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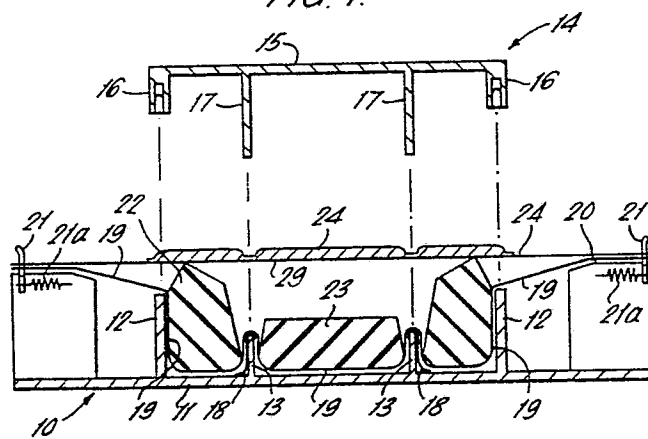
(54) **Methods of making seat cushions and seat cushions so obtained.**

(57) A seat cushion for a motor vehicle seat is produced by assembling a main block of plastics foam (23) within a U-shaped block of plastics foam (22). The foam blocks are located on a heat weldable flexible backing cloth (19). A sheet of heat weldable flexible trim cover material (24) is laid over the top of the blocks. A dielectric welding tool (14) having lower (11) and upper (15) bases carrying lower (12,13) and upper (16,17) electrodes respectively is then used to weld the top cover (24) and backing cloth 19 together around the outer periphery of the U-shaped block (22) and between the blocks (22,23). In order to ensure that the foam blocks are tightly held within the top and bottom covers, the outer peripheries of the covers are resiliently anchored (21, 21a) prior to the welding operation so that as the electrodes of the welding tools come together they draw the covers around the blocks compressing the blocks (22,23) within the cavities formed between the covers.

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FIG. 1.



TITLE MODIFIED

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METHODS OF MAKING SEAT CUSHIONS

This invention relates to methods of making seat cushions and is particularly although not exclusively applicable to methods of making seat cushions for seat bases and seat backs of motor vehicle seats.

It is known to make a trim panel comprising two sheets of heat weldable material secured together by heat welding with foam blocks trapped between the sheets as, for example, described in U.K. Patent Specification No. 1100533. This method is not however suitable for manufacturing seat cushions such as those used in motor vehicle seats because the foam is not tightly held between the two layers of sheet material.

This invention provides a method of making a seat cushion comprising the steps of assembling a main resilient plastics foam block with at least one subsidiary plastics foam block to provide a perimeter part of the cushion, locating a top trim cover of heat weldable material over the intended top surface of the two blocks, locating an underside trim cover of heat weldable material over the intended under-parts and sides of the block, holding at least one of the covers around its perimeter and heat welding the under/side cover to the top cover around the outer perimeter of the foam block assembly and between the two foam blocks to form separate pockets between the trim covers in which the foam blocks are firmly held.

Preferably both the top and under/side trim covers are held around their perimeters during the heat welding operation.

The subsidiary block may be generally U-shaped to receive within the U the main block.

The U-shaped block may be formed in one piece or may be formed from three separate pieces.



The following is a description of some specific embodiments of the invention, reference being made to the accompanying drawings in which:

Figure 1 is a diagrammatic cross-sectional view of the apparatus
5 utilized to carry out the method of the present invention.

Figure 2 is a diagrammatic sectional view in side elevation of the
apparatus shown in Figure 1.

Figure 3 is a diagrammatic cross-sectional view showing part of a
vehicle seat support structure on which is mounted a seat
10 cover formed by the method according to the invention.

Figure 4 a diagrammatic sectional view in side elevation of the seat
support structure and seat cover shown in Figure 3.

This invention relates particularly but not exclusively to motor
vehicle seats and to a method of making such seats.

15 According to the invention there is provided a method of forming
a seat cushion in which the lower portion 10 of a two-part dielectric
welding tool comprises a fixed base 11 from which extends an upstanding
outer electrode 12 which in plan view is of substantially rectangular
shape with rounded corners. The rear wall of the electrode is lower
20 in height than the front wall, whilst the heights of the side walls
changes correspondingly along their lengths between the front
and rear walls such that the top edges are of arcuate form in side
elevation which, with the top edges of the front and rear walls
correspond to the required peripheral shape of a decorative embossed
25 simulated piping line formed in the trim cover material of a foam
filled seat cushion as described later. An upstanding inner
electrode 13 of smaller rectangular shape in plan view than the outer
electrode 12 is also formed in base 11 such that the rear wall is
common to both electrodes and the remaining walls of the inner
30 electrode 13 are of the same height therewith and are spaced from the
corresponding walls of the outer electrode 12 within the perimeter
thereof.

The upper portion 14 of the welding tool is movable towards and
away from the lower portion and comprises a base 15 oppositely
35 parallel with base 11 formed with downwardly extending outer and inner

electrodes 16, 17 respectively which in plan view are opposite to and correspond in shape to the lower outer and inner electrodes 12, 13, the heights and profiles of the upper electrodes 16, 17 being correspondingly opposite to those of the electrodes 12, 13 such that
5 the working edges of corresponding upper and lower electrodes match when the upper portion of the welding tool is moved towards the lower portion for the required distance. The working edge of the upper outer electrode 16 is formed with two spaced-apart walls, the cavity therebetween permitting extrusion of weld material therein during the
10 welding operation to form a narrow embossed line simulating a decorative piping extending continuously around the finished seat cushion. A form of electrode particularly suitable for this purpose is described in our British Patent Specification No. 1229891.

With the welding tool in the open position as shown in Figure 1,
15 flaps 18 comprising elongate strips of weldable flexible material are placed over the front and side walls of the lower inner electrode 13 such that a greater proportion of the width of each strip lies along the outer face of its corresponding wall whilst a marginal edge portion rests on the base 11. A sheet of weldable flexible backing cloth 19
20 is then placed over the lower portion of the welding tool such that within the perimeter of the lower outer electrode 12 the cloth is positioned to conform approximately with the contours defined by the inner surface of the base 11, the lower inner electrode and the inner face of the wall of the lower outer electrode 12. A peripheral margin
25 of the backing cloth extends outwardly of the outer electrode 12 and rests on a support surface 20 surrounding the lower portion of the welding tool level with the working edge thereof and the marginal portion of the backing cloth is secured in this position to the upper
ends of spaced hooks 21 pivotally mounted on the support surface 20.
30 Tension springs 21a are connected to the lower ends of the hooks to hold the outer part of the backing cloth in tension when the welding tool closes.

A U-shaped block 22 of polyether foam (or other plastics foam) is positioned in the lower portion of the welding tool upon the
35 backing cloth such that it substantially occupies the space between

the outer and inner electrodes 12, 13 and projects above their working edges a predetermined amount. The sectional shape of the U-shaped block 22 varies along its length to enable the desired shape of the elements of the finished seat cushion to be obtained. A further
5 polyether foam (or other plastics foam) block 23 of rectangular shape and substantially uniform thickness is positioned upon the backing cloth such that the block substantially occupies the space within the perimeter of the lower inner electrode 13 and projects above the working edge thereof by a predetermined amount.

10 A sheet of weldable flexible trim cover material 24 has a rectangular embossed area corresponding to the area defined by the perimeter of the outer electrodes of the welding tool, the material extends beyond the embossed area to form a marginal portion therewith. The embossed area is formed by laminated materials comprising the trim
15 material 24, a weldable backing cloth 24a between which is a layer of plastics foam such as polyvinyl chloride approximately 6 to 15 mm thick, which may be secured by suitable adhesive to the underside of the trim material 24. Those materials are dielectrically welded together along lines corresponding in plan view and size to the shape
20 of the outer and inner electrodes of the welding tool. The central rectangular embossed panel may if desired be divided into smaller rectangular panels by additional weld lines extending transversely between the weld lines corresponding directionally with the side walls of the outer electrodes.

25 The trim cover material thus formed is placed in position over the lower portion of the weld tool such that the weld lines defining the embossed panels are in line with the inner and outer electrodes and the marginal portions of the trim material 24 are attached to hooks 21 in a similar manner to the backing cloth 19. The upper
30 portion 14 of the weld tool is then moved towards the lower portion 10 such that the electrodes apply pressure to the trim material, the backing cloth and lies between the electrodes and simultaneously dielectrically weld them together.

Resulting from this operation, the pressure of the encapsulating
35 materials will cause a degree of compression of the polyether blocks 22, 23 to change their sectional shapes to the more rounded forms as shown in Figures 3 and 4, whilst any undue stretching of the backing

cloth 19 and trim cover material 24 during the welding operation is prevented by movement of the securing hooks 21 towards the welding tool against the resilient tension springs 21a.

After welding is completed, the seat cushion thus formed is removed from the welding tool and the marginal portion of the backing cloth and trim material are suitably finished and extended downwardly against the main part of the backing cloth and secured thereto by suitable means to form the side covers of the seat cushion.

The completed seat cushion thus formed is then placed in position in a seat support structure which in this particular embodiment comprises a metal rectangular pan 25 with a base having an upwardly forwardly sloping portion 26 at the front thereof extending transversely substantially the width of the base. A large rectangular aperture 27 is formed in the base rearwardly of the sloping portion such that the forward and side edges of the aperture are approximately in line with the flaps 18 extending downwardly from the base of the seat cushion. The flaps are pulled through the aperture and turned around the edges thereof to lie against the underside of the seat pan to which they are secured by a suitable number of screws engaging into spaced holes in the seat pan base. Suitable washers are interposed between the flaps and the underside of the heads of the screws to reduce any strain on the material of the flaps. To provide support for the base of the seat cushion, a number of resilient straps 28 extend transversely across the aperture 27 and are attached at their ends to the seat pan base in a manner known per se.

It will be appreciated that whilst a specific embodiment of a seat cushion and a method of producing such a cushion has been described hereinbefore, this is by way of example only and other forms of upholstered cushions, for example vehicle seat back squabs, can also be produced in a similar manner.

It will also be appreciated that various modifications can be made to the embodiment described hereinbefore without departing from the scope of the invention. For example, the polyether foam blocks may be cut or moulded, whilst separate blocks of suitable shape may be substituted for the U-shaped block 23. Also the seat support structure may be of different construction.

CLAIMS:

1. A method of making a seat cushion comprising the steps of assembling a main resilient plastics foam block with at least one subsidiary resilient plastics foam block to provide a perimeter part of the cushion, locating a top trim cover of heat weldable material over the intended top surface of the two blocks, locating an underside trim cover of heat weldable material over the intended under-parts and sides of the block, holding at least one of the covers around its perimeter and heat welding the under/side cover to the top cover around the outer perimeter of the foam block assembly and between the two foam blocks to form separate pockets between the trim covers in which the foam blocks are firmly held.
2. A method as claimed in claim 1 wherein both the top and under/side trim covers are held around their perimeters during the heat welding operation.
3. A method as claimed in claim 1 or claim 2 wherein the subsidiary block is generally U-shaped and receives within the U, the main block.
4. A method as claimed in claim 3 wherein the U-shaped block is formed in one piece.
5. A method as claimed in claim 3 wherein the U-shaped block is formed in three separate pieces which are enclosed in a single pocket performed between the top and under/side covers when the covers are heat welded together.
6. A method as claimed in any of the preceding claims wherein at least one strip of heat welded material is heat welded to the under/side trim cover along the weld between the two foam blocks when the two covers are heat welded together for anchoring the cushion in a base frame.

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7. A seat cushion as claimed in any of the preceding claims wherein the heat sealing of the perimeter of the top cover to the under/side cover is so carried out that a bead of the material of the trim cover is formed around the perimeter of the top trim cover.

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8. A method as claimed in any of the preceding claims wherein the trim cover is mounted on a rigid base frame shaped to hold the top surface of the subsidiary foam block inclined upwardly from the top surface of the main block.

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FIG. 3.

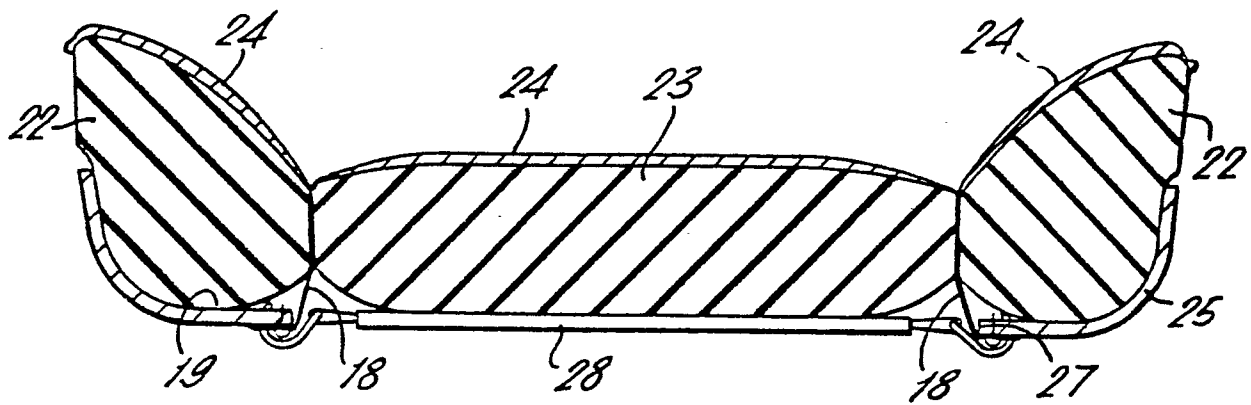


FIG. 4.

