April 28, 1942. J. TURNER 2,281,341

CHAIR OR SEAT

Filed Nov. 23, 1938 4 Sheets-Sheet 1

Fig. 1.

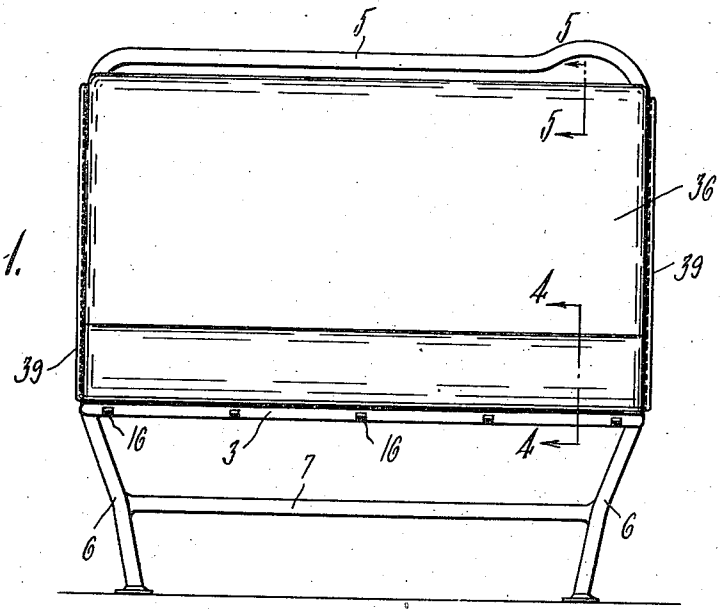
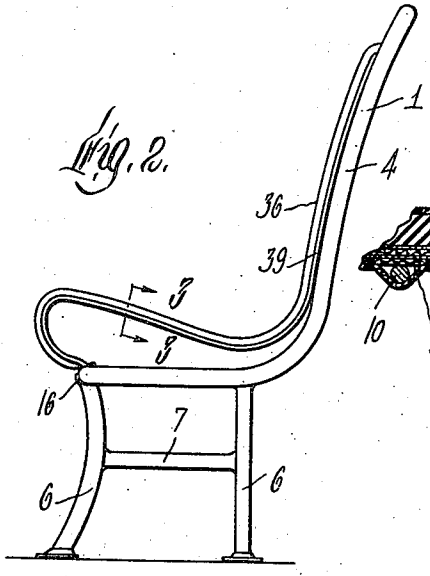


Fig. 2.



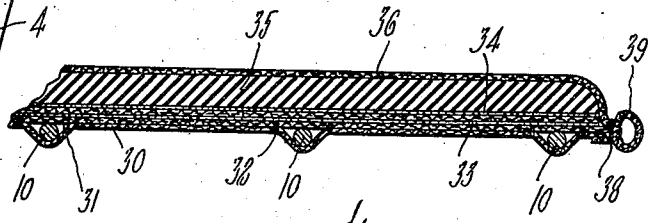


Fig. 3.

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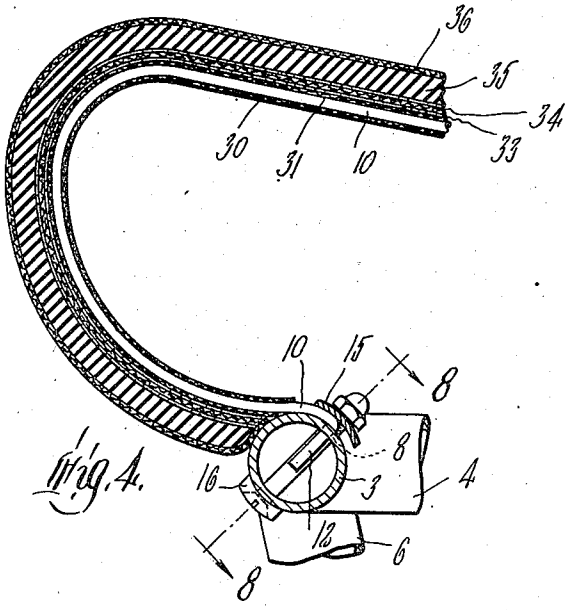

Fig. 4.

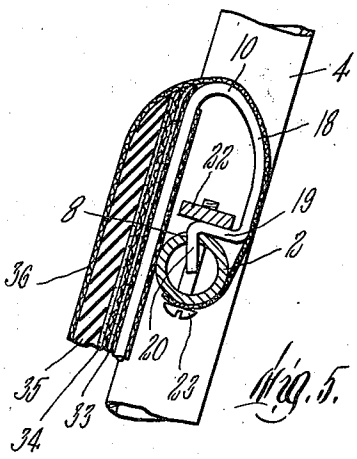

Fig. 5.

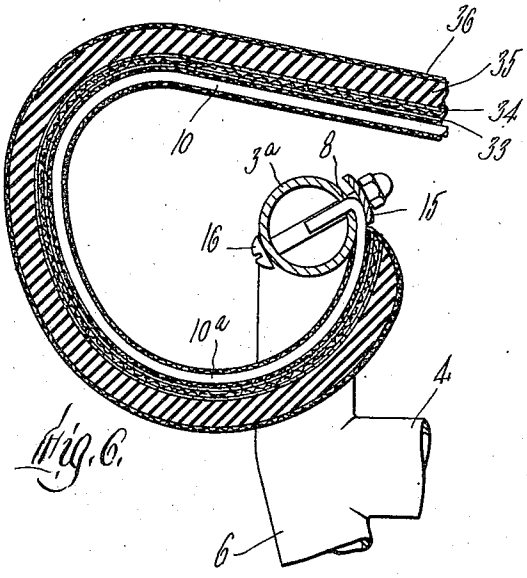

Fig. 6.

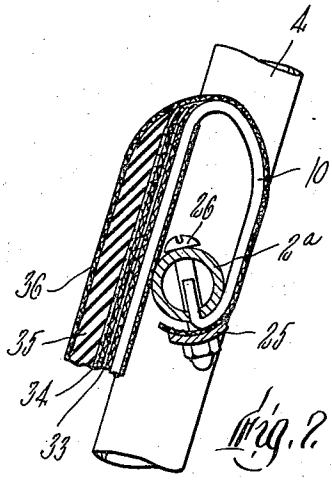

Fig. 7.

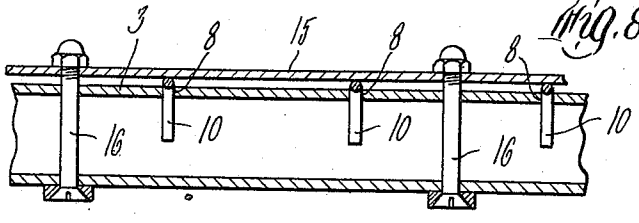

Fig. 8.

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CHAIR OR SEAT

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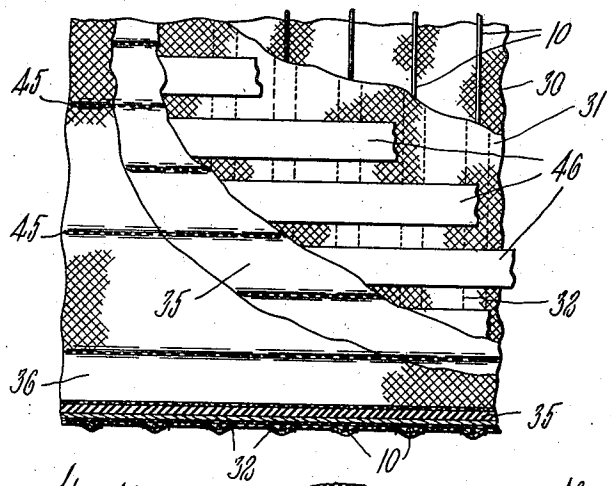

Fig. 10.

Fig. 9.

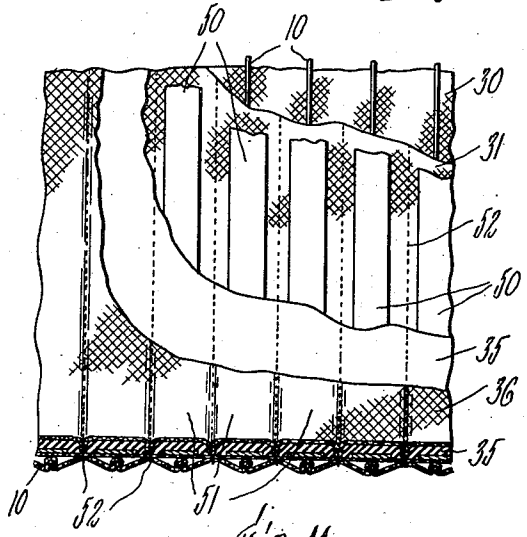

Fig. 11.

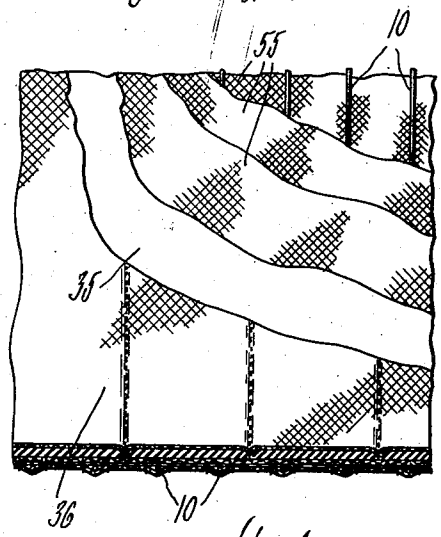

Fig. 12.

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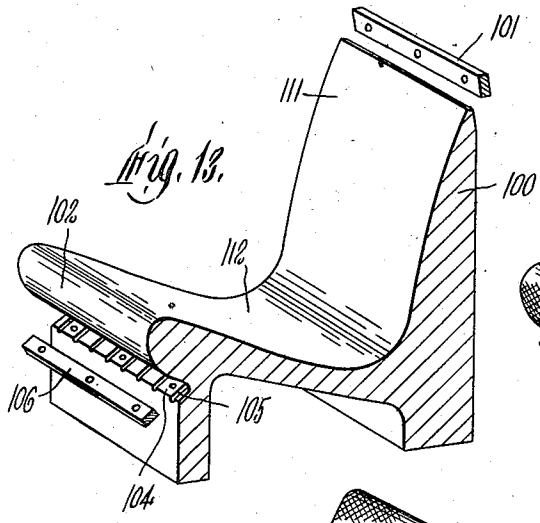

Fig. 13.

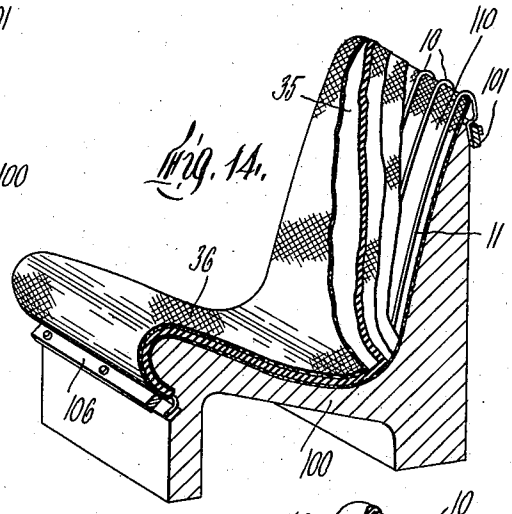

Fig. 14.

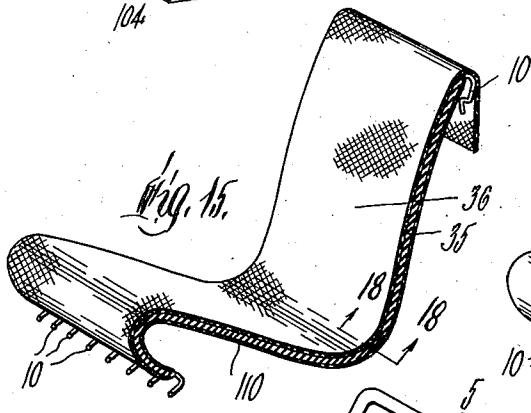

Fig. 15.

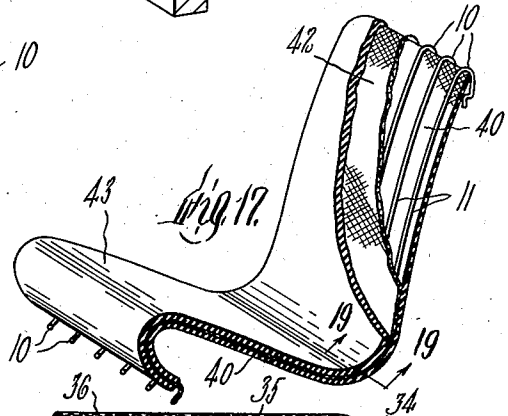

Fig. 17.

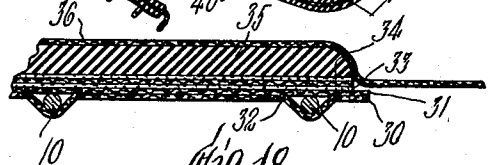

Fig. 18.

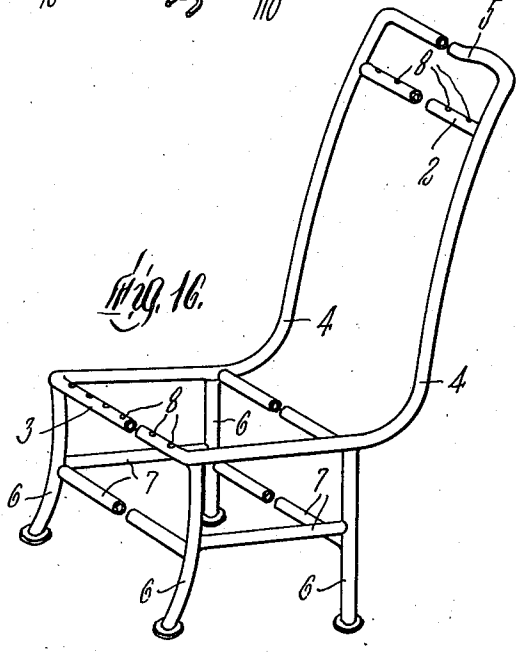

Fig. 16.

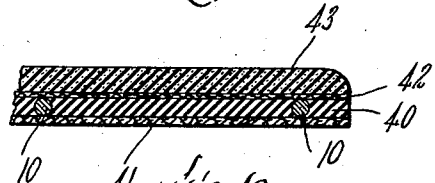

Fig. 19.

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Patented Apr. 28, 1942

2,281,341

UNITED STATES PATENT OFFICE

2,281,341

CHAIR OR SEAT

John Turner, Contoocook, N. H.

Application November 23, 1938, Serial No. 241,911

8 Claims. (Cl. 155—119)

This invention relates to chairs or seats and has for an object to provide a structure having the advantages of the structure shown in my Patent No. 2,097,541, granted November 2, 1937, but which is softer and less rigid, and thus is more comfortable.

A further object is to provide further improvements which increase its range of utility.

To these ends the members which transfer pressure between the seat and back portions of the structure are made resilient instead of relatively rigid as in my patented construction, and are so formed that they are capable of body supporting functions not heretofore possible.

A further object is to provide a method particularly suitable for manufacturing a chair or seat in accordance with this invention.

For a more complete understanding of this invention, reference may be had to the accompanying drawings in which

Figures 1 and 2 are front and end elevations, respectively, of a seat embodying the invention and particularly suitable for car or bus service.

Figure 3 is a fragmentary detail section to a larger scale on line 3—3 of Figure 2.

Figures 4 and 5 are detail sections to a larger scale on lines 4—4 and 5—5, respectively, of Figure 1.

Figures 6 and 7 are views similar to Figures 4 and 5, respectively, but showing a modification.

Figure 8 is a detail section on line 8—8 of Figure 4.

Figure 9 is a fragmentary vertical section through the seat and back portion showing a modified construction.

Figure 10 is a section on line 10—10 of Figure 9 with parts broken away.

Figures 11 and 12 are views similar to Figure 10, but showing further modifications.

Figure 13 is a perspective view partly sectioned showing a form for facilitating the assembly of the parts of the seat structure.

Figure 14 is a view similar to Figure 13, but showing some of the parts assembled, certain of these parts being broken away.

Figure 15 is a perspective view in section showing the assembled parts as removed from the form of Figure 13.

Figure 16 is a perspective view of the seat frame to which the structure shown in Figure 15 is to be applied.

Figure 17 is a view similar to Figure 15 with parts broken away to show a modified construction.

Figures 18 and 19 are detail sections on the correspondingly numbered section lines of Figures 15 and 17, respectively.

The seat structure is built upon a skeleton frame indicated generally at 1 having a top back member 2 (see Figure 16), and a front seat member 3. These may be joined by side frame members 4 which may be extended above the top back frame member 2 to form a cross handle member 5. These frame members may be supported on a suitable sub-structure including legs 6 and horizontal bracing members 7 of any suitable description.

The top back frame member 2 and the front seat frame member 3 furnish the entire framing supports for the seat and back structure and are provided with means for securing the seat and back structure thereto. As shown they are provided with spaced perforations as 8 for this purpose. The seat and back structure may be formed up in various ways, but with certain essential elements which comprise a flexible layer of material which is suitably surfaced for the desired finish of the forward face of the back and top face of the seat, and a plurality of flexible resilient supporting ribs rigidly secured at their ends to the frame structure and so related that they act to resiliently transfer pressure between the back and seat portions of the overlying material which they directly support without the necessity of any intermediate springs. Such ribs may be formed from spring wire and for this purpose a steel wire 10 of approximately 0.125 inch in diameter has been found very satisfactory. In order that it may function completely each of these wires should have its ends rigidly secured and be bowed forwardly in its back portion as at 11 and its seat portion, for best results, should take the form of a reverse curve, curving over and backwardly at the front portion of the seat structure, where its forward end is rigidly secured. With this form, pressure exerted tending to flatten the seat portion will result in increasing the bowing effect at the back, so that these wires acting upon the flexible sheet material will cause this to yieldingly follow the configuration of the person occupying the seat and result in an extremely comfortable support. At the ends of a seat structure, or of a seating where a plurality of seatings are arranged in a single structure, it may be desired to increase the size of the

supporting wire somewhat to form a more rigid structure and thus form an effective division between the seatings.

In order to rigidly secure the ends of the wires 10, constructions such as shown in Figures 4 to 7 may be employed. Referring to Figure 4, which shows the forward seat frame member 3, it will be noted that the wires 10 have their forward ends turned sharply downwardly and outwardly as shown at 12 where they are inserted in the perforations 8 and are clamped in position as by the clamping plates 15 engaging over a portion of the wires and secured as by the clamping bolts and nuts at 16. The wires at their top back portions may be turned downwardly as shown at 18 in Figure 5 then turned forwardly as at 19 and their extremities sharply bent as at 20 to pass through the holes 8 in the top back frame member 2 where they may be clamped by a clamping plate 22 secured in position as by the screws 23.

In Figure 6 a somewhat modified front seat connection has been illustrated in which the front seat frame member 3*a* is shown as elevated above the side members to form a bumper to limit the possible downward motion of the forward portion of the seat structure should a heavy localized load be imposed thereon. The wires 10*a* are curved upwardly toward the supporting portion of the seat to a greater extent than the wires 10 shown in Figure 4, but they may be secured to the front seat frame member 3*a* in a manner similar to that shown in Figure 4, with the clamping plate 15 and the bolts and nuts at 16.

In Figure 7 the upper ends of the wires 10 are shown as brought down and inserted in an upward direction through the top back frame member 2*a* where they are secured by a curved clamping plate 25 and bolts and nuts at 26.

As before noted, the flexible body support which directly supports the body of the occupant may be variously formed and secured to the wires 10. Thus in Figures 3 and 18, the wires 10 may be held between two layers of fabric 30 and 31 which may be stitched or otherwise secured together on each side of each wire 10 as at 32 and which may be cemented together as by rubber cement in between. A layer of cement as 33 may be spread on the top or outer face of the fabric layer 31 and there may be applied thereto a rattan or paper fabric or any other suitable material which will impart some lateral stiffness to the material so as to tend to hold the wires 10 intermediate their ends in parallel relation and to transmit sufficient load from one to another to avoid local irregularities. On this layer may be cemented, as by the cement 34, a layer of rubber or padding as at 35 to the forward face of which may be secured the surfacing fabric 36 which is exposed on the forward face of the chair structure. This facing material 36 may be extended laterally beyond the underlying material and may be finished by folding in under the edge of the entire body supporting structure or in any other suitable manner. In Figure 3 it is shown as secured by stitching as at 38 forming an ornamental beading 39. This surfacing fabric may be also extended beyond the wire ends as indicated at the top of the back portion in Figure 15 and this may be brought around the back top frame member and secured in position as by the bolts 23 shown in Figure 5. Similarly the facing material may be secured to the front seat frame member in the manner shown in Figures 5 and 7 for the top back member or in any other suitable or desired manner.

In Figures 17 and 19 the wires 10 are shown as embedded in a layer or rubber or the like 40, which may be vulcanized to a fabric or other flexible layer 41 which gives a finish to the back of the seat structure. Overlying this rubber 40 may be placed a wire netting or other suitable stiffening material 42 to the upper face of which may be secured, as by vulcanization or the like, the cushioning rubber layer 43 which may well be sponge rubber.

In Figures 9 and 10 the flexible material is shown as being horizontally ribbed, having the horizontal depressions 45 in its forward face, and a sufficient lateral stiffness may then be secured as by laterally extending ribbons of sheet metal or other suitable material as 46 overlying the wires 10 and embedded in any suitable manner in the structure.

In Figure 11 longitudinal strips of thin sheet metal or the like, as 50, overlying the wires 10 are illustrated, these strips 50 forming cores for longitudinally extending ribbed portions 51 presenting depressions 52 running parallel with the wires 10, this ribbed structure having inherently sufficient lateral rigidity. The depressions 45 and 52 may be made in any suitable way, as, for example, by stitching or other fastenings securing the outer walls together and extending through thin portions of the intermediate material 35.

In Figure 12 still another modification is shown in which the wires 10 are covered by layers 55 which may be either textile or wire fabric, transverse wires, or any other suitable structure which impart the desired lateral stiffness.

When a seat structure so built up is used in a vehicle, such, for example, as a motor vehicle, it may be desirable to prevent the body supporting structure from being thrown forwardly as in the case of sudden stops, since it is secured to the frame at its ends only. This may be accomplished by securing to the body supporting structure at or about the juncture between the back and seat portions, forward and upper ends of tie members such as shown at 60 in Figure 9, and the lower or rearward ends of these members being fixedly secured as to a cross frame member 61. If desired, such a tie member may comprise a coil spring 62 surrounding a flexible strap or the like 63 which positively limits the forward motion of the seat structure with reference to the frame while the spring may act as a cushioning extension element resiliently holding the body supporting structure while it remains within its limit of motion as determined by the length of the strap between its points of attachment to the body supporting structure and to the frame.

In Figures 13 to 15 is illustrated a desirable method of forming up and assembling the body supporting structure on the frame. Referring to Figures 13 and 14 at 100 is shown an assembly form having its forward and top faces formed to the desired contour of the seat-supporting structure. To its top back portion may be bolted a clamping bar 101. At its forward portion beneath the curved extension 102, it may be provided with a forwardly and downwardly inclined surface 104 provided with grooves 105 corresponding in spacing to the wires 10, and these may be secured in position temporarily during the assembling operation as by a clamping bar 106 which may be bolted in position against the surface 104. Similarly the back face of the form 100

may be provided with grooves to receive the upper ends of the wires 10, if desired. The wires themselves are pre-formed by suitable presses to the precise contour desired before being assembled with the other parts of the structure. First, a layer of any suitable sheet material such as may be employed to form the back finish 110 of the chair structure is laid over the back and seat-simulating faces 111 and 112 of the form 100 and the wires 10 are then assembled thereon and rigidly clamped in position as by the clamping bars 101 and 106. Then the other materials, including the lateral stiffening and the cushioning material are assembled and either cemented in place where cement is used, or in case it is desired to vulcanize, the entire structure may be assembled with unvulcanized rubber layers, which being unvulcanized are in plastic condition.

When the parts have thus been assembled and at least temporarily secured together, they are removed as a unit from the form 100 as shown in Figures 15 and 17. Where the unvulcanized rubber is employed to cement the parts together and to form the cushioning face of the body supporting structure with or without the facing material as may be desired, depending on whether or not the facing material is of a character which can withstand the vulcanizing process, the parts are secured together by vulcanization. The structure thus formed is then assembled on the frame, the ends of the wires 10 being then secured to the top back frame member and the front seat member, and the marginal portions of the covering are then finished off as desired.

It will be noted that not only is the seat structure soft and comfortable to the chair occupant, conforming automatically to his figure, but also that it is unnecessary to provide any separate seat or back cushions or to employ springs of any description other than those furnished by the supporting wires 10. Not only is an exceedingly economical and comfortable structure produced, but also there is a great saving in weight and in space occupied, thus leaving much room available beneath the seat for baggage, tools, or the like, when the seat is used in conveyances, and in general being highly suitable for such use as well as for general utility.

From the foregoing description of certain embodiments of this invention and of a method by which the structure of the invention may be readily made, it should be evident to those skilled in the art that various other changes and modifications might be made without departing from the spirit or scope of this invention as defined by the appended claims.

I claim:

1. A seat structure having a plurality of seatings having a top back frame member and a front seat frame member, a flexible body supporting layer of material extending between said frame members, and ribs of resilient material rigidly secured at their ends to said frame members and arranged in spaced parallel relation and underlying and directly supporting said flexible layer, said ribs each presenting a forwardly bowed back portion and a reversely curved seat portion, the ribs defining the side limits of individual seatings being of greater stiffness than those intermediate thereto.

2. A seat structure comprising a plurality of superposed layers of material facially cemented together, one of said layers consisting of a plurality of spaced parallel spring wires contoured to form seat and back portions and extending lengthwise thereof, another layer consisting of spaced parallel stiffening strands extending crosswise of said spring wires, and a frame having top back and front seat members to which the end portions of said wires are rigidly secured.

3. A seat structure comprising a plurality of superposed layers of material, one of said layers consisting of a plurality of spaced parallel spring wires contoured to form seat and back portions and extending lengthwise thereof, another layer consisting of spaced parallel stiffening strands, said layers being united together solely by a rubber compound, and a frame having top back and front seat members to which the end portions of said wires are rigidly secured.

4. A seat structure comprising a vulcanized layer having the longitudinal contour of back and seat portions and having incorporated in its rear portion adjacent to its outer face a plurality of spring wires extending longitudinally thereof in parallel spaced relation and forwardly of said spring wires transversely extending individual stiffening strands and comprising a layer of sponge rubber forwardly of the stiffening strands, and a frame having top back and front seat members to which the end portions of said wires are rigidly secured.

5. A seat structure comprising a vulcanized layer having the longitudinal contour of forwardly bowed back and reversely curved seat portions and having incorporated in its rear portion adjacent to its outer face a plurality of spring wires extending longitudinally thereof in parallel spaced relation and forwardly of said spring wires transversely extending individual stiffening strands and comprising a layer of sponge rubber forwardly of the stiffening strands, and a frame having top back and front seat members to which the end portions of said wires are rigidly secured.

6. The method of making a seat structure which comprises forming a plurality of spring wires into seat and back form having a forwardly bowed back portion and a reversely curved seat portion merging with said back portion and with projecting ends, laying sheet material over a seat form having a contour similar to that of said wires, arranging a plurality of said wires in substantially parallel relation on said sheet material and clamping said ends in position, overlying said wires with lateral stiffening material and unvulcanized rubber, and vulcanizing said rubber, wires, sheet material, and stiffening material together, unclamping said wire ends, and removing the structure from said form, and then permanently securing said wire ends to top back and front seat frame members with said vulcanized structure free from the frame between said members.

7. The method of making a seat structure which comprises forming a plurality of spring wires into seat and back form having a forwardly bowed back portion and a reversely curved seat portion merging with said back portion and with projecting ends, laying sheet material over a seat form having a contour similar to that of said wires, arranging a plurality of said wires in substantially parallel relation on said sheet material and clamping said ends in position, overlying said wires with individual transverse stiffening strands and unvulcanized rubber, and vulcanizing said rubber, wires, stiffening strands and sheet material layer together, unclamping said wire ends, and removing the structure from said form, and then permanently securing said

wire ends to top back and front seat frame members with said vulcanized structure free from the frame between said members.

8. The method of making a seat structure which comprises forming a plurality of spring wires into seat and back form having a forwardly bowed back portion and a reversely curved seat portion merging with said back portion and with projecting ends, laying sheet material over a seat form having a contour similar to that of said wires, arranging a plurality of said wires in substantially parallel relation on said sheet material and clamping said ends in position, overlying said wires with unvulcanized rubber and vulcanizing said rubber, wires, and sheet material layer together, unclamping said wire ends, and removing the structure from said form, and then permanently securing said wire ends to top back and front seat frame members with said vulcanized structure free from the frame between said members.

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