said conduit means comprises a sinuously arranged resilient tube having one end sealed and portions thereof extending along and substantially coinciding with at least one edge extremity of said envelope, the other end thereof extending outwardly of said envelope and constituting said last-named means.

3. A control mat as defined in claim 1 wherein said plate extends over substantially the entire area of said mat.

4. A control mat as defined in claim 1 wherein said conduit means is a sinuously arranged resilient tube engaging the upper surface of said bottom wall and the lower surface of said plate, and means adhesively securing said tube to at least one of said surfaces.

5. A control mat as defined in claim 1 wherein said top and bottom walls are of air impervious material sealed together throughout their peripheral edges.

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