

1

3,562,052

## INTERIOR LINING MATERIALS FOR MOTOR VEHICLE BODIES

Franz Matejcek, Furth, Hubert Scheithauer, Baunach, and Hermann Peter Kayser, Bamberg, Germany, assignors to Schaeffler Teppichboden, G.m.b.H., Bamberg, Germany, a corporation of Germany  
No Drawing, Filed May 16, 1967, Ser. No. 638,748  
Claims priority, application Germany, May 23, 1966, M 69,591

Int. Cl. B31f 7/00; B32f 5/06

U.S. Cl. 156—221

4 Claims

### ABSTRACT OF THE DISCLOSURE

Novel custom-made interior linings for motor vehicle bodies comprised of a needle stitched fiber fleece of 50 to 600 gm./m.<sup>2</sup> having a permanently shaped, thermoplastic supporting layer.

### PRIOR ART

The interior walls and the floors of cars used for passenger transportation consist for the most part of iron or steel plates and these plates therefore have to be provided with a special inner lining to provide insulation and soundproofing. A particularly comfortable and pleasing character is lent to car interiors when they are covered with rugs and rug-like materials. According to the present state of the art, tufted or padded rug materials are almost always used for this purpose. These consist of a strong jute base into which the warp threads form the textile fiber material are interlocked with the aid of a weaving loom.

It has been found exceedingly advantageous when fitting these coverings into the cars to line the car bodies with as few as possible large-area pieces of the lining material. These large-sized pieces of interior lining have to be fitted to the curves and uneven surfaces of the interior, as for example over the Kardan duct for the drive shaft. For this purpose, flat, tufted rugs have a reinforcing supporting layer of polyethylene, and they have been heated to the melting point of the polyethylene, shaped in a pressing die and cut to the desired size. However, these pre-shaped and cut-to-size interior linings from tufting rugs have many disadvantages. Particularly, due to construction requirements, the floors of car bodies have corners and edges as well as non-planar surfaces, for example, the covering over the clutch, gear shift, the driveshaft, and on the platforms of the seat supporting means. The lining or covering material has to be fitted to these uneven areas in a smooth and flawless manner, which requires a considerable stretchability on part of the tufted rug reinforced with a layer of polyethylene. However, due to the jute backing, this type of rug has only a very restricted stretchability and cannot be shaped at random. In those areas where rounded surfaces or corners have to be fitted, creases or even tears due to the cracking of the jute fabric are apt to occur and elimination of such creases requires a special and very costly operation.

Since the lining materials always have to be of identical dimensions, they are cut to adapt to the respective fitting area after forming. However, these cut edges produce a very ugly sight when tufted rugs are used because the cut jute and warp threads hang out over a length of several centimeters. These hanging threads also interfere when the interior lining is fitted into the car body and therefore it is frequently necessary to cover the cut edges with a seam binding. For large-area, fitted and notched sections of interior linings, this calls for specific and costly operational steps. Furthermore at those points where the edges run parallel to the warp-thread rows of the tufted rugs, the

2

warp-thread rows separate and the reinforcing jute fabric becomes visible and makes a very undesirable sight.

### OBJECTS OF THE INVENTION

It is an object of the invention to provide novel interior linings for automobiles which can be economically produced and simply installed.

It is another object of the invention to provide novel automobile interior linings which do not have the disadvantages of interior linings with jute backings.

These and other objects and advantages of the invention will become obvious from the following detailed description.

### THE INVENTION

The interior lining of the invention for automobile bodies is comprised of a fiber fleece of 50 to 600 g./m.<sup>2</sup>, needle stitched two or more times and a substantially closed, thermoplastic supporting layer on one side of which the said fleece is embedded, the said linings being permanently shaped by heating the same above the softening temperature of the thermoplastic supporting layer, compressing the heated lining in a cold pressing die and cutting the linings to the desired size.

These interior linings of the invention do not have the disadvantages of the prior art linings. They are easy to shape and they adapt themselves without creasing even to difficult contours, which require a pronounced stretchability. This is a particular advantage since tufted rugs due to their poor stretchability very often are cut only in small sections which then have to be sewn together or seam fused into the lining as desired and these working steps are costly and cause considerable waste. No unsightly hanging ends to interfere with the fitting will occur at the cut edges of the interior lining of the invention. A further advantage of the interior lining of the invention resides in the low price compared to tufted rugs because of the simpler and less costly method of production.

A particularly advantageous development of the lining material according to the invention consists in that this material can be laminated with additional layers of heat and sound-limiting materials disposed on the thermoplastic supporting layer.

Textile fibers for the interior linings of the invention may be natural fibers such as wool or any other animal hair, silk, cotton, linen, flax and the like, as well as synthetic fibers such as reclaimed cellulose, cellulose derivatives, polypropylene, polyamides of the type of polycaprolactone and polyhexamethylene adipamides, polyesters such as polyterephthalic acid glycolate, acrylonitrile fibers and others.

The thermoplastics for the supporting layer shall possess at room temperatures the utmost dimension constancy and flexibility without cracking. The softening temperature should lie between 80–180° C. Examples of suitable thermoplastics are high-pressure and low-pressure polyethylene, polypropylene, hard and soft polyvinyl chloride.

Aside from the type of the fiber material used, the weight of the fleece and the manner of sewing are most decisive for the usefulness of the interior linings. Fleece weights of less than 100 g./m.<sup>2</sup> manifest a poor durability solely due to the fact that the effective textile layer is very thin. Advantageously, the durability is tested by means of the Schopper-abrasion device.

Although the effective thickness of the textile layer increases with the increasing weight of the fleece, the tendency to develop fluff or nap increases in the same measure. By means of heavier stitching, this nap formation can be prevented or at least restricted, even when heavier fleeces are used. However, at fleeces weighing

more than 600 g./m.<sup>2</sup>, the formation of nap can no longer be prevented. The most preferred fleece weights lie between 200 and 400 g./m.<sup>2</sup>. The stitching is particularly effective when it is done in several seams and the fleece is turned over between the individual seams. For each seam stitched, at least 70 stitches per cm.<sup>2</sup> should be made.

The securing of the fleece to the thermoplastics can be effected, for example, by sprinkling and subsequent fusing on of thermoplastic powder or by application of a thermoplastic film, heated to its softening point. An important factor is to be certain that the fleece fibers are thoroughly secured and hardened in the thermoplastics.

Prior to the molding, the thermoplastic layer is heated above its fusion point. The hot lining is then placed in the pressing die and is molded. This process can be effected either by pressure or by vacuum. The lining is cooled and retains the desired form thereafter. It has also proved very advantageous and timesaving to arrange slits and ridges on the exterior of the press-molds, corresponding to the final contours of the lining material when installed in the vehicle.

The edge of this lining material may be accurately cut along these slits and edges with a knife or a red-hot wire, while they are securely held in the mold where they will then cool. When a predominantly thermoplastic fiber, such as polyamide fibers, is used in the fleece, a smooth, fiber-free edge is obtained by cutting with the red-hot wire.

With a relatively thin lining material consisting of, for example, 300 g./m.<sup>2</sup> of fiber fleece and 400 g./m.<sup>2</sup> of polyethylene, which is expected to have an improved capability to insulate against cold and sound, it is advantageous to introduce additional layers of heat and sound-proof fabrics into the side of the press mold which faces the thermoplastic layer. These insulating materials, such as for example wool felt, cork mats, composition pulp board, gumpcocos mats, polyurethane foam materials or foamed-up polyvinyl chloride, can cover the entire area of the form die or only parts thereof. The insulating material layers for larger sized parts have to be frequently slit or wedges have to be cut out at specific points so that no creases occur during the shaping process. During the shaping process, the hot thermoplastic layer is pressed onto the insulating material to join the insulating layer with the coated fleece into a homogeneous interior lining, which is endowed with especially high values of insulation.

These lining materials of the invention cannot only be used for covering the floor, but they can be installed at any other part of the interior of the cars, such as lining of the ceilings, trunk, arm rests and others.

In the following example, there is described a preferred embodiment to illustrate the invention. However, it should be understood that the invention is not intended to be limited to the specific embodiment.

## EXAMPLE

## Automobile interior lining or arm rests

A needle fleece of 200 g./m.<sup>2</sup> consisting of nylon 12 fibers with a pile length of 90 mm. and which was produced in the usual manner in a carding- and wefting-loom, was twice needle-stitched with about 75 stitches per 1 cm.<sup>2</sup>. Between the two needle runs, the fleece was turned. The resulting needle fleece was sprinkled with 400 g./m.<sup>2</sup> of polyethylene powder and the polyethylene powder was then heated to its melting point in an infrared radiation field. This material with the still hot polyethylene layer was rolled out between cooled rollers under moderate pressure to effect a good anchoring of the fibers in the polyethylene layer. This material was cut into fitting pieces of about 40 x 30 cm.<sup>2</sup> and the said pieces were heated to above the softening point and then placed into an open die. This pressing die consisted of punches and stencils which exactly conformed to the shape of the arm rest. After the pressing die had been closed, the material was cooled and was cut at the edge. An interior lining without cracks or creases was thus obtained. Examination of the wearability of the lining with a Schopper-device showed about 3000 chafe marks before the fiber fleece was worn down to the polyethylene layer.

Various modifications of the interior lining of the invention may be made without departing from the spirit or scope thereof.

## We claim:

1. A method of producing interior linings for automobile bodies consisting essentially of the steps of forming a fiber fleece of 50 to 600 g./m.<sup>2</sup> by repeatedly needle-stitching and turning over between two successive stitching seams, applying a substantially closed thermoplastic supporting layer on one side of said fleece, permanently shaping said fleece and said supporting layer by heating the same above the softening temperature of the thermoplastic supporting layer, compressing the heated lining in a cold pressing die and cutting the linings to the desired size.

2. The method of claim 1 wherein the fiber fleece produced has a weight of 200 to 500 g./m.<sup>2</sup>.

3. The method of claim 1 wherein the thermoplastic supporting layer is fused to an insulating layer.

4. The method of claim 1 wherein the softening temperature of the thermoplastic supporting layer is between 80 to 180° C.

## References Cited

## UNITED STATES PATENTS

|           |        |               |         |
|-----------|--------|---------------|---------|
| 3,142,611 | 7/1964 | Mills         | 161—170 |
| 3,307,990 | 3/1967 | Homier et al. | 161—81  |

DOUGLAS J. DRUMMONS, Primary Examiner

U.S. Cl. X.R.

156—245; 161—154

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,562,052 Dated February 9, 1971

Inventor(s) Franz Matejcek et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 42, (claim 2) "500" should read  
-- 400 --.

Signed and sealed this 31st day of August 1971.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Acting Commissioner of Patents