

Dec. 27, 1938.

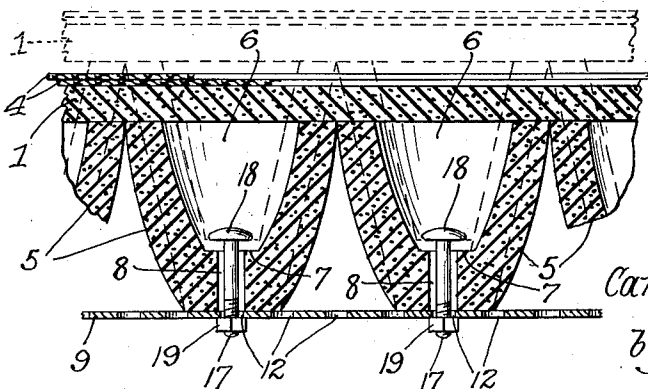
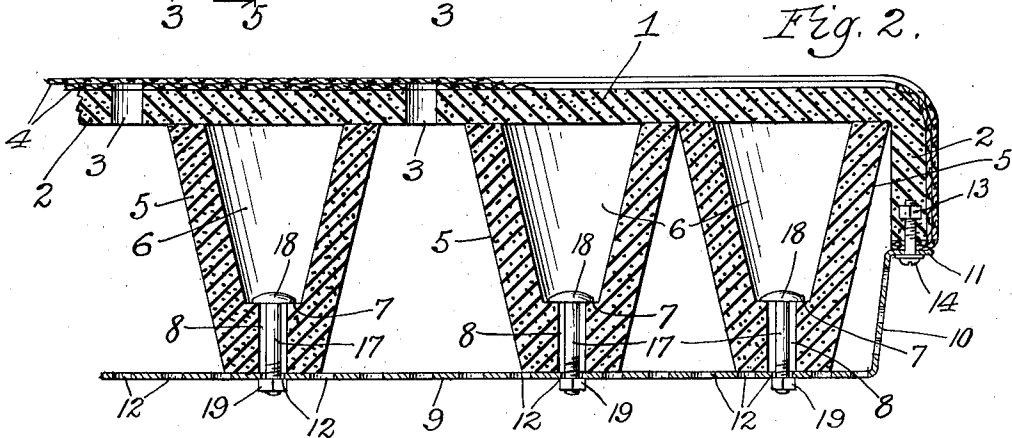
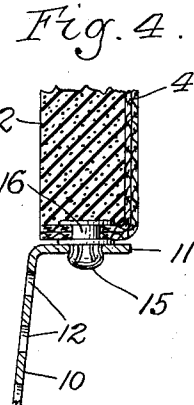
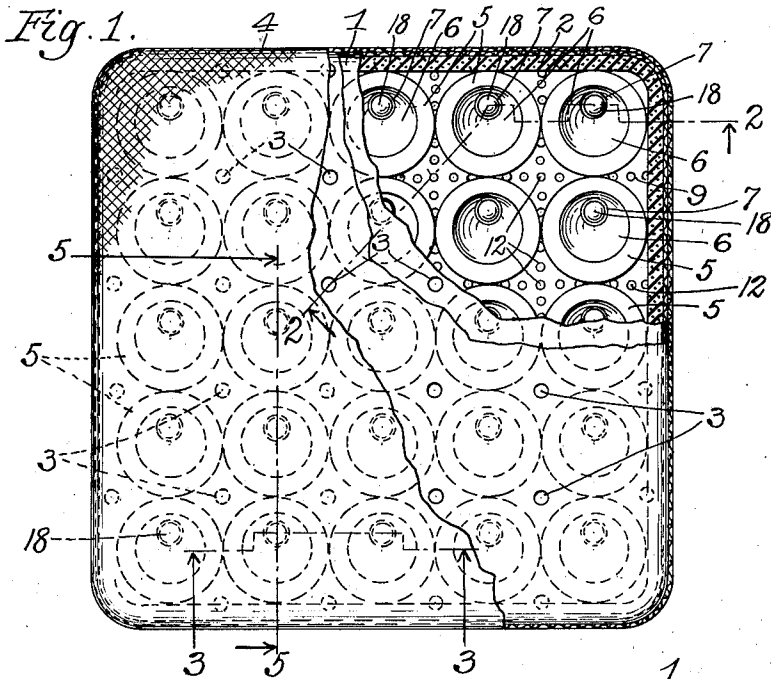
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2,141,271

UPHOLSTERY

Filed Jan. 2, 1937

3 Sheets-Sheet 1



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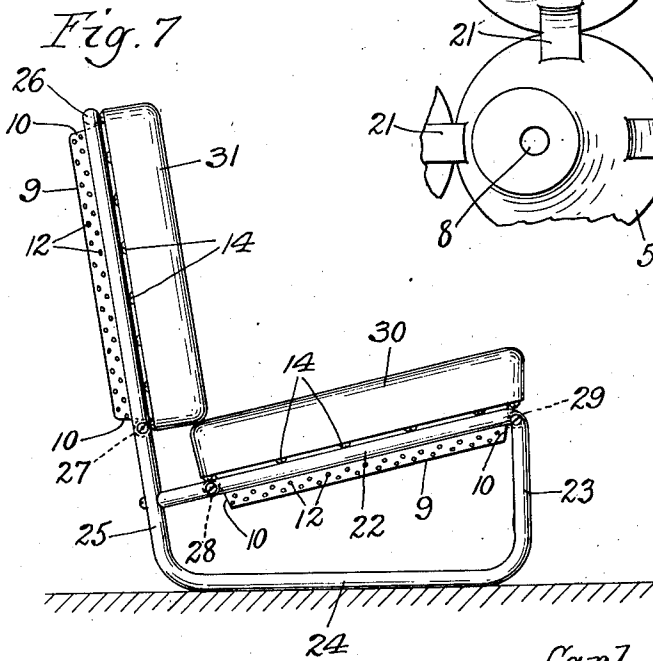
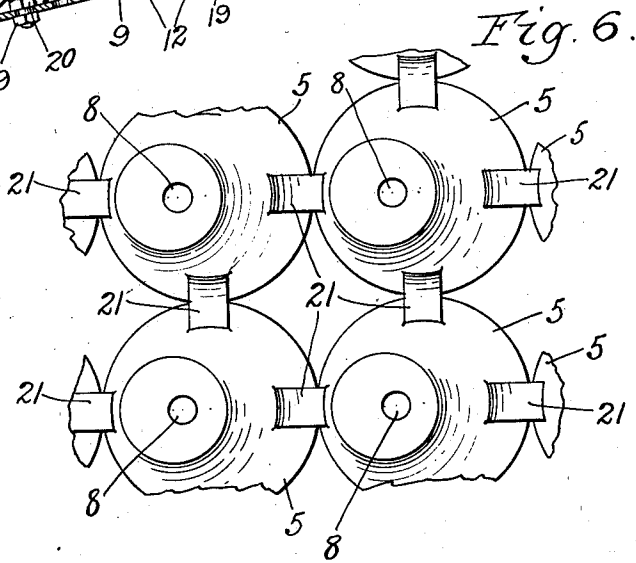
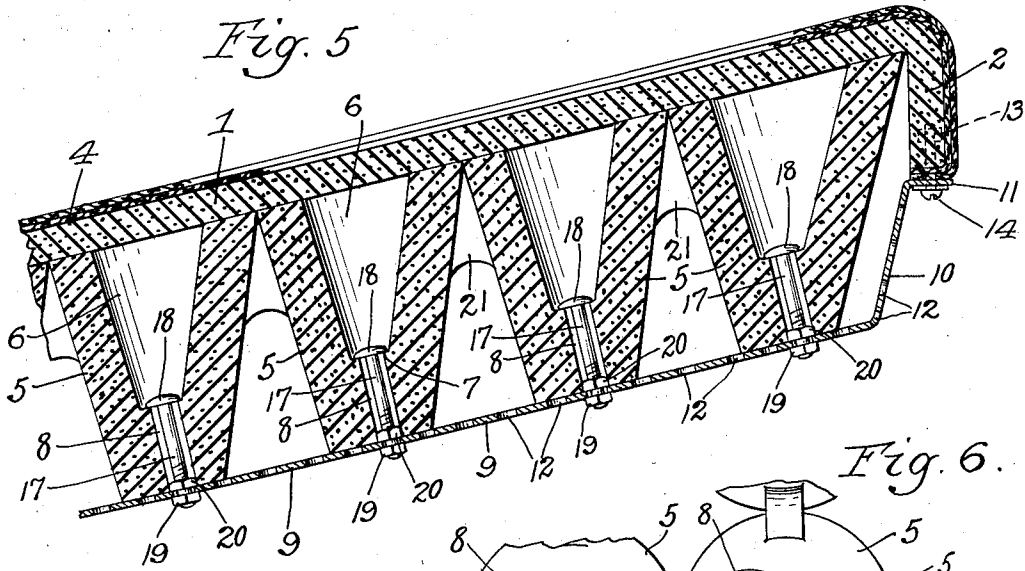
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UPHOLSTERY

Filed Jan. 2, 1937

3 Sheets-Sheet 2



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UPHOLSTERY

Filed Jan. 2, 1937

3 Sheets-Sheet 3

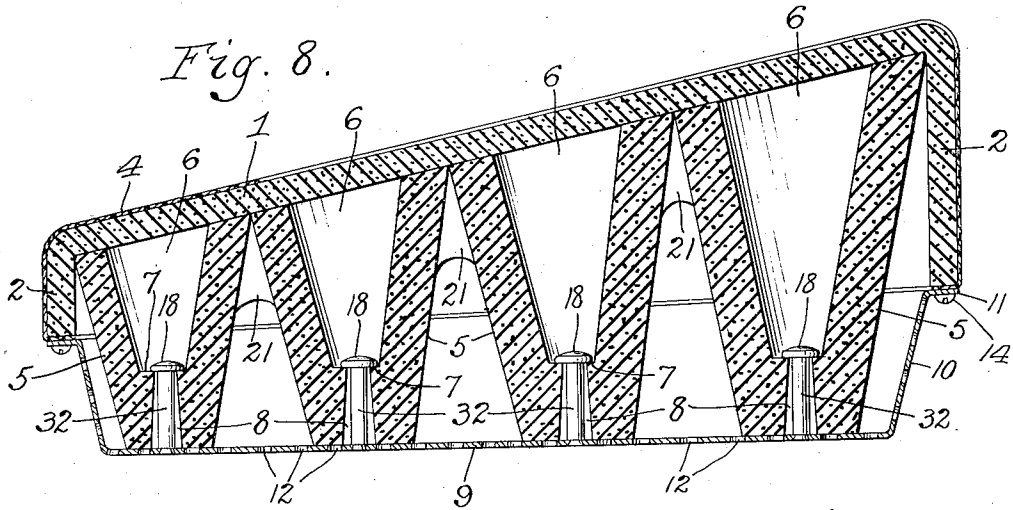
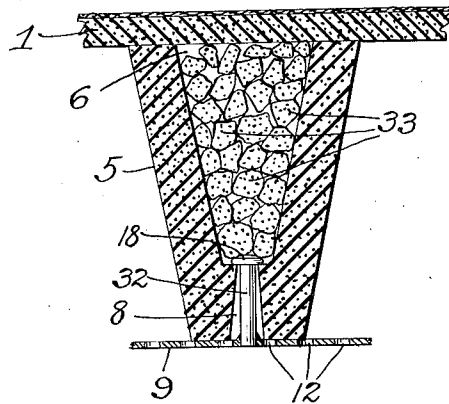


Fig. 9.



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UNITED STATES PATENT OFFICE

2,141,271

UPHOLSTERY

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Application January 2, 1937, Serial No. 118,855

19 Claims. (Cl. 155—179)

This invention relates to upholstery. It has for one object to provide an upholstery member or cushion formed of sponge rubber and suitable for use in any association where cushions are advantageous, such as in chairs, motor cars and anywhere that seat cushions or back cushions are useful. The cushion of this invention may also be used as a mattress for beds, couches and the like and in the manufacture of pillows or cushions generally.

It has for another object to provide a sponge rubber cushion in which ventilation throughout the body of the cushion, through top and bottom and through its sides, is accomplished.

Another object is to provide a composite seat member formed in part of a sponge rubber cushion or upholstery member and in part of a relatively more rigid body portion which may for example be of metal but may be of any other suitable material.

Other objects will appear from time to time in the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:—

Figure 1 is a plan view of one form of cushion with parts broken away and parts in section;

Figure 2 is a generally vertical sectional detail taken on an enlarged scale at line 2—2 of Figure 1;

Figure 3 is a generally vertical sectional detail taken on an enlarged scale at line 3—3 of Figure 1, showing the cushion compressed from its full uncompressed position;

Figure 4 is a vertical sectional detail on an enlarged scale, showing a point of contact and a modified form of attachment of the cushion to a supporting or body member;

Figure 5 is a generally vertical sectional detail taken at line 5—5 of Figure 1 on an enlarged scale, showing a modified form of cushion construction;

Figure 6 is a fragmentary bottom plan view of the rubber cushion portion of the device as shown in Figure 5;

Figure 7 is a side elevation of one form of composite chair embodying bottom and rear cushion members;

Fig. 8 is a view generally similar to Fig. 5 illustrating a modified form of cushion;

Fig. 9 is a detailed vertical section of a modified form of finger.

Like parts are designated by like characters throughout the specification and drawings.

The cushion or upholstery member of the present invention includes generally a sheet-like top member and a plurality of downwardly extending fingers which contact some form of base. The cushion may be placed in the open upon any suit-

able supporting surface or may be more or less permanently associated with a body portion.

In the form shown herewith the cushion comprises a sheetlike surface member 1, preferably having a downwardly depending flange 2 surrounding it. The sheet is perforated as at 3 with ventilating perforations and may have on its upper surface and on the outer surface of the flanges 2 a fabric covering 4, which may be of a single thickness or of several plies of material. As shown particularly in Figures 1 and 5, two plies are used. They may be of different quality or different material or they may be the same. For some purposes the fabric covering would be omitted.

Secured to the under surface of the sheet 1 are a plurality of fingers 5. These may be made separately from the sheet and secured to it by vulcanizing, cementing or in any other desired manner, or they may be made integrally with the sheet. As shown herewith they are indicated as having been made separately and secured to the sheet but the invention is not limited to this manner of manufacture and it contemplates also the integral manufacture of the sheet and the supporting fingers, 5.

As shown these fingers are tapered and their interiors are hollow as at 6. The interior is shaped to provide a ledge or shelf-like surface 7 at the bottom of the finger and this communicates with a perforation 8 which extends outwardly and downwardly through the bottom of the finger 5.

The cushion may be used without any particular or permanent association with any body portion but it is frequently convenient to fasten it to such a body portion and it is so shown in the figures. As shown, a main body portion 9 having upturned flanges or sides 10 terminating in laterally extending flanges 11 is used. The metal body portion is formed of perforated metal having a plurality of perforations 12. The number of perforations is immaterial so long as they are sufficient to furnish adequate ventilation. If the rubber portion of the cushion is provided with the downwardly depending flange 2 it may be secured to the flange 11 of the body portion in any desired way. One manner of securing is shown in Figure 2. As there shown a nut 13 is imbedded in the rubber of the flange and engages a bolt 14 which penetrates a perforation in the flange 11, passes through the rubber and engages the threads of the nut 13. A suitable number of such nut and bolt connections is provided to fasten the rubber cushion portion to the body portion.

In the modified form of attachment of Figure 4, a snap fastener is used and as there shown the flange 11 is perforated to receive the penetrating portion 15 of snaps 16, which are secured

either to the rubber of the flange 2 or to the fabric 4 which encloses it. The invention is not limited to these two forms of attachment but they are to be taken as merely illustrative of the possibility of a variety of such attachment means.

Where the rubber cushion is associated with a body portion it is convenient to secure the individual fingers individually to that body portion and as shown the securing means comprise in each case a bolt 17 having its head 18 within the cavity 6 of the finger 5. The under side of the head 18 rests upon the shelf-like portion 7 and the shaft of the bolt lies within the perforation 8. The shaft is preferably of smaller diameter than the perforation to permit a free clearance between the shaft and the walls of the perforation which surround it. The end of the bolt passes through a perforation in the body portion 9 and is held in position by a nut 19. A locking nut 20, as shown in Figure 5, may be used additionally.

The shape and particularly the inclination of the fingers 5 with respect to the plane of the sheet member 1 may be altered, depending upon the use to which the cushion is to be put. If it is to serve as the bottom cushion of a chair or sofa or to serve as the seat cushion of an automobile, its forward edge will frequently be raised above its rearward edge and when that is done it is preferable to shape the relatively conical finger members so that the inclination with respect to the true vertical is generally as shown in Figure 5. If the cushion is to be used flat, the fingers 5 will ordinarily be truly conical and their tops and bottoms will lie in planes at right angles to the vertical axis of the finger. The invention is not limited to any particular angular relationship but one is shown which is generally preferable where the seat is to be tilted or pitched.

For greater strength some or all of the finger members may be joined to adjacent finger members by web-like parts 21. These are shown in Figures 5 and 6 as a modification of the form shown in the earlier figures. They may or may not be used and if used some or all of the fingers may be so joined.

As an indication of a further use to which the cushion of the present invention may be applied, Figure 7 shows one form of chair in which a seat and back cushion made according to the present invention are mounted. As shown, the chair itself is formed of a single piece of metal which may be solid but is preferably tubular and which is bent to form the bottom cushion retaining portions 22, the front vertical portions 23, floor contacting portions 24, back supporting portions 25. A horizontal portion 26 joins the two back supporting portions and is, of course, a part of the same member from which they are formed. A transverse, generally horizontal member 27 may be fastened in place to join the two back supporting portions 25 and to serve as a means for supporting a cushion. Similarly two generally horizontal members 28 and 29 join the seat cushion supporting parts 22 and stiffen the chair and serve to support a cushion. As shown in Figure 7, a seat cushion, which is designated generally as 30 but which corresponds to the forms shown and described in connection with the earlier figures, is supported on the structure just described. It may be screwed in place or merely fit in place. Also a back cushion 31 is in position, being supported by the members described and resting upon the transverse members 26 and 27. The two may be screwed, sprung or otherwise secured in place.

Figure 3 shows the cushion in a position of use. When the cushion is not being used, that is to say, when no one is sitting upon or leaning against it and it is thus not subjected to pressure from any outside source, it stands generally as shown in Figures 2 and 5. When, however, someone sits upon it or it is otherwise under pressure, since it is formed of sponge rubber and is, therefore, compressible, it yields. The fingers 5 are depressed and the sheet member is correspondingly moved from its original position. When the cushion is assembled on the base or body portion 1 the nuts 19 are tightened on the bolts 17 sufficiently to compress the portion of the fingers lying between each nut and bolt. These portions of the fingers are preferably under initial compression. When a user sits upon or leans against the cushion and the finger is initially depressed during the first portion of the compressible movement of the finger the head of the bolt still closes the opening 8 so that this movement is resisted by the resiliency of the rubber and also to some degree by the air entrapped within the hollows 6 of each finger 5. After the compressible movement has continued to a predetermined point, the fingers become compressed beyond the initial compression caused by the bolts and thus the shelf-like portion 7 in the interior of a finger is moved out of contact with the under surface of the bolt head 18 and thus the passage 8 becomes open so that air may be forced from the cavity 6, outwardly through the passage 8 and through the perforation 12. Any movement of the user which causes variation of pressure upon or against the cushion will cause a variation in the action of the cushion because as pressure is increased at any given point a finger or several fingers will be depressed increasingly and as pressure is reduced the finger or fingers will correspondingly expand again. With the first movement of expansion, while the bolt head 18 is out of contact with the shelf 7, air is again drawn into the hollow fingers rapidly through the free passage above described. Afterwards, when the head is again in contact with the shelf 7, the movement is retarded because air, although it may leak through to some degree, is impeded in its passage. Thus a bolt forms with the outer end of each finger a valve mechanism to prevent or retard the passage of air to and from the interior of the finger during a portion of the relative movement and at another portion permits free passage to or from the interior of the finger. The device thus adds to the normal resiliency of sponge rubber the additional and controlled resiliency of an automatic, valve-controlled air cushion including, of course, a separate and separately air controlled seal for each finger provided with the details of construction shown in Figures 2, 3 and 5.

In the modified form of Figure 8 the cushion is preferably generally the same as that shown in the earlier figures but is given greater thickness at the front than at the rear. To put it another way, the cushion has a pitch backward. This may be accomplished as shown in Figures 5 and 7 by using a cushion of relatively uniform thickness or it may be accomplished as shown in Figure 8 by giving the cushion greater thickness at its forward edge. When that is done the fingers are preferably also modified as to size so that the fingers at the front edge are the longest, those at the rear edge are the shortest and intermediate fingers are of intermediate length. Since the parts of the cushion shown in Figure 8

are the same as those shown in Figure 5, differing from them only in size, the same reference numerals are applied to them. It is to be understood that in the form of Figure 8 web portions 21, such as those shown in Figure 5, may or may not be used and if used they may be used throughout or in part.

One modification illustrated in Figure 8 from that shown in Figure 5 is in the means of fastening the fingers to the plate 9. Instead of utilizing bolts 17 and nuts 19 and 20, studs 32 are used. They are secured to the plate member 9 by welding, riveting or otherwise, and they serve in general the same purpose as do the bolts 17.

Figure 9 illustrates a modification which may be applied if desired to one or more of the fingers. Instead of merely leaving the interior of the fingers empty, they may be wholly or partially filled with pieces of rubber. As shown irregularly shaped pieces of sponge rubber 33 have been used to fill the interior of one of the fingers. When the finger is so filled the device acts as an air cushion just as in the earlier described forms, the air entering and leaving the interior of the finger in the same manner, but the addition of the rubber filling which is preferably loose and therefore relatively movable adds to the structural strength of the device. The filling parts 33 may or may not be of sponge rubber and may or may not be of the same degree of elasticity and resiliency as the finger itself.

Since the filling pieces are preferably loose they conform readily to changes in shape of the finger and thus do not interfere with its normal action except that they add some resistance and in effect stiffen the finger by furnishing a filling for it which is resilient and at the same time resistant to compression.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of the parts without departing from the spirit of the invention and I wish therefore that my showing be taken as in a sense diagrammatic.

In particular the cushion may be of any size or shape desired. The fingers may be of any size or shape desired. Solid fingers may be used. The flange 2 may be omitted, the body portion may be omitted or any other desired form of body portion may be used. The fingers may be formed integrally with the sheet portion or they may be made separately, individually or in groups, and thereafter secured to the sheet portion. The method of fastening the fingers to the body portion 9 may be varied and that shown is merely illustrative of one convenient means. While the body portion shown is preferably relatively rigid, it might be provided with flexible sections and thus if the flange 2 were omitted it might be desirable to provide a flexible front section in place of the front portion 10 having the flange 11.

The use and operation of my invention are as follows:

The cushions may be used in any location where a cushion is desirable and when used they may comprise merely the rubber portion with or without a fabric covering. Such cushions are suitable for many different uses. For some purposes, however, it is desirable to form what might be called a "unit cushion", including the cushion portion and a body portion. This is useful as a seat cushion of an automobile, as a seat cushion of a chair of the type shown particularly in Figure 7, and for many other uses where the cushion is

preferably associated relatively permanently with a housing or body member which supports it and by means of which it may be readily mounted on or attached to chairs, automobiles and a variety of articles of furniture.

In whatever form it is used, the cushion serves the normal purpose of upholstery. Where it is associated with a body portion there is added to it the valve function above described and the consequent air cushion feature in addition to that due to the resiliency of the rubber itself and to the shape of the parts.

Where the cushion is used without the body portion the fingers will normally rest upon something such as a seat or a chair and, therefore, the holes or passages 8 will be to some extent sealed. Pressure upon the cushion, if sufficiently great, can force air out from the cavity 6 so that even in this form of the device there is the air cushion feature but it acts without the positive and automatic valve-controlled function provided by the combination of the cushion, the body portion and the attaching and controlling bolts. There is thus in both forms of the cushion the combination of resiliency due to the rubber itself, that due to the provision of and shape of the fingers and that due to the air cushion feature accomplished by the entrapment of air within the hollows or cavities of the fingers.

When the cushion is used in an automobile it has in addition to what might be called a normal cushioning action a controlled shock absorbing action because of the passage of air into and out of the interior of the several fingers. Also because of the construction of the fingers which at first interpose relatively slight resistance and as compressed interpose greater structural resistance to further deformation, there is an increasing shock absorbing effect.

Because of the ready resiliency of the cushion, because it is distortable not merely vertically but laterally, it is at no time what may be called "dead". Even the slightest movement of the user of a cushion effects a corresponding movement of the cushion. This is due in part to the provision of fingers and to their air cushioning effect, in part to the fact that the cushion is made of sponge rubber which is itself highly resilient and also in part to the combination of these three features. As a person sitting on the cushion moves, instead of an inert or dead supporting effect, the cushion has an alive and actually massaging effect.

Where a seat cushion and a back cushion are combined, for example in a chair such as that shown in Figure 7, or in an automobile, the greatest movement occurs normally in the seat cushion, which movement is generally more or less straight down and is in compression. If the exterior be leaned against the back at the same time that the car strikes a bump so that the seat cushion is compressed, the back cushion yields to his movement and because of the finger construction that surface of the back against which the user is leaning rises and falls and the fingers bend largely to compensate for this movement. Thus the flexibility of the fingers not merely up and down in compression but laterally in bending is effective to cause the back cushion to conform to the bodily movement of a user just as readily as does the seat cushion and the surface of the back cushion against which the user may be leaning rises and falls in a more or less vertical plane, this movement being permitted by the bending of the fingers so that there is no relative

movement of the back of the user and the cushion surface against which he is leaning and there is thus a cooperation and a combination between the seat cushion and the back cushion which permits them to move and yield in relation to each other but each cushion in this cooperation has in the main a different movement. The fingers of the seat cushion move in compression and the fingers of the back cushion moving in bending.

I claim:

1. In combination in a cushion, a flexible surface member, a plurality of hollow flexible relatively self-sustaining fingers secured to the under side of said surface member extending downwardly therefrom, each finger forming, with said surface member and within itself, an individually complete air pocket, perforations in the lower ends of said fingers and means inserted in said perforations and enclosed by said fingers for controlling the passage of air through said perforations.

2. In combination in a cushion, a surface member of sponge rubber, an integral downwardly depending flange of sponge rubber about the edges thereof, a plurality of perforations through said member, a plurality of hollow fingers secured to the under side of said surface member extending downwardly therefrom beyond the lower edge of said flange, perforations in the lower edges of said fingers, and means in said perforations for controlling the passage of air through said perforations.

3. In combination in a cushion, a surface member, a downwardly depending flange about the edges thereof, a plurality of hollow fingers secured to the under side of said surface member extending downwardly therefrom beyond the lower edge of said flange, a relatively rigid body portion comprising a main section having upturned sides, said surface member flange in contact with said body member and secured thereto, said fingers being in contact with the body member and secured thereto by attaching members.

4. In combination in a cushion, a surface member of sponge rubber, an integral downwardly depending flange of sponge rubber about the edges thereof, a plurality of hollow fingers secured to the under side of said surface member extending downwardly therefrom beyond the lower edge of said flange, a relatively rigid body portion comprising a main section having upturned sides terminating in an outwardly projecting flange, said surface member flange in contact with the flange of said body member and secured thereto, said fingers being in contact with the body member and secured thereto by attaching members.

5. In combination in a cushion, a flexible surface member, a downwardly depending flange about the edges thereof, a plurality of perforations through said member, a plurality of hollow fingers secured to the under side of said surface member extending downwardly therefrom beyond the lower edge of said flange, perforations in the lower ends of said fingers and means for controlling the passage of air through said perforations, a metallic body portion comprising a main section having upturned sides, said surface member flange in contact with said body member and secured thereto, said fingers being in contact with the body member and secured thereto by attaching members which comprise also the means for controlling the passage of air through the perforations in the ends of said fingers.

6. In combination in a cushion, a surface mem-

ber of sponge rubber, an integral downwardly depending flange of sponge rubber about the edges thereof, a plurality of perforations through said member, a plurality of hollow, downwardly tapered fingers secured to the under side of said surface member extending downwardly therefrom beyond the lower edge of said flange, perforations in the lower ends of said fingers and means within said perforations for controlling the passage of air therethrough, a relatively stiff body portion comprising a main generally flat section having upturned sides terminating in an outwardly projecting flange, said surface member flange in contact with said body member and secured thereto, said fingers being in contact with the body member and secured thereto by attaching members.

7. In combination in a cushion, a surface member of sponge rubber, an integral downwardly depending flange of sponge rubber about the edges thereof, a plurality of perforations through said member, a plurality of hollow, downwardly tapered fingers secured to the under side of said surface member extending downwardly therefrom beyond the lower edge of said flange, perforations in the lower ends of said fingers and means for controlling the passage of air through said perforations, a body portion comprising a main generally flat section having upturned sides terminating in an outwardly projecting flange, said surface member flange in contact with the flange of said body member and secured thereto, said fingers being in contact with the body member and secured thereto by attaching members which comprise also the means for controlling the passage of air through the perforations in the ends of said fingers.

8. In combination in a cushion, a surface member of sponge rubber, a plurality of perforations through said member, a plurality of hollow downwardly extending fingers secured to the under side of said surface member, perforations in the lower ends of said fingers and means within said perforations for controlling the passage of air therethrough.

9. In combination in a cushion, a surface member of sponge rubber, a plurality of perforations through said member, a plurality of hollow downwardly extending fingers secured to the under side of said surface member, perforations in the lower ends of said fingers and means within said perforations for controlling the passage of air therethrough, and a relatively rigid body portion, said fingers secured to said body portion, the body portion, the surface member and the fingers forming together a unitary cushion device, said surface member provided with a downwardly depending integral flange about its edges, said body portion provided with an upwardly extending integral side portion terminating in a flange, the flange of said surface member being secured to the said last mentioned flange.

10. In combination in a cushion, a sheetlike member formed of sponge rubber, having a downwardly depending flange about its edges, a plurality of hollow fingers projecting downwardly from the under surface of said sheetlike member, said sheet member having perforations formed in it intermediate said fingers, said fingers having perforations formed in their ends away from said sheetlike member, an air-pervious, relatively rigid body member associated with said cushion, said body member provided with a raised flange positioned above its bottom, the downwardly depending flange of said sheet member being se-

cured to the flange of said body member, the ends of said fingers away from said sheet member being in contact with said body member, securing means fastened to said body member and extending into the interior of said fingers, the securing means comprising elongated parts of less diameter than the perforation in said fingers, and having heads within said fingers of greater diameter than said perforation, the heads sealing said perforation when the fingers are in one condition of compression and being out of sealing contact when the fingers are in another condition of compression.

11. In combination in a seat cushion, a rubber cushion element comprising a rubber sheet-like member and a plurality of hollow perforated rubber fingers projecting from one side of said sheet-like member, a perforated body member, more rigid than the sheet member or the fingers, and means for securing the fingers to the body member, said means comprising parts engaging the body member, passing through said perforations in said fingers, engaging said fingers and serving as valve members to control the passage of air through said perforations.

12. In combination in a seat cushion, a rubber cushion element comprising a rubber sheet-like member and a plurality of hollow perforated rubber fingers projecting from one side of said sheet-like member, a perforated body member, more rigid than the sheet member or the fingers, and means for securing the fingers to the body member, said means comprising parts engaging the body member, passing through said perforations in said fingers, engaging said fingers and serving as valve members to control the passage of air through said perforations, said combined valve and attaching member comprising a bolt which passes through said body member and through a perforation in a finger, said bolt having means for engaging said body member and said finger.

13. In combination in a seat cushion, a rubber cushion element comprising a rubber sheet-like member and a plurality of hollow perforated rubber fingers projecting from one side of said sheet-like member, said fingers shouldered interiorly each about its perforation, a perforated body member, more rigid than the sheet member or the fingers, and means for securing the fingers to the body member, said means comprising parts engaging the body member, passing through said perforations in said fingers, engaging said fingers and serving as valve members to control the passage of air through said perforations, said combined valve and securing means comprising bolts passing through perforations in said body member and through the perforations in said fingers, said bolts being provided each with a part to engage a shoulder within a finger and a part to engage said body member.

14. In combination, in a cushion, a body supporting member, normally effective means for admitting air to the space beneath said member; and means for sustaining said member, including a plurality of hollow flexible fingers downwardly projecting therefrom, said fingers having normally closed air connections extending from the interiors thereof and means for closing said connections and for opening them after a pre-determined compression of said fingers.

15. In combination, in a cushion, a body supporting member, normally effective means for admitting air to the space beneath said member, and means for sustaining said member, including

a plurality of hollow flexible fingers downwardly projecting therefrom, said fingers having normally closed air connections extending from the interiors thereof, and means for closing said connections and for opening them after a pre-determined compression of said fingers and a freely air-pervious supporting member for said cushion positioned in contact with the free ends of said fingers.

16. In combination, in a cushion, a body-supporting member, said body-supporting member being provided with a plurality of apertures, a fabric covering for said body-supporting member extending also over said apertures, normally effective means for admitting air to the space beneath said member, and in communication with said apertures, and means for sustaining said member, including a plurality of hollow flexible fingers downwardly projecting from said member, said fingers having normally closed air connections extending from the interiors thereof, and means for closing said connections and for opening them after a predetermined compression of said fingers and a freely air-pervious support upon which the free ends of said fingers are supported.

17. In combination, in a cushion, a body-supporting member, said body-supporting member being provided with a plurality of apertures, a fabric covering for said body-supporting member extending also over said apertures, and means for sustaining said member, including a plurality of hollow flexible fingers downwardly projecting from said member, said fingers having normally closed air connections extending from the interiors thereof, and means for closing said connections and for opening them after a pre-determined compression of said fingers and a freely air-pervious support upon which the free ends of said fingers are supported.

18. In combination, in a cushion, a body-supporting member, said body-supporting member being provided with a plurality of apertures, a fabric covering for said body-supporting member extending also over said apertures, normally effective means for admitting air to the space beneath said member, and in communication with said apertures, and means for sustaining said member, including a plurality of hollow flexible fingers downwardly projecting from said member, said fingers having normally closed air connections extending from the interiors thereof, and means for closing said connections and for opening them after a pre-determined compression of said fingers and a freely air-pervious support upon which the free ends of said fingers are supported, a connection between the air-pervious support and the edges of the body supporting member.

19. In combination, in a cushion, a body supporting member, normally effective means for admitting air freely to the space beneath said member, and means for sustaining said member, including a plurality of hollow flexible fingers downwardly projecting therefrom, said fingers having normally effective air connections extending from the interiors thereof, and means for closing said connections and for opening them after a pre-determined compression of said fingers, said fingers increasing in height from one edge to an opposite edge of the body supporting member.

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