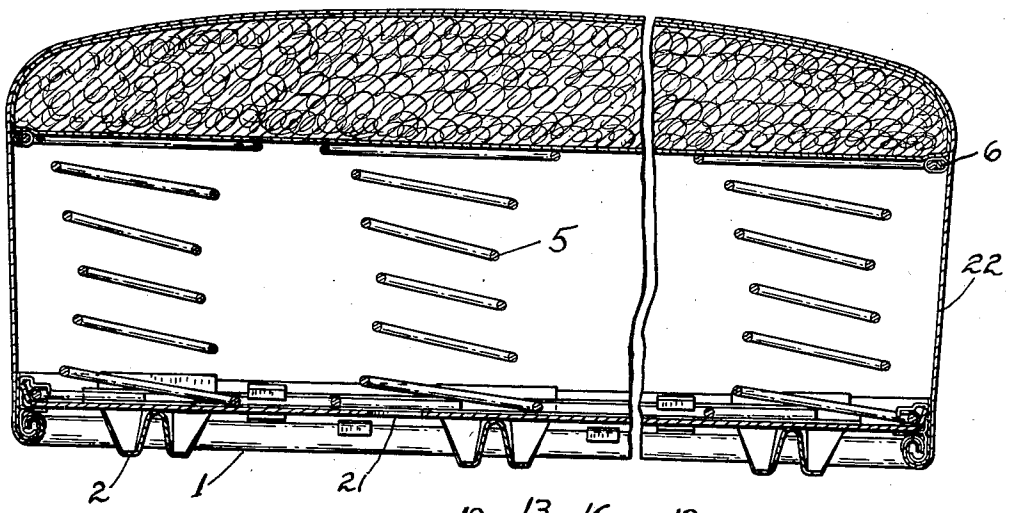
May 7, 1940. D. A. GREENE ET AL 2,199,489

SPRING AND AIR CUSHION

Filed Aug. 8, 1938 2 Sheets-Sheet 1

Fig. 1.



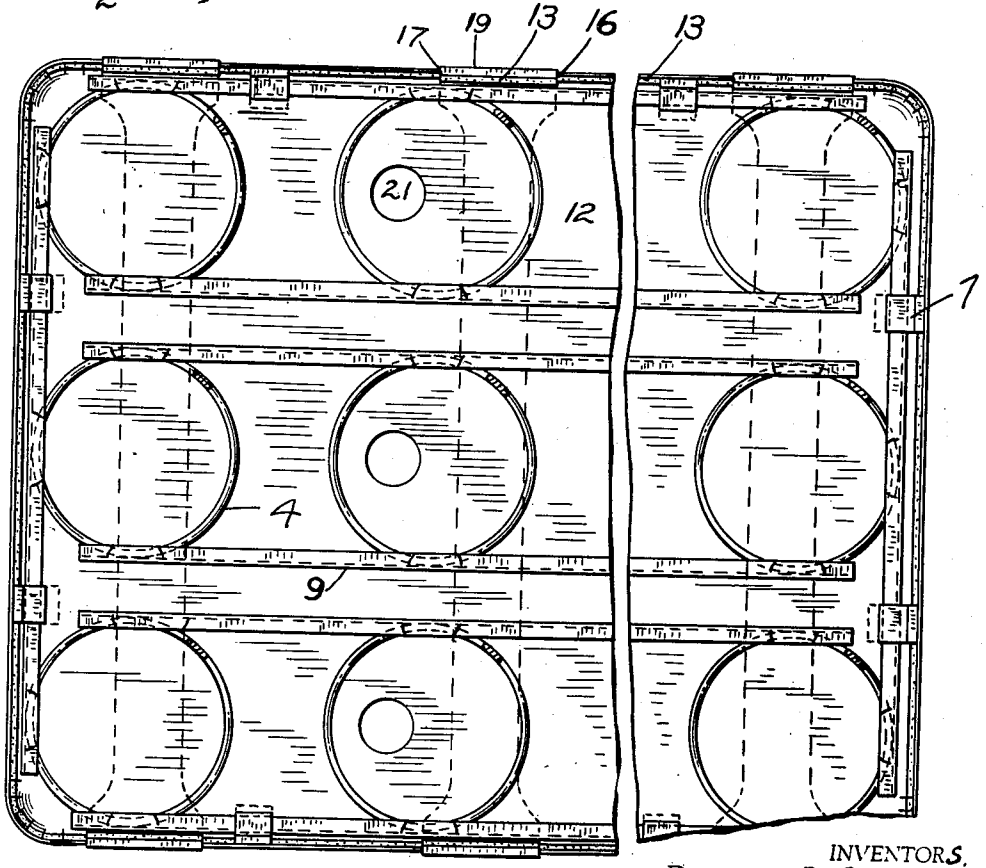


Fig. 2.

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Filed Aug. 8, 1938 2 Sheets-Sheet 2

Fig. 3

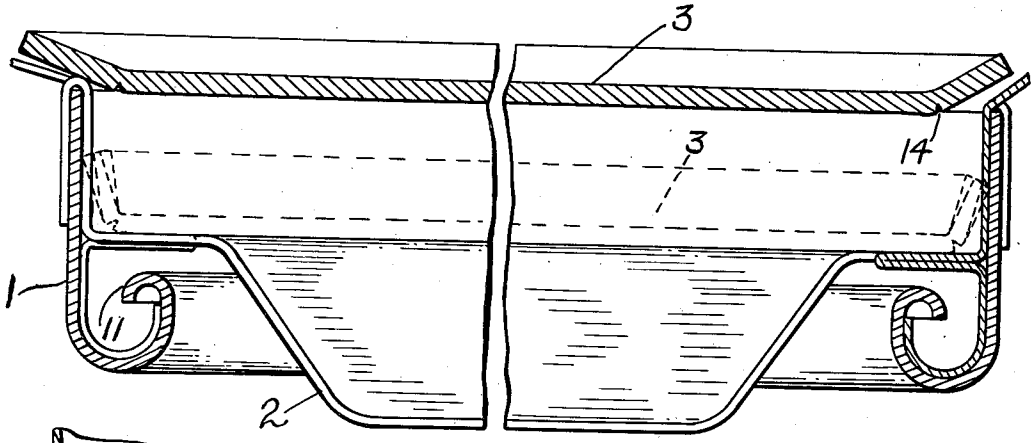


Fig. 4

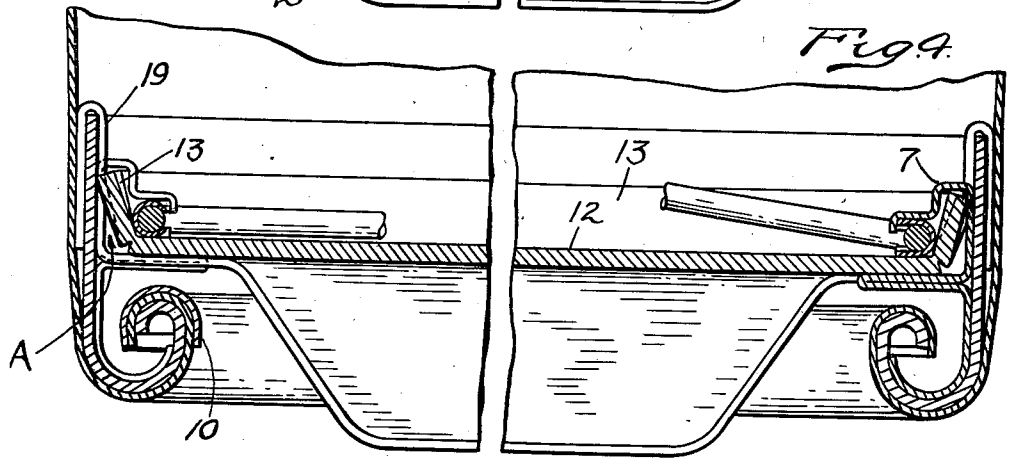
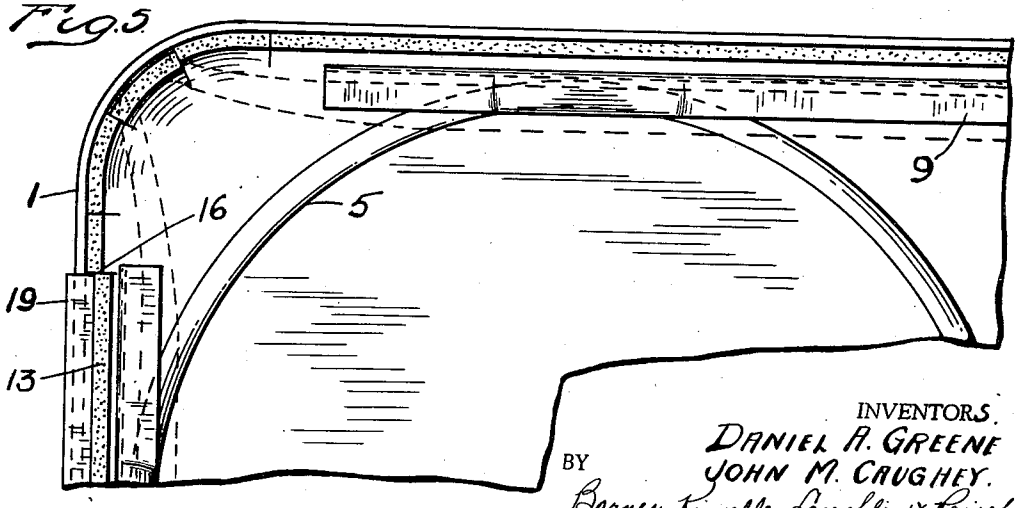


Fig. 5



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SPRING AND AIR CUSHION

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Application August 8, 1938, Serial No. 223,604

7 Claims. (Cl. 155—179)

This invention relates to a spring and air cushion.

The prior art is replete with spring and air cushions. The Stubnitz Patent No. 2,031,745 shows a spring and air cushion comprising a border frame which is bridged by a plurality of cross slats and an imperforate bottom plate of fiber board positioned upon the slats within the border frame and provided with a small clearance between the periphery and the frame so that air can pass into and out of the seat cushion through the clearance between the edge of the bottom plate and the frame. This air and spring cushion has proved unsatisfactory in use because it has been found impossible to definitely control the amount of air passing into and out of the cushion between the edge of the bottom plate and the frame. The inability to definitely control the amount of air leakage is due primarily to two factors, first, there is always a slight variation in size of production frames which necessarily gives a different clearance between different frames and their respective bottom plates, and secondly, since the bottom plates are generally made of fibrous material, such as fiber board and cardboard, they also vary in size depending upon conditions of humidity. In a dry atmosphere the fiber board bottom plate will shrink or contract and in a moist atmosphere expand. Due to this expansion or contraction a diaphragm measuring approximately 45 inches in length sometimes varies in length as much as $\frac{3}{16}$ of an inch.

The type of spring and air cushion shown in the Stubnitz Patent No. 2,031,745 has also been unsatisfactory because in a two passenger cushion where the interior air space or compression chamber is larger less leakage is desired than is necessary in the smaller one passenger cushions. According to the Stubnitz patent the clearance between the edge of the bottom plate and the lower frame allows more clearance than is necessary in the two passenger cushion. In a smaller one passenger cushion where more leakage is desired than in the two passenger cushion, due to the restricted air space, the spaced bottom plate of the Stubnitz patent allows less air leakage than is necessary. In other words, the amount of air leakage necessary in a spring cushion does not vary in direct proportion to the volume of the interior of the cushion.

It is an object of this invention to overcome the above disadvantages of the spring and air cushion heretofore known in the art and produce a combination air and spring cushion in which the amount of air compression and the amount of air flowing out of and into the interior of the cushion can be definitely controlled.

In the drawings:

Fig. 1 is a vertical section through the spring and air cushion.

Fig. 2 is a horizontal section through the spring and air cushion looking down upon the perforated bottom plate.

Fig. 3 is an enlarged vertical section through the lower border frame and bottom plate with a full line showing of the bottom plate being inserted into the border frame and with a dotted line showing of the bottom plate in position within the border frame.

Fig. 4 is a detail vertical sectional view through the border frame and bottom plate showing the spring assembly mounted on the bottom plate.

Fig. 5 is an enlarged fragmentary horizontal section looking down upon a corner of the bottom plate and lower border frame.

Referring more particularly to the drawings there is shown a seat comprising a lower border frame 1 bridged by a plurality of cross bars 2 which support a bottom plate 3 and a spring assembly 4. The spring assembly comprises a plurality of springs 5 which are held together at the top by the wire frame 6 and at the bottom by the metal channel members 9 which are clamped on to the springs. The spring assembly is provided with a padding and then covered by a suitable fabric or leather trim cover which is drawn taut and secured in any suitable manner, such as by the clips 10, to the bead 11 on the lower border frame. The trim cover is referenced 22.

In order to definitely control the amount of air flowing into and out of the interior of the seat cushion it is proposed to use a bottom plate preferably, although not necessarily, of fibrous material, such as fiber board, cardboard, or KB board, which has a practically air-tight seal at all times with the lower border frame regardless of the change in dimensions of the bottom plate due to expansion or contraction or variations in size of the lower border frames due to manufacturing conditions and imperfections. This has been achieved by providing a bottom plate having an edge portion which is held at all times against the inside face of the border frame and that portion of the cross bars which fits against the inside face of the border frame. Therefore expansion and contraction of the bottom plate will merely increase and decrease respectively the angle at which the edge of the bottom plate is held against the border frame but will not cause the bottom

plate to draw away from the border frame and permit air leakage.

One specific embodiment of the above described bottom plate which is shown for purposes of description but not by way of limitation, consists of a fiber board 12 having a hinged flap 13 extending completely around the periphery of the bottom plate. This bottom plate 12 is mounted upon the cross bars and preferably beneath the spring assembly 4. Since the variation in size of the lower border frames due to manufacturing conditions can be readily determined and since the overall difference in dimensions of the fiber board 12 due to expansion and contraction caused by variations in relative humidity of the atmosphere and the amount of moisture absorbed by the board can also be easily determined, it is essential that the overall dimensions of the flap 13 and fiber board 12 should be such that the flap will always be held against the inside face of the border frame. The width of the flap can vary but as above stated, the flap should always be sufficiently wide so that under all conditions of humidity it will be held against the inside face of the border frame and the portion of the cross bars extending upwardly along the inside face of the border frame and in air-sealing relation with these members.

As shown in Figs. 1 and 3, the overall dimensions, width and length of the fiber board 12 and peripheral flap 13 is greater than the inside dimensions of the frame. Preferably this difference should at least equal the difference in the dimensions of the bottom plate due to extreme expansion and extreme contraction. By forcing the bottom plate inwardly into the border frame and down upon the cross bars the peripheral flap 13 is bent upwardly and held under stress against the inside face of the border frame. The bottom plate can be held against the slats in any suitable manner.

Preferably the spring assembly is positioned upon the bottom plate and then held down upon the bottom plate by the clips 7. As herein shown it will be noted that the spring assembly cooperates with the clips to hold the bottom plate against the cross bars and thus the flap 13 is held against the inside face of the lower border frame to effect an air-tight seal. Preferably the bottom plate can be scored on its underside as at 14 to facilitate the hinging action of the flap 13.

From the above it is evident that as the bottom plate expands or contracts the flap 13 being held under stress acts like a hinge and at all times seats against the inside face of the border frame to effect an air-tight seal.

Preferably the bottom plate and in particular the flap 13 is cut as at 16 and 17 on each side of the portion 19 of the slat which engages the inside face of the border frame to effect a better air-tight seal between the flap and this portion of the slat.

The flap will lay against the inner wall of the border frame at an angle depending upon the variation and size of the diaphragm and frame. The acute angle A between flap 13 and the inside face of the border frame will vary as the bottom plate expands and contracts due to atmospheric conditions but the flap will always effect a substantially air-tight seal with the border frame.

After the bottom plate is thus positioned within the lower border frame and the cushion is properly trimmed, the exact amount of air leakage required for best riding comfort in any given cushion may then be obtained by cutting a sufficient number of proper sized holes 21 in the bottom plate.

We claim:

1. A spring and air cushion comprising a border frame, a bottom plate having one or more perforations therein and a resilient peripheral portion, the overall size of said bottom plate and resilient edge portion being greater than the inside dimensions of said frame, a spring assembly above the bottom plate, a cover enclosing said spring assembly, the said bottom plate being positioned within the frame whereby the resilient edge portion is held against the inside of the border frame at an angle and at all times seals the same whereby air flows into and out of said cushion substantially only through said perforations.

2. A spring and air cushion comprising a border frame, cross bars bridging the frame, a fiber board bottom plate having an edge flap positioned within the frame upon the cross bars with the flap held at an angle against the inside face of the border frame, a spring assembly above the bottom plate, one or more perforations in the bottom plate, a cover for said spring assembly secured to the frame whereby flow of air into and out of the cushion is controlled by said perforations and the flap seals against the border frame at all times regardless of expansion and contraction of said bottom plate.

3. A spring and air cushion comprising a border frame defining an opening, a perforated bottom plate positioned within the frame having a yieldable edge portion held at an acute angle against the inside face of the border frame with a practically air-tight seal, a spring assembly positioned above the bottom plate, means for securing the spring assembly to the bottom plate, a cover for the spring assembly whereby expansion and contraction of the bottom plate respectively decreases and increases the acuteness of the said angle between the yieldable edge portion and the border frame and the air-tight seal between these members is maintained and substantially all air passing into and out of the interior of the cushion will pass through said perforations.

4. A spring and air cushion comprising a border frame defining an opening, a perforated bottom plate positioned within the frame having a hinged flap held at an acute angle against the inside face of the border frame with a practically air-tight seal, a spring assembly positioned above the bottom plate, means for securing the spring assembly to the bottom plate, a cover for the spring assembly whereby expansion and contraction of the bottom plate respectively decreases and increases the acuteness of the said angle between the hinged flap and the border frame and the air-tight seal between these members is maintained and substantially all air passing into and out of the interior of the cushion will pass through said perforations.

5. A spring and air cushion comprising a border frame defining an opening, a perforated bottom plate positioned within the frame having a hinged flap held at an acute angle against the inside face of the border frame with a practically air-tight seal, the bottom plate being scored along the line where the flap joins the bottom plate to facilitate hinging of the flap, a spring assembly positioned above the bottom plate, means for securing the spring assembly to the bottom plate, a cover for the spring assembly whereby expansion and contraction of the bottom plate respectively decreases and increases the acuteness of the said angle

between the hinged flap and the border frame and the air-tight seal between these members is maintained and substantially all air passing into and out of the interior of the cushion will pass through said perforations.

6. A spring and air cushion comprising a border frame, a perforated bottom plate positioned within the frame and having a yieldable edge portion held at an angle against the inside face of the border frame with a substantially air-tight seal, a spring assembly positioned upon the bottom plate having a lower edge portion which extends adjacent the edge of the bottom plate, means for securing the spring assembly to the border frame whereby the spring assembly stresses the yieldable edge portion of the bottom plate to at all times effect a substantially air-tight seal between said yieldable edge portion and the bottom frame regardless of expansion and contraction of the bottom plate, and a cover for enclosing said spring assembly.

7. A spring and air cushion comprising a border frame, a perforated bottom plate positioned within the frame and having a resilient flap held at an angle against the inside face of the border frame with a substantially air-tight seal, a spring assembly positioned upon the bottom plate having a lower edge portion which extends adjacent the edge of the bottom plate, means for securing the spring assembly to the border frame whereby the spring assembly stresses the resilient flap of the bottom plate to at all times effect a substantially air-tight seal between said resilient flap and the bottom frame regardless of expansion and contraction of the bottom plate, and a cover for enclosing said spring assembly.

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