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(54) IMPROVEMENTS RELATING TO MOULDED CUSHIONS

(71) We, SOCIETE INDUSTRIELLE BERTRAND FAURE, a French Company of Brières les Scellés 91150 ETAMPES, France, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to a method of manufacturing a cushion by moulding a padding material inside the lining.

The use of a moulding process in which the lining is applied against the internal surface of the cavity of a mould by a partial vacuum created thereunder poses, at the present time, numerous problems when it is a question of forming cushions having reliefs and/or relatively marked depressions. The lining which is preformed by means of the partial vacuum is in fact subjected locally to elongations varying with the shape of the internal surface of the cavity of the mould and it can happen that in certain zones the lining cannot come into intimate contact with the mould whereas the others it is forced to crease.

The cushion is, of course, formed in a satisfactory way only if the lining has been correctly preformed. To this end known moulding processes propose fixing the lining around the periphery of the mouth of the mould of the cavity by means of sliding blank-holders. These allow a complementary "feeding" of the lining but do not, however, allow the local elongations to be suitably spread out, nor creases to be eliminated. Consequently, it is often necessary to handle the lining manually so that it can be correctly preformed.

The present invention aims at remedying these disadvantages, and one aspect thereof provides accordingly a method of manufacturing a cushion by moulding a padding material inside a lining, which comprises providing a mould having a mould cavity with a mouth and a movable bottom mould wall, moving the movable bottom wall away from the mouth of the mould cavity, fixing the lining to the periphery of the mouth, with the movable bottom wall positioned away from the mouth, creating a partial vacuum under the lining so as to stretch the lining, moving the bottom wall towards the mouth of the mould cavity so that it pushes the stretched lining progressively back and brings it into a preformed moulding position, maintaining the partial vacuum under the lining, pouring a padding material into the thus preformed lining, closing the mould, and finally removing the moulded cushion from the mould.

Under the action of the partial vacuum, the lining bellies out inside the cavity of the mould whilst being uniformly elongated.

When the movable bottom wall pushes it back towards the outside, its elongations can then spread out progressively themselves which results in the suppression of local over-tensions in the lining and avoids the formation of creases.

With the method of the invention, the preforming of the lining can be carried out in a more satisfactory way so that the final appearance of the cushion is greatly improved thereby.

Preferably, the movable bottom wall is independent of the side walls of the mould. When the partial vacuum is applied under the lining, this latter comes immediately against the side walls of the mould which are fixed, and is then pushed progressively back towards the outside only at its parts located above the movable bottom.

It may, however, be advantageous for the movable bottom wall to carry the side walls of the mould. In this case, the lining is pushed back progressively towards the outside at all the parts thereof overhanging the cavity.

Another aspect of the present invention

provides a mould for putting the above-described process into practice, such mould comprising a body having an internal mould cavity with a mouth, a mould bottom wall movable inside the cavity, between a retracted position in which the bottom wall is distant from the mouth and an extended position in which the bottom wall is nearer to the mouth, means for fixing a lining around the periphery of the mouth of the cavity, means for creating a partial vacuum within the mould cavity under a lining so fixed when the bottom wall is in the retracted position to stretch a lining fixed around the periphery of the mouth into engagement with the bottom wall, and means for moving the bottom wall into the extended position while the partial vacuum is maintained to bring a thus-stretched lining into a mould position, and a lid for closing the mouth of the mould.

Preferably the mould bottom wall is removably fixed to the plate, which allows it to be easily replaced. Cushions can thereby be provided in different shapes at less cost since the major part of the tools required is standard.

The side walls of the mould may be either integral with the moulded bottom wall or integral with the body of the mould. Having these two possibilities, the tools can, of course, be chosen depending on the shape of the cushion to be provided.

Advantageously, the plate is movable under the control of a jack, for example, a piston-and-cylinder jack whereof the cylinder is fixed to the outer face of the body at the bottom of the internal mould cavity and the piston rod passes through the body and is fixed to said plate.

The operation of such a control means is particularly flexible so that the lining may be brought into the moulding position under the best conditions.

The present invention will now be further described with reference to the accompanying drawings in which:-

*Figures 1 to 3* illustrate respectively three consecutive steps in the performance of the method of the invention;

*Figure 4* is a sectional view of a mould according to the invention; and

*Figure 5* is a sectional view of a modified mould according to a variant.

The mould of the invention comprises a body 1 having an internal mould cavity 2 the mouth of which is surrounded by a row of small spikes 3 and the base of which is connectible to a vacuum source (not shown) by means of a pipe 4.

The spikes 3 co-operate with a blank holder 5 to fix to the periphery of the mouth of cavity 2, a lining 6 in which padding material, for example synthetic foam, will be poured so as to form a cushion.

It will be noted that a lid 7 is provided to close, at the right moment, the mouth and thus the mould cavity 2.

In accordance with the invention, the mould has a movable bottom wall 8 mounted on a plate 9 movable inside cavity 2, between a retracted position in which the bottom wall remains under the lining 6, even when the latter is stretched following the creation of a partial vacuum in cavity 2, and an extended position in which the bottom wall, after having lifted the lining, maintains this latter in the moulding position.

In the embodiment considered here, the movement of the plate 9 is controlled by a jack whose cylinder 10 is fixed by an appropriate means to the outer face of the body 1 at the bottom of cavity 2, and whose piston rod 11, which passes sealingly through the body 1 is connected in a known way to the plate 9.

Referring particularly to Figures 4 and 5, it will be noticed that side walls 12 of the mould may be either integral with the movable bottom wall 8 or integral with the body 1.

The formation of a cushion in the mould is carried out in the following way.

First of all the jack is activated to bring plate 9 to its retracted position which is shown in full lines in Figure 1 and in broken lines in Figures 4 and 5. Then lining 6 is placed above cavity 2 and its periphery is impaled on the spikes 3, after which the blank-holder 5 is positioned to fix the lining 6 firmly around the perimeter of the mouth of cavity 2.

When the lining 6 has been fixed in this manner a partial vacuum is created within the mould cavity by connecting pipe 4 to a vacuum source. It will be noted that, because of the clearances existing between body 1 and the movable bottom wall assembly 8, 9 the partial vacuum is also exerted in the part of the cavity located above the movable bottom wall 8. Due to the elasticity of the material of the lining, the lining stretches uniformly and bellies out as shown in Figure 1.

The partial vacuum being maintained, the jack is then activated to bring plate 9 close to the mouth of the cavity. When the bottom wall reaches the stretched lining 6 it pushes it back towards the outside whilst it is progressively applied thereagainst as shown in Figure 2. The elongations of the lining can in fact spread out by themselves, which permits the lining to come into intimate contact with the mobile bottom wall 8.

When the plate reaches the extended position, as shown in Figures 3, 4 and 5, the bottom wall brings the lining into the moulding position in which it is perfectly

pre-shaped.

Of course, the amount of the partial vacuum is chosen so that the elongations of the lining are compatible with the shape of the bottom wall mould bottom.

The padding material is then poured inside the lining, whereafter the mould is closed until the formed cushion can be removed from the mould.

The process and the mould according to the present invention are more particularly intended for the manufacture of squabs for motor vehicle seats. But it goes without saying that they can be used to provide any cushion formed from a padding material poured into a pre-shaped lining.

#### WHAT WE CLAIM IS:-

1. A method of manufacturing a cushion by moulding a padding material inside a lining, which comprises providing a mould having a mould cavity with a mouth and a movable bottom mould wall, moving the movable bottom wall away from the mouth of the mould cavity, fixing the lining to the periphery of the mouth, with the movable bottom wall positioned away from the mouth, creating a partial vacuum under the lining so as to stretch the lining, moving the bottom wall towards the mouth of the mould cavity so that it pushes the stretched lining progressively back and brings it into a preformed moulding position, maintaining the partial vacuum under the lining, pouring a padding material into the thus preformed lining, closing the mould, and finally removing the moulded cushion from the mould.

2. A method according to Claim 1, wherein the movable bottom wall is independent of side walls of the mould.

3. A method according to Claim 1, wherein the movable bottom wall carries side walls of the mould.

4. A mould for use in the method claimed in Claim 1, comprising a body having an internal mould cavity with a mouth, a mould bottom wall movable inside the cavity, between a retracted position in which the bottom wall is distant from the mouth and an extended position in which the bottom wall is nearer to the mouth, means for fixing a lining around the periphery of the mouth of the cavity, means for creating a partial vacuum within the mould cavity under a lining so fixed when the bottom wall is in the retracted position to stretch a lining fixed around the periphery of the mouth into engagement with the bottom wall, and means for moving the bottom wall into the extended position while the partial vacuum is maintained to bring a thus-stretched lining into a moulding position, and a lid for closing the mouth of the mould.

5. A mould according to Claim 4, including side walls which are integral with the

bottom wall.

6. A mould according to Claim 4, including side walls which are integral with the body.

7. A mould as claimed in any one of Claims 4 to 6, wherein the bottom wall is removably mounted on a movable plate.

8. A mould as claimed in any one of Claims 4 to 7, wherein the means for moving the bottom wall comprises a jack.

9. A cushion when made by the method claimed in any one of Claims 1 to 3.

10. A method of manufacturing a moulded cushion according to Claim 1 and substantially as hereinbefore described.

11. A mould constructed, arranged and adapted for use, substantially as hereinbefore described with reference to the accompanying drawings.

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Fig.1

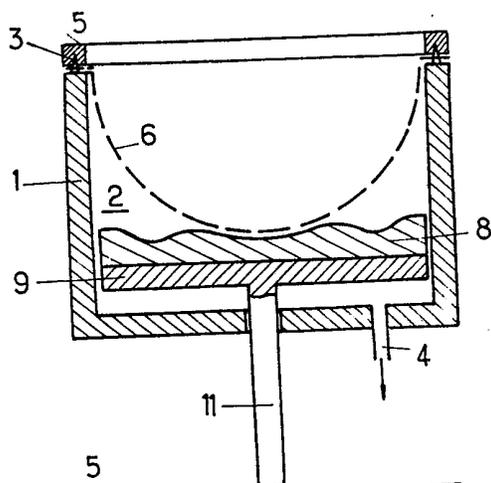


Fig. 2

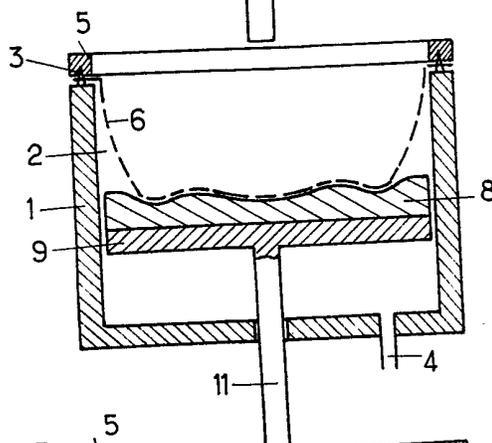


Fig.3

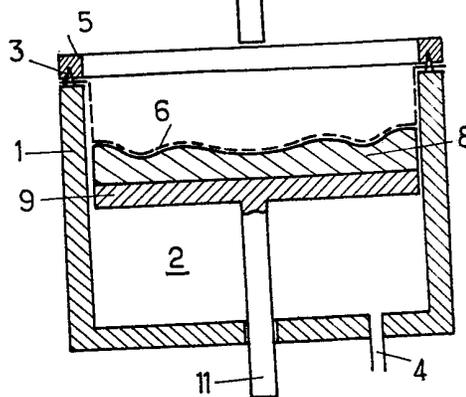


Fig. 4

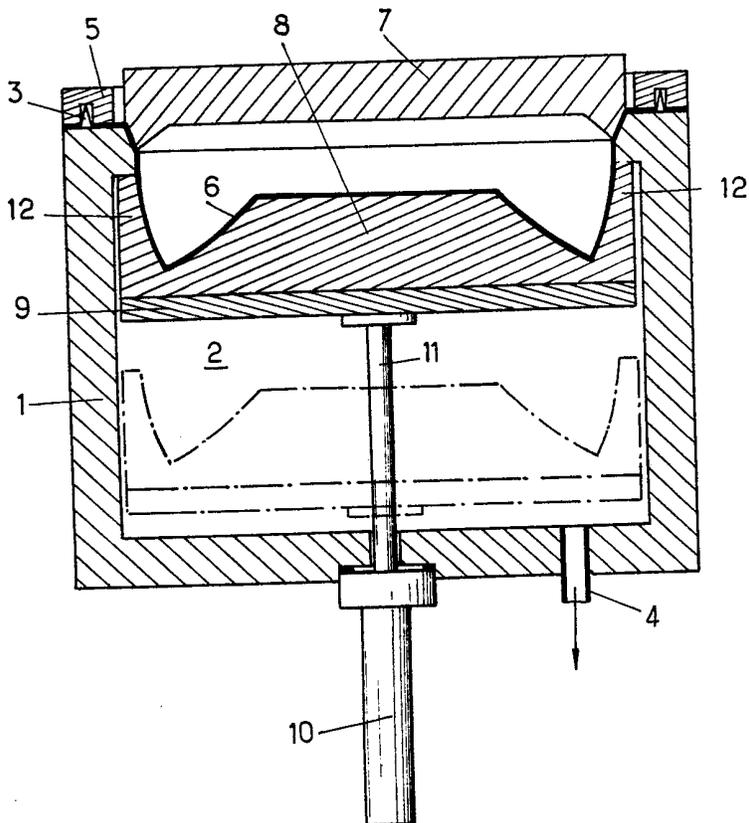


Fig. 5

