May 9, 1967 H. V. B. POLLOCK 3,318,756

CUSHION MATERIAL

Original Filed Nov. 13, 1961 2 Sheets-Sheet 1

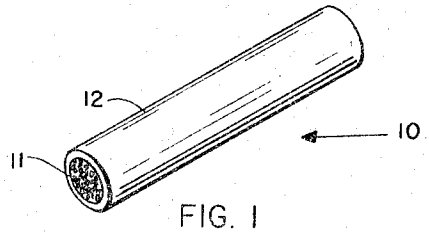
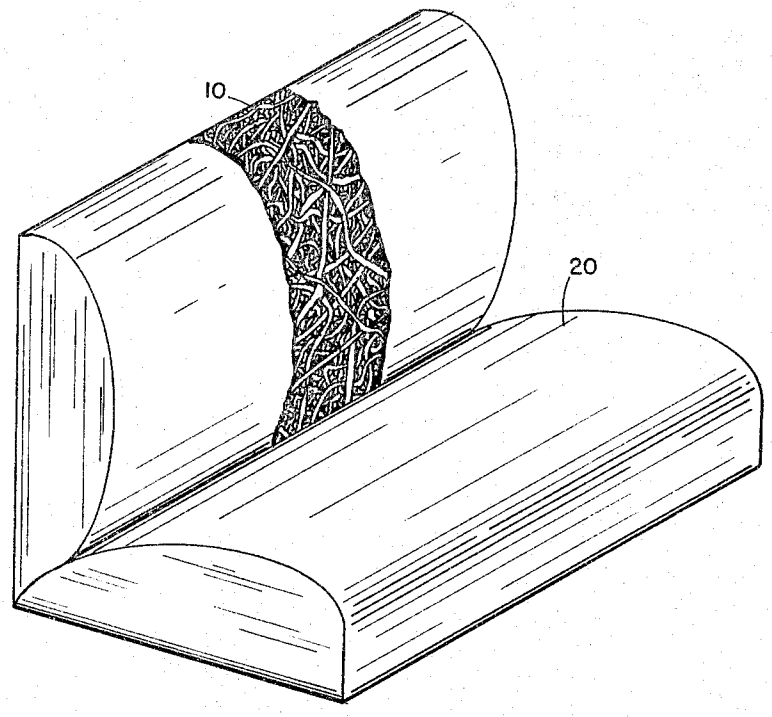


FIG. 1

FIG. 2



INVENTOR.
HAROLD VAN B. POLLOCK,
BY John M. Diehl,
ATTORNEY.

May 9, 1967 H. V. B. POLLOCK 3,318,756

CUSHION MATERIAL

Original Filed Nov. 13, 1961 2 Sheets-Sheet 2

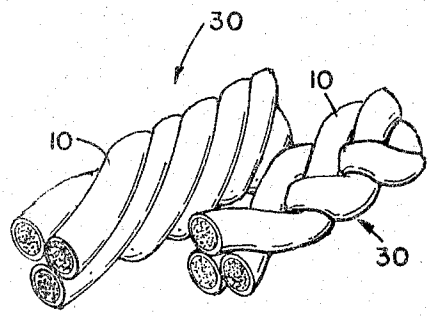


FIG. 4

FIG. 5

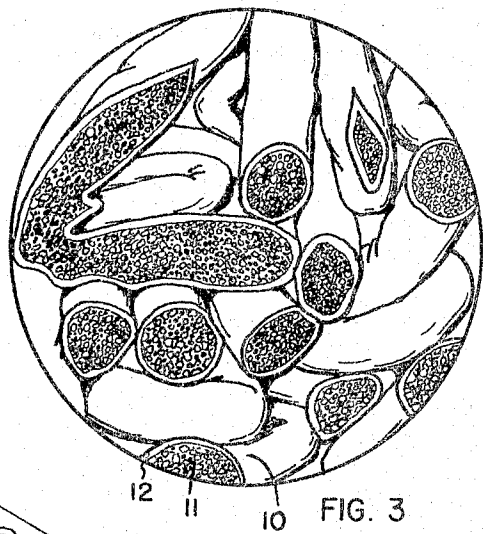


FIG. 3

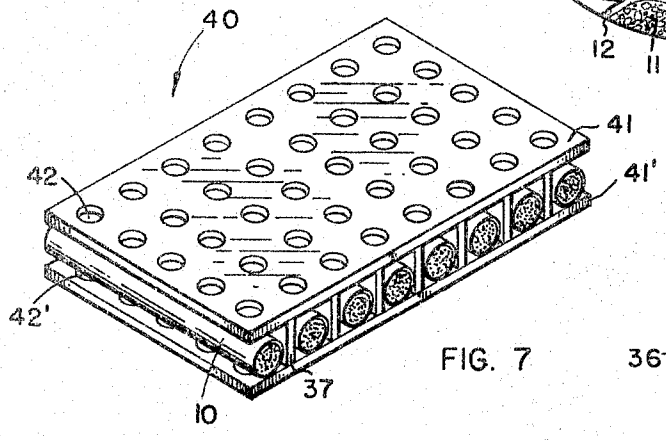


FIG. 7

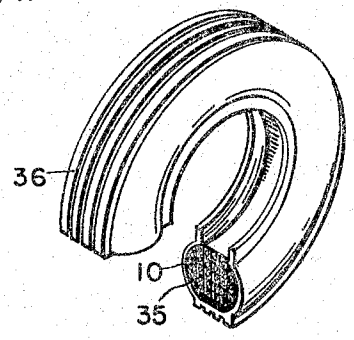


FIG. 6

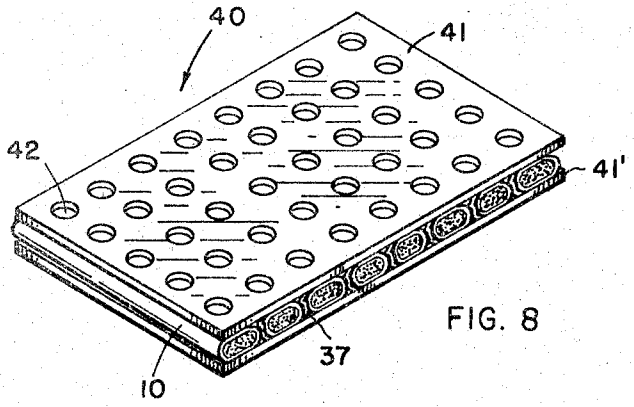


FIG. 8

INVENTOR

HAROLD VAN B. POLLOCK

BY

ATTORNEY

United States Patent Office 3,318,756
Patented May 9, 1967

3,318,756

CUSHION MATERIAL

Harold Van B. Pollock, Minneapolis, Minn., assignor to Foster Grant Co., Inc., Leominster, Mass., a corporation of Delaware

Continuation of application Ser. No. 151,986, Nov. 13, 1961. This application Apr. 21, 1965, Ser. No. 453,542
The portion of the term of the patent subsequent to Oct. 23, 1979, has been disclaimed
4 Claims. (Cl. 161—69)

This application is a continuation of my co-pending application Ser. No. 151,986 filed Nov. 13, 1961, now abandoned, which is a continuation-in-part of application Ser. No. 829,131, filed July 23, 1959, now United States Patent 3,059,251.

This invention relates to a cushion article and a process for making, and more particularly relates to cushions such as used in mattresses, upholstered articles and the like comprised with a fabric overlayer and a resilient filling material thereunder. In the article of this invention one or more resilient cords comprised with a foamed resinous core and a substantially smooth resinous outer wall are randomly arranged to provide filling material in cushion articles. The cord of this invention has greater resilience than cord of similar dimension composed entirely of foamed resin. The unfoamed wall of the cord hereof increases the tensile and compressive strentghs of the cord while increasing the density of the cord only slightly. The foamed core provides a low density filler separating the walls of the cord thereby increasing the bending strength of the cord.

Heretofore it has been known to provide totally foamed natural or synthetic polymeric materials in upholstered products. It has also been known to provide hollow tubular fibers or filaments in cushion articles. In foam or sponge articles synthetic resinous material or natural or synthetic rubber are used. Such materials are highly resilient and elastomeric so that stresses are disposed over an area not substantially greater than the area of applied force. Thus, a foamed synthetic resinous sponge or foam material readily conforms to the contour of the object placed thereon and a person who sits or reclines on an article upholstered with resilient foam material experiences a sidewise resisting force from foam immediately adjacent the area of support. Such attributes of foam cushioning are particularly noticeable in the case of pillows or other articles having comparatively thick layers of foam material. It is known in the art to provide filamentary hollow tubes of elastomeric material such as of fibrous silicone rubber to improve the feel of a cushion article by increasing the distributive area over which the applied force is effective and thereby increasing the firmness of the upholstered article and decreasing the tendency of the article to conform to the contour of the object placed thereon. The present invention discloses a material wherein the desirable qualities of cellular foamed elastomeric material and of fibrous tubular material are combined to provide the advantages of both types of material. A foamed resinous elastomeric material is extruded through an orifice into the form of a cord with a substantially smooth web of skin surrounding a lower density foamed core. The cord when placed in an upholstered article in a random manner provides a padding for upholstery which operably distributes the weight of an article thereon over an area larger than the base of the article while providing the resilient contour conforming quality of foamed elastomeric material.

It is an object of this invention to provide an improved method of fabricating upholstered articles.

It is another object of this invention to provide an upholstered article having superior combined properties of resiliency and load distribution.

It is another object of this invention to provide a material for upholstering furniture which can be manufactured from new or synthetic resinous thermoplastic polymeric material.

Other objects will become apparent from the drawings and from the following detailed description in which it is intended to illustrate the applicability of the invention without thereby limiting its scope to less than all equivalents which may be apparent to one skilled in the art. In the drawings like reference numerals refer to like parts and:

FIGURE 1 is a perspective view of a section of the cord material which is used in this invention;

FIGURE 2 is a schematic view of an upholstered article constructed in accordance with this invention;

FIGURE 3 is a schematic detailed view of a cross section of a portion of the article of FIGURE 2;

FIGURE 4 is a perspective view of another embodiment of this invention showing a section of a rope made from the cords shown in FIGURE 1;

FIGURE 5 is a perspective view of another embodiment of this invention showing a section of a rope made by interturning the cords shown in FIGURE 1;

FIGURE 6 is a perspective cutaway view of a rubber tire using the cords of FIGURE 1 as the filling according to another embodiment of this invention;

FIGURE 7 is a perspective view showing a panel using the cords of FIGURE 1 as the inner filler material according to another embodiment of this invention;

FIGURE 8 is a perspective view of the panel of FIGURE 7 when it is compressed.

Referring now to FIGURE 1 there is shown a section of a cord of material for use in this invention and designated generally as **10**. Cord **10** is comprised of extruded or otherwise formed foamed resinous core **11** in a continuous skin **12** formed around core **11** and enclosing core **11** throughout its entire length. A provision of a foamed resilient core material with a contiguous web therewith provides a structure that is possessed of superior properties of tensile, compressive, and bending strength and of resiliency in comparison with a foam web of material or composite materials which are made by utilizing chunks of foamed materials adhered or fused together. Skin **12** of cord **10** of FIGURE 1, when tensilely deformed, exerts an elastic force which causes the material to be returned to its original form more readily than is the case of a totally foamed material because a greater cross-sectional area of material, i.e., the web of skin **12** of cord **10**, is deformed in the inventive material than would be in a totally foamed resinous cord of similar diameter. Cord **10** is also superior to hollow tubular elongated filamentary or fibrous materials because foamed core **11** prevents cord **10** from collapsing so that skin **12** on opposite sides of cord **10** are not in contacting relation as would be the case with a hollow filament.

Core **11** and skin **12** of cord **10** are preferably of the same or similar composition, and may be comprised of polyethylene, polyvinylchloride, polyvinylidene chloride, copolymers of polyvinyl chloride and polyvinylidene chloride, polyvinylacetate, polyvinylalcohol, and other well-known vinyl elastomeric compositions. They may also be comprised of polystyrene or other polymerizable aromatic materials having ethylenic unsaturation, or may be comprised of cellulosic compositions such as cellulose acetate, cellulose acetate butyrate, cellulose nitrate or ethyl cellulose. Thermoplastic synthetic resinous substances are preferred because they can be used in the articles of this invention by remelting scrap materials from other thermoplastic manufacturing operations or

may be obtained by reclaiming scrap materials, the presence of contaminants in such materials being of relatively minor importance because the upholstery cord of this invention will normally be covered with a layer of fabric or similar material. However, other elastomeric synthetic resinous substances may be used such as the reaction product of a diisocyanate and an unsaturated fatty acid, particularly the open-celled variety of polyurethane material thus produced, polyesters such as polyethylene terephthalate, polyamides such as nylon may be used, and other well-known isocyanate and amines may be employed in manners well-known to those skilled in the art. Polymers such as phenol formaldehyde, resorcinol formaldehyde, phenol furfural, and other thermosetting resins may be employed, epoxys such as those obtained by reacting bisphenol–A and epichlorohydrin may also be employed. Polyacetals may also be employed. Natural latex may be employed and vulcanized to a degree consistent with use in this invention and synthetic rubber such as butadiene acrylonitrile, butadiene styrene copolymer, neoprene, butyl rubber, and other well-known synthetic rubbers may be employed in non-preferred embodiments of this invention.

Core **11** may be comprised of a material with either a continuous or discontinuous gas phase dispersed therethrough so as to produce either a sponge or a foamed polymeric material. Cord **10** may be fabricated from scrap or reclaim material in which foreign inclusions are present because the visual appearance of cord **10** is relatively unimportant for reasons above stated.

Cord **10** is preferably made by extruding a thermoplastic foam composition through a die orifice. The cord formed will have a foamed resinous core and a substantially continuous skin **12**, the provision of skin **12** resulting from the conditions which are present at a die orifice when a foamed fusible material is extruded or drawn therethrough. Thus, any material herein mentioned when extruded through a die orifice has a skin formed thereabout and will be configured as illustrated in FIGURE 1. However, thermosetting resinous substances which are salvaged or reclaimed cannot be remelted and if they are employed to provide the material of this invention it is necessary to pack them into a preformed casing either with or without the use of adhesive. The use of reclaimed or salvaged thermosetting materials is a non-preferred embodiment of the invention.

In FIGURE 2 is shown automobile seat **20** wherein cord **10** is used. Cord **10** may be arranged in random manner without any perceptible degree of orientation to form a cushioning material in seat **20**, however, a slight advantage may be obtained by orienting cord **10** substantially in a plane normal to the direction of the load thereon. As may be seen in FIGURE 2, the material in FIGURE 1 may be compressed into regular, irregular or convolute shape of equal facility and need not be cut or formed to conform to a particular surface configuration in the article in which it is used. The material may be packed in any manner to occupy volumes of any configuration and to provide a quality article with minimum attention being necessary to the placing of the material in the upholstered article. Seat **20** is superior to articles made in conventional manners from foam material or simliar compositions, particularly when the article is configured having graduated thicknesses of cushioning material.

In FIGURE 3 is shown a detailed view of the article of seat **20** of FIGURE 2 wherein it may be seen that skin **12** completely encloses cord **10** which may be unoriented and randomly disposed within seat **20**. FIGURE 3 is a sectional view of the interior of seat **20** and the lengths of cord **10** are shown cut in random manner so as to expose core **11** in a variety of shapes, however, it is to be understood that cord **10** is preferably substantially regular cross section.

The inventive method hereof of constructing a cushion article can be utilized in applications other than in seat

construction. Decorative packaging paddings, pillows and the like can be made by utilizing the method of this invention, and virtually any foamable resilient material can be utilized to manufacture cord **10**. Skin **12** and core **11** of cord **10** may be comprised of materials of different compositions or may be of similar or dissimilar compositions and be adhered together in non-preferred embodiments.

The cord of polymeric material from which articles constructed in accordance with this invention may be configured may be of any usable diameter, but is preferable to provide a cord having a diameter from ⅛ inch to ¾ inch. In another embodiment of this invention, skin **12** may be increased in thickness by cord **10** being dipped in other plastic or other similar material to strengthen skin **12**. Such a material may be for instance polyethylene dissolved or dispersed in a solvent or dispersing medium or it may comprise an aqueous dispersion of natural or synthetic latex. Other resinous compositions may equally well be used. A coating may be deposited on cord **10** and the article then be operably heated to cause polymerization or crosslinking or drying of the coating as the case may be.

In another embodiment of this invention as shown in FIGURE 4 cord **10** may be twisted into a rope **30** to provide a similar longated article but of greater diameter than that of individual cord **10**. Similarly, the material may be woven or braided into a ropelike material **30** such as shown in FIGURE 5. The method of use is similar in use to that described for cord **10** hereinbefore. With rope **30** it may be desirable to use one inch or two inch diameters or, if it is desired, cord **10** may be made individually in larger similar diameters.

In another embodiment of this invention cord **10** or rope **30** may be introduced into a tire casing as shown in FIGURE 6 to provide a resilient filling therein and thereby avoid the conventional method of air-inflating a tire or inner tube. The use of foamed rubber or foamed plastic in tire casings is known in the art and it is within the scope of this invention only to introduce a foamed rubber or plastic cord having a skin thereon which increases the resistance to bending of the foam material in comparison to that of a material which is foamed uniformly throughout the interior of the tire casing. Resilient rubber, honeycomb configured, cord separators **35** may be intermittently spaced along cord **10** within tire **36** to retain alignment of cord **10** therein. The tire may or may not be inflated with air; the pressure of the cord disposed within the casing may provide the requisite force to prevent the tire from collapsing.

In another embodiment of this invention, cord **10** as shown in FIGURES 7 and 8 may be arranged in parallel side by side adjacency between two facing panels **41** and **41′** which may be made of plywood or semi-rigid plastic or the like and be perforated with holes **42** and **42′** so that air may readily pass through the composite article **40** when under pressure and applied against facing sheet **41** or **41′** of article **40**. However, when bulk material is loaded on top facing sheet **41**, cords **10** are deformed into contacting adjacency, as shown in FIGURE 8, so as to prevent solid granular or finely comminuted bulk material from passing therebetween. Article **40** may be supported above the usual floor of enclosed railroad cars such as a box car into which flour or other fine comminuted feed, grain, or the like may be loaded. Bulk material may then be loaded onto the car, whereupon it will be supported by article **40** in the bottom of the car. To facilitate unloading the car, air may be introduced between article **40** and the normal floor of the car to cause article **40** to tend to assume the position shown in FIGURE 7. The air then passes upward through article **40** and passes into and upward through the bulk material in the box car. The effect is to provide a fluidized bed of material in the box car thereby causing flow of the material out of a door or side opening of the car

so as to operably unload the material without mechanical handling means being used. The use of air directed through a car floor has heretofore been known and forms no part of this invention, however, the use of cords **10** between perforated facing plates is the new and novel embodiment of this invention. Spacers **37** between cords **10** are of resilient material and are collapsed or compressed under load from panel **41**. Spacers may be configured in any manner which operably separates cords **10**, and may be omitted if desired.

In any of the embodiments of this invention convolute foamed resinous cords **10** as described may be adhered or cemented together to form a shaped mass which embodies desirable properties of firm resiliency without readily conforming to the contours of objects placed thereon and which is of unitary structure and appearance without use of fabric or other covering material. The cords may be adhered together by any operable material such as by epoxy, urethane, phenol or resorcinol resins as above described or other operable natural, synthetic, or artificial resins or plastics. High pressure curing of an adhesive is possible such as for use with phenol formaldehyde resins and the like, but low pressure curing or air curing is preferred and for this use epoxy resins and other polyether resins or polyester resins such as polyurethane are preferred. Natural glues such as animal glues are usable, but waterproof adhesives are preferred. If desired, skins **12** of cords **10** can be fused together by heating if thermoplastic cord compositions are employed. Such adhesive materials may be applied to cords **10** by spraying or dipping or other manner as desired. Means for applying adhesive materials to foamed resins is well known and any such means as is operable to provide the articles of this invention may be employed.

While certain modifications and embodiments of the invention have been described, it is of course to be understood that there are a great number of variations which will suggest themselves to anyone familiar with the subject matter thereof and it is to be distinctly understood that this invention should not be limited except by such limitations as are clearly imposed in the appended claims.

I claim:

1. A resilient panel for use in unloading stored articles, comprising in combination at least one layer of foamed polymeric material placed between two panel facing sheets, said foamed material being configured from a plurality of cords of said polymeric material, each of

said cords having a core comprising a gas phase entrained in a solid phase with a hard skin casing formed thereabout and integral within said core so as to comprise a continuous web of elastomeric polymeric material, each of said cords being disposed between said panel facing sheets in a side by side arrangement, each cord being separated from the next adjacent cord by means of a collapsible resilient wall extending from the face of one panel sheet to the face of the other panel sheet, both panel sheets being perforated with holes so that gas may readily pass through the panel.

2. The panel of claim **1** wherein said solid phase core material and said hard skin web are of identical compositions.

3. Foamed polymeric thermoplastic resilient synthetic resin material cord means arranged and confined so as to provide a cushioning layer having a depth greater than the diameter of said cord means,

said cushioning layer being formed by several layers of said cord means arranged in an irregular and intertwined manner;

said cord means comprising

a foamed central core of closed cells surrounded by an integral continuous skin which when tensilely deformed exerts an elastic force tending to return the material to substantially its original form,

said cord means having an effective diameter of at least ⅛ inch such as to render it flexible, and having an irregular convoluted shape when in said cushioning layer.

4. The foamed cord means defined in claim **3** wherein said polymeric thermoplastic resilient synthetic resin material is polystyrene.

References Cited by the Examiner

UNITED STATES PATENTS

1,394,252	10/1921	Costello	152—313 X
2,213,028	2/1940	Kraft	156—113 X
2,620,845	12/1952	Lord	156—113 X
2,994,110	8/1961	Hardy	264—112
3,054,146	9/1962	Griffin	18—48
3,059,251	12/1962	Pollock	161—175 X

EARL M. BERGERT, *Primary Examiner.*

CLIFTON B. COSBY, *Examiner.*