

April 7, 1942.

P. G. PEIK

2,278,733

SOUND DEADENER

Filed Oct. 5, 1939

2 Sheets-Sheet 1

Fig. 1.

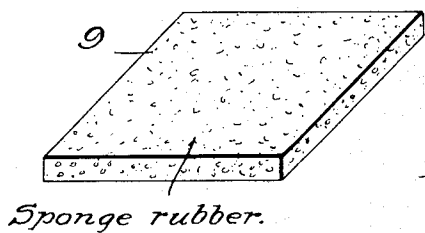


Fig. 2.

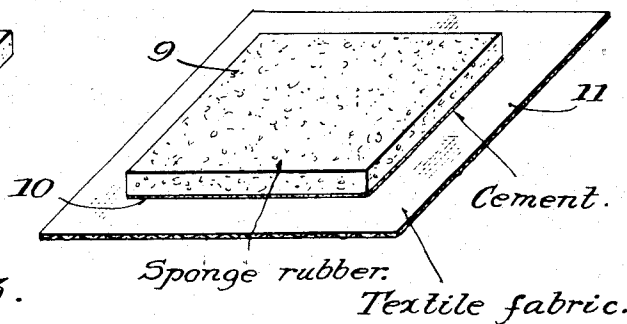


Fig. 3.

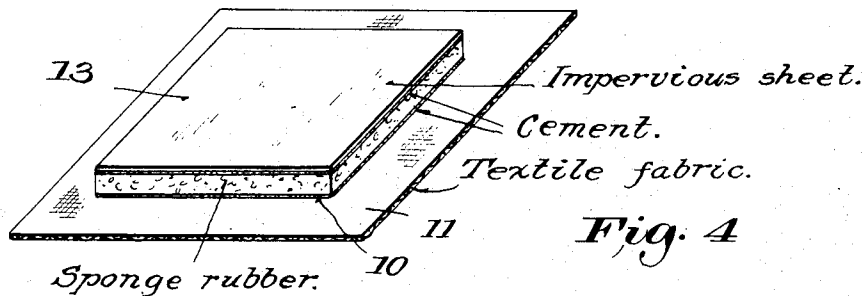


Fig. 4

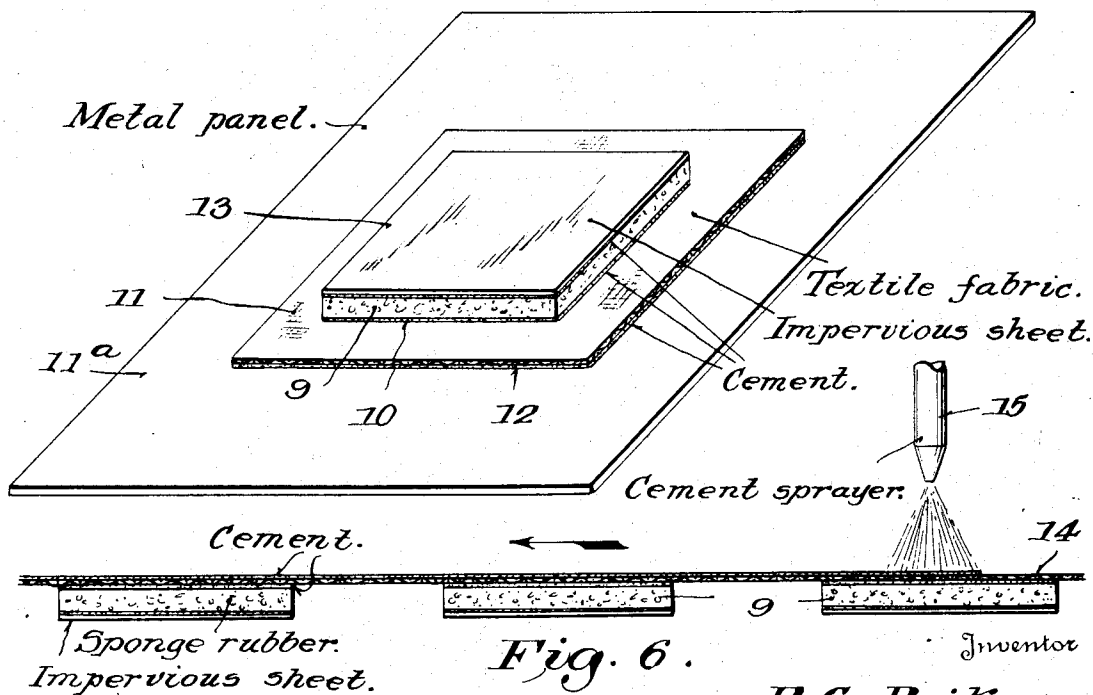


Fig. 6.

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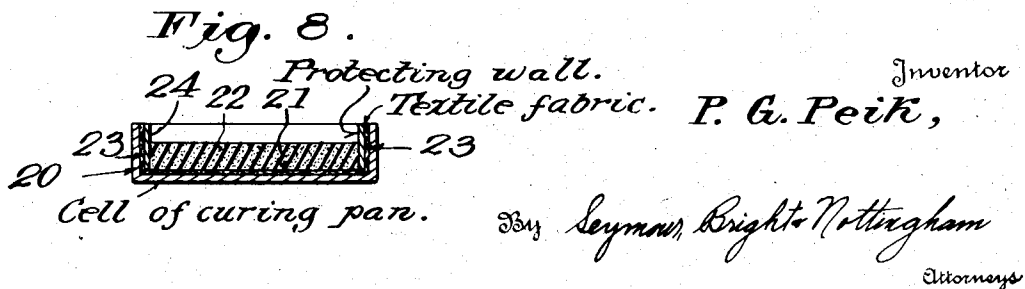
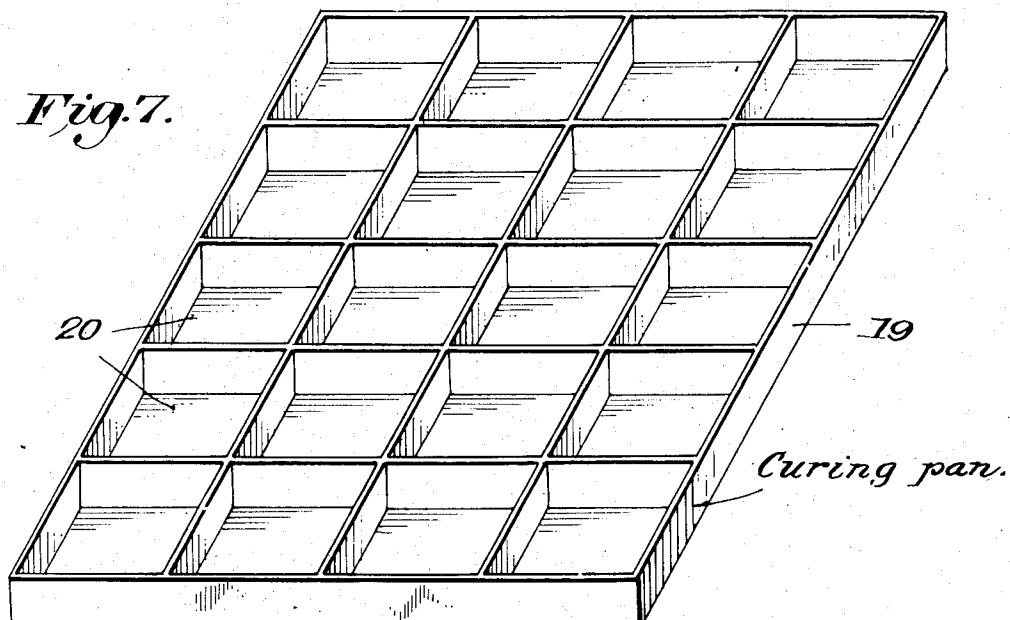
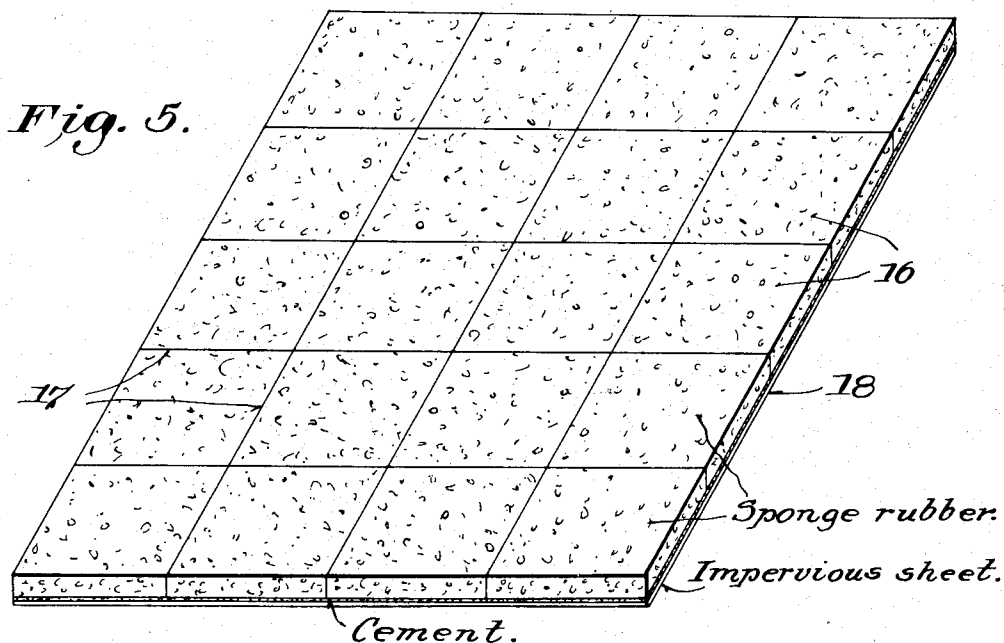
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,278,733

SOUND DEADENER

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Application October 5, 1939, Serial No. 298,159

5 Claims. (Cl. 154-44)

This invention relates to sound deadening, and more particularly to the deadening of sound in automobile bodies or the like, formed with a metal shell.

In my application Serial No. 230,709, filed September 19, 1938, I have disclosed novel sponge rubbers and methods of manufacturing the same, and some of such sponge rubbers are particularly adapted for the deadening of sound. In accordance with that invention, a water in oil type emulsion of dispersed rubber is produced, and subsequently, the emulsion is heat treated to vulcanize the same and form sponge rubber.

The primary purpose of the present invention is to provide novel sponge rubber panels, and means for attaching the same to a metal or other surface.

With the foregoing object outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a perspective view of a sponge rubber panel manufactured by the methods disclosed in my prior application.

Fig. 2 is a similar view of such a panel shown attached to a piece of textile fabric.

Fig. 3 is a view similar to Fig. 2, but showing the panel covered with a sheet of impervious material such as paper.

Fig. 4 is a perspective view of a metal panel having one of my sound deadening units secured thereto.

Fig. 5 is a perspective view of a laminated sheet of sponge rubber and paper from which panels are cut.

Fig. 6 is a side elevation of a web of textile fabric having spaced sponge rubber panels secured thereto, and illustrating the manner in which cement is applied to the surface of the fabric opposite that where the panels are secured.

Fig. 7 is a perspective view of a curing pan having a multiplicity of cells in which the sound deadening units may be formed.

Fig. 8 is a vertical sectional view of one of said cells and illustrating the manner in which a unit is formed therein.

I have found in practice that sponge rubber manufactured in accordance with my prior invention has an extremely high sound deadening efficiency for automobile bodies and the like. I have also found that due to the novel and pe-

culiar characteristics of my sponge rubber, it is difficult to obtain a satisfactory bond with any known cement to adhere small panels of such sponge rubber to the inside surface of a metal auto body panel. In this connection, it should be kept in mind that on account of the extreme high sound deadening efficiency of my material, a very small amount is required for any specific job. For example, it has been found by actual laboratory and road tests that a panel of my sponge rubber 4" x 4" and 1/2" thick, cemented to the center of the door panel of an automobile dampens the sound caused by vibrations of the panel as effectively as one pound of commercial spray-on asphalt deadener per square foot over the entire inner surface of the door panel area.

In view of this fact, plus the fact that any loosely woven fabric can be readily cemented to metal, and that the sponge rubber deadener is readily cemented to such a fabric, I have devised a novel means of applying this deadener to automobile body panels or to any other surface to which the sponge rubber deadener cannot be readily cemented directly.

In accordance with the present invention, a sponge rubber panel 9, made in accordance with my prior invention, is cemented as indicated at 10 in Fig. 2, to a piece 11 of loosely woven textile fabric, such as outing flannel, somewhat larger in dimension than the rubber panel. In actual practice, in the auto industry, a piece of fabric 2" greater in each dimension than the rubber panel has been found sufficient, as it leaves a fabric margin of 1". This textile fabric with the rubber panel cemented thereto is then cemented to the metal automobile panel 11a, as indicated at 12 in Fig. 4.

Due to the unique physical characteristics of my sponge rubber, there is a greater inclination to curl when cement is applied to only one of its sides. This does not occur when cement is applied to both sides, and it has therefore been found desirable to apply a dense impervious sheet, such as ordinary wrapping paper, to the exposed side of the rubber panel at the time of securing the panel to the piece of textile fabric. Such an impervious sheet is shown at 13 in Figs. 3 and 4. In addition to retaining the true alignment or shape of the rubber panel, such paper surface has other important purposes, and is considered an essential part of my present invention. It acts as a seal so that the oxidation of the rubber or weathering of the rubber is greatly retarded. It also facilitates stacking of the panels for shipment as, due to the unique physical characteris-

tics of the sponge rubber, panels thereof tend to adhere to each other if in contact under pressure for an extended period of time, as during shipment in packing cases.

In manufacturing my improved sound deadening units for the automotive trade (Fig. 6), the sponge rubber panels 9 can be fastened or adhered to a strip 14 of cloth of substantial width and spaced at regular intervals so that when the strip is severed to form the units before application, there will remain exactly the margin of cloth desired around the rubber panel. By this procedure, the strip 14 of muslin or the like, with the rubber panels attached thereto, may pass along a conveyor belt with the rubber panels below the strip of fabric, making possible the spraying of cement (from a nozzle 15 for example), on the side of the textile fabric which is to be cemented to the auto body panel. When the structure thus fabricated arrives at the point of application in the line of auto body panels, the cement has had time to dry, and the cloth is cut so that the individual rubber panels can be cemented to the metal auto body panels. This procedure is very desirable and essential on account of the speed of application required in an auto body assembly line, and the difficulty in handling individual units of the rubber panels attached to the cloth. It has been found in some cases, depending on the nature of the metal, that it is unnecessary to apply cement both on the cloth and the metal auto body panel to obtain a sufficient bond. In these instances, the cement is merely applied to the auto body panel, and the cloth and rubber unit applied on the cloth side to the surface so cemented. In such instances, the strip of cloth with the rubber deadener panels spaced uniformly on it may be cut up into individual units before shipping, as the sole object of keeping the cloth in strips is to facilitate application of the cement.

The paper or other impervious sheet 13 applied to the exposed side of the rubber panel surface has another important purpose. The rubber deadener panels are manufactured in extremely large sheets, such as shown at 16 in Fig. 5, and such sheets are severed along the lines 17 for example, in the requisite size after the work leaves the curing oven. It is the nature of such sponge rubber deadener that it is very fragile, having very little tensile strength as it emerges from the oven, which tensile strength, however, it acquires over a period of approximately twenty-four hours. Cementing paper to this material eliminates a good part of this delay, and enables the sound deadener to acquire the necessary strength so that it can be cut and assembled into the desired units while it develops its final tensile strength. The paper facilitates the handling of the sponge rubber, as rubber deadening panels can be much more effectively cemented to the cloth while in this fragile state than before having developed its ultimate tensile strength. In this connection it will be noted (Fig. 5) that the paper sheet 13 is applied to the sheet of sponge rubber before the latter is severed into individual pieces.

Before curing the emulsion from which the sponge rubber is formed, the water dispersed in it is substantially liquid, and the emulsion, while of heavy consistency, is sufficiently fluid in nature so that it will seek its own level if poured into a curing pan 19 of the kind illustrated in Fig. 7 for example. Such pan may be divided by partition walls 20 into a number of

cells, and instead of forming the sponge rubber as a sheet, the emulsion may be introduced directed into such cells. However, before introducing the emulsion into a cell, the latter, as illustrated in Fig. 8, will be lined with a piece of textile fabric 21 which is to form the cloth part of the sound deadening unit, and then the emulsion 22 is poured into the cell before curing. In order to prevent the emulsion from adhering to the marginal portions 23 of the textile fabric, any suitable form of protector 24 may be placed in the cell as a liner to segregate the emulsion from the marginal portions 23 of the cloth. In other words, I have found that the cloth may be put into the bottom of the cells before the emulsion is poured, and upon curing or vulcanizing, the main portion of the cloth is actually vulcanized into the surface of the sponge rubber as an integral part of it. This, of course, eliminates the cementing of small sponge rubber panels to the textile fabric, but makes it necessary to divide a large curing pan into a multiplicity of cells to obtain a margin of cloth around each of the small sponge rubber panels of the size ultimately required.

The bond obtained by applying a piece of fabric of greater dimension than the rubber panel is extremely strong. As a matter of fact, the bond between the rubber and the loosely woven fabric is stronger than either material, while the bond between the fabric and the metal is definitely stronger than the fabric itself, when a suitable rubber cement is used. This, coupled with the fact that there is a margin of fabric around the rubber, insures non-breakage of either bond, even though the rubber panel is purposely distorted, for instance, by the employment of high temperatures. Needless to say, this is not done in practice, but is merely evidence of the extreme strength of bond obtained by the method of this invention.

The herein described and illustrated embodiments have given satisfactory results in practice, and it will be manifest to those skilled in the art that other changes and modifications may be made without departing from the spirit or scope of the invention, as comprehended within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. A sound deadening unit of the character described, comprising a panel of vulcanized sponge rubber of a type initially very fragile and incapable of being securely bonded to metal by cement, a piece of loosely woven textile fabric secured to one side of the panel, and an impervious reinforcing facing secured to the opposite side of the panel, the facing and piece of textile fabric each being at least as large as the area of the panel.

2. A sound deadening unit of the character described, comprising a panel of vulcanized sponge rubber of a type initially very fragile and incapable of being securely bonded to metal by cement, a piece of loosely woven textile fabric secured to one side of said panel, and an impervious reinforcing facing, at least as large as the area of said panel, secured to the opposite side of the panel, said piece of textile fabric being of greater area than the area of the panel to provide a marginal portion of fabric around the edge portion of the panel.

3. A sound deadening unit of the character described, comprising a panel of vulcanized sponge rubber of a type initially very fragile and

incapable of being securely bonded to metal by cement, a piece of loosely woven textile fabric secured to one side of the panel, and an impervious reinforcing facing secured to the opposite side of the panel, the facing and piece of textile fabric each being at least as large as the area of the panel, said panel being of materially greater thickness than said piece of textile fabric.

4. A sound deadening unit of the character described, comprising a panel of vulcanized sponge rubber of a type initially very fragile and incapable of being securely bonded to metal by cement, a piece of loosely woven textile fabric secured to one side of said panel, and an impervious reinforcing facing, at least as large as the area of said panel, secured to the opposite side of the panel, said piece of textile fabric being of greater area than the area of the panel to provide a marginal portion of fabric around the

edge portion of the panel, said panel being of materially greater thickness than said piece of textile fabric.

5. In combination, a metal panel, a piece of loosely woven textile fabric of materially less area than the metal panel, a layer of cement arranged between one side surface of the piece of fabric and the metal panel and securing the textile fabric to the panel, a vulcanized sponge rubber panel of less area than the piece of textile fabric secured to the opposite side of said piece of fabric, said sponge rubber panel being of a type which is initially very fragile and cannot be effectively secured to metal by adhesive cements, and an impervious reinforcing facing at least as large as the area of said sponge rubber panel, secured to the outer side of the sponge rubber panel.

PAUL G. PEIK.