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PACKAGING MATERIAL AND PACKAGE

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Fig. 1

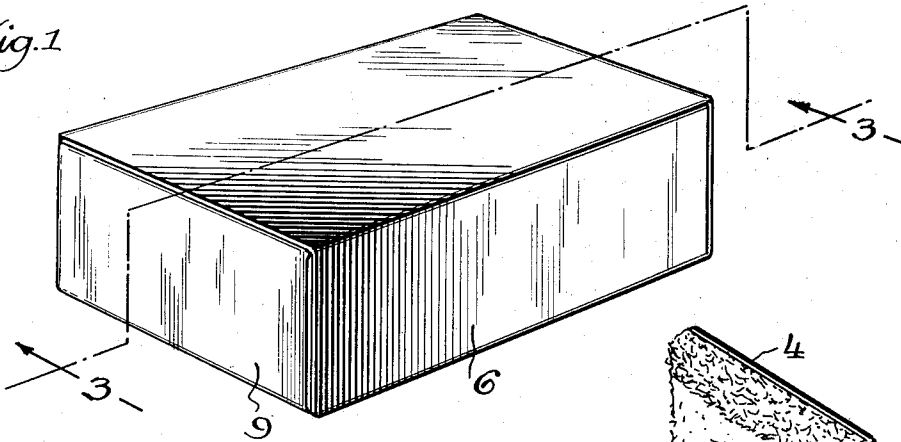


Fig. 2

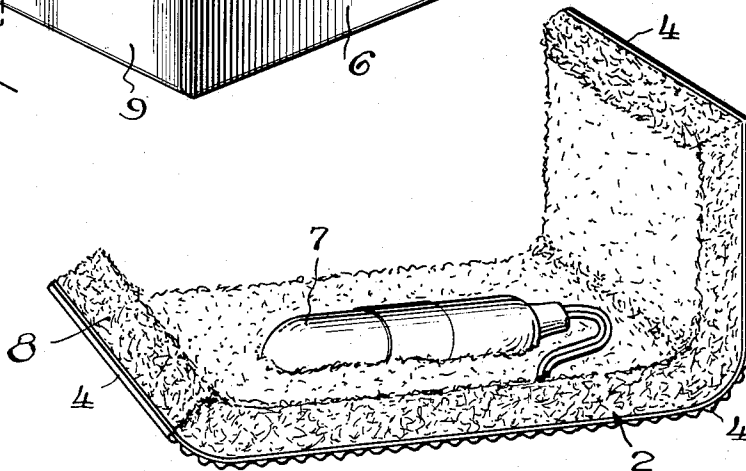


Fig. 3

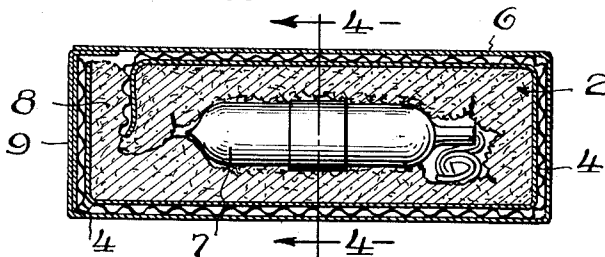


Fig. 4

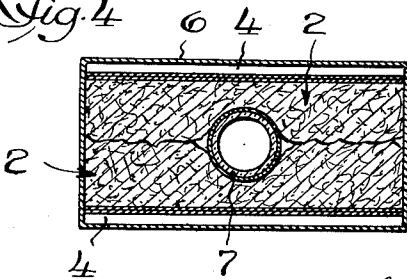
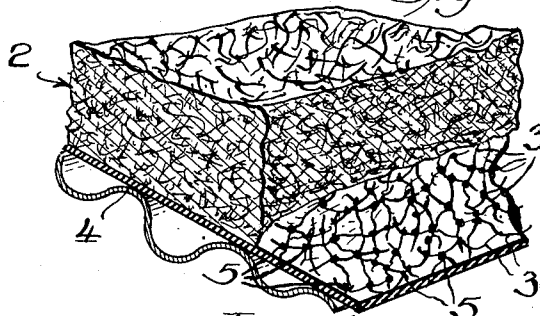


Fig. 5



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This invention relates to a packaging material adapted to conform readily to contours of irregularly shaped articles, and to the package formed therewith.

The packaging material is soft and resilient so that it will protect fragile articles from shock and will not scratch or mar highly polished finishes. The packaging material has a high insulating value against heat or cold and provides excellent protection against moisture or dust.

The packaging material of the present invention comprises a soft, resilient layer of fibers bonded to a suitable backing, such as, for example, a flexible sheet of corrugated paperboard. Although a flexible corrugated paperboard backing sheet is preferred, a rigid corrugated paperboard backing may be used, either in sheet form or as a shaped member to fit any specific article to be packaged. The packaging material is folded around an article positioned on the fibrous layer and slipped into a paperboard carton to complete the package.

The fibrous layer, which may be of any desired thickness, comprises a mass of non-absorbent, non-matting fibers, preferably plastic fibers, of various lengths from about one-half inch to two inches, held in three dimensional, random arrangement by means of a flexible adhesive which also serves to bond the layer of fibers to the backing material. The individual fibers are first arranged in a three-dimensional, random arrangement and are then wetted lightly with adhesive to cause them to adhere to each other at their spaced points of contact.

The application of adhesive to the fibers and the drying thereof is effected without crushing or compacting them. The fibrous layer is very soft and resilient, and has a very high loft. The adherence of the three-dimensional, randomly arranged fibers to each other at substantially only their points of contact imparts excellent air retaining and insulating qualities to the packaging material. Accordingly, the packaging material can be shaped around articles of irregular contour, and the fibers can be compressed without loss of softness or loft, or balling of the fibers, thereby cradling and cushioning the article.

Any adhesive which gives a flexible bond, such as natural rubber or synthetic rubber, may be used in accordance with the present invention, but an elastic resinous adhesive is preferred.

The structure by means of which the above and other advantages are attained will be described in detail in the following specification, taken in conjunction with the accompanying drawings, showing a preferred illustrative embodiment of the invention, in which:

FIGURE 1 is a perspective view of a complete package embodying the invention;

FIG. 2 is a perspective view of the packaging material with an object of irregular shape mounted thereon;

FIG. 3 is a longitudinal sectional view, taken along the line 3-3 of FIG. 1;

FIG. 4 is a cross sectional view, taken along the line 4-4 of FIG. 3; and

FIG. 5 is a fragmentary perspective view, on an enlarged scale, showing the packaging material.

In the drawings, the reference numeral 2 indicates a layer of non-absorbent, non-matting fibers 3 bonded to the flat facing sheet of a flexible backing 4 of corrugated paperboard by an adhesive which also bonds the individual fibers to each other at their points of contact 5, as hereinafter described. Although sheet 4 is preferably flexible

in one direction, i.e., parallel to the direction of the flutes of the corrugations, it should be understood that a rigid corrugated paperboard backing material may be used, either in sheet form, or in preshaped configuration to fit around an article to be packaged.

As shown, flexible backing material 4 consists of a single ply of corrugated paper having one surface of its parallel, transversely spaced flutes bonded to a flat facing sheet. The fibrous layer may be bonded to either side of the backing material, but it is preferred to bond it to the flat facing sheet because the surface of the fibrous layer is substantially flat and the flat surface of the facing sheet provides a uniform bonding surface throughout the surface area of the fibrous layer. If desired, flat facing sheets may be bonded to opposite sides of the corrugated ply.

The fibers 3 preferably are curled or crimped, but straight fibers may be used. It is preferred to use synthetic fibers, such as, for example, cellulose acetate, polyvinyl acetate, nylon, rayon, acrylic fiber (a copolymer of vinyl chloride and acrylonitrile) commercially available under the trademark "Dynel," acrylic fiber (formed from a polymer of acrylonitrile) commercially available under the trademark "Orlon," or polyvinylidene chloride-polyvinyl chloride copolymer fiber commercially available under the trademark "Saran." Natural fibers such as hogs hair, or non-organic fibers such as glass fiber, commercially available under the trademark "Fiberglas," may also be used. Any of these fibers may be used alone or mixed with each other.

The fibers are preferably of various lengths, from about one-half inch to two inches, and are intermingled in random arrangement so that they lay at various angles, both horizontally and vertically, with the individual fibers contacting each other at their separate points of contact throughout the layer, as indicated at 5, FIG. 5. Relatively few pairs of individual fibers contact each other at more than one point, and each fiber contacts a plurality of other fibers at spaced points which may be in the same or in different planes.

The fibrous layer is sprayed or otherwise coated lightly with an elastic adhesive on both surfaces. The amount of adhesive used is at least sufficient to coat the outer fibers of the layer so that they adhere to each other and to the transversely extending fibers which exist throughout the mass, at their points of contact, as indicated at 5, but the amount used is insufficient to fill the voids between the fibers. It is important that the spaces between the fibers be substantially free of adhesive to maintain the softness and resiliency of the fibrous layer. A small amount of adhesive passes through the interstices between the outer fibers and wets at least some of the fibers in the interior of the fibrous layer and causes them to adhere to each other and to the transversely extending fibers at their points of contact. The fibers in the interior of the layer are in the main unimpregnated, and hence retain their natural springiness and impart the desired resiliency and loft to the packaging material.

The spaced joining of the three-dimensional, random arrangement of the fibers prevents matting and reorientation of the fibers due to externally applied forces. Also, the elastic adhesive applied thereto substantially increases the resiliency of the packaging material.

The fibrous layer may be made of any desired thickness, say, from about one-fourth to one-half of an inch up to about one and one-half inches and even more, depending upon the articles to be packaged. When the fibrous layer is about three-fourths of an inch or less in thickness, the fibers throughout the entire layer may be penetrated and coated with adhesive by a spraying operation applied to the outer surfaces thereof. It is not essential that the adhesive reach fibers in the interior of the

layer, because the adhesive serves to tie the whole layer together by joining fibers extending transversely with the longitudinally extending fibers at both end portions of the transversely extending fibers.

Any elastic adhesive material may be used. Resinous adhesives, such as a solution of polyvinyl acetate or polyvinyl chloride or copolymers thereof in organic solvents, are preferred. These adhesives are non-corrosive, and metal articles may be kept in contact with the packaging material indefinitely without being deleteriously affected thereby. Rubber adhesives may also be used. In the case of either natural or a synthetic rubber adhesive, for example, it is applied in the form of an aqueous suspension or latex, with or without vulcanizing agents, and the adhesive coating is then dried to precipitate the rubber. Any conventional, commercially available, ammonium-stabilized, natural rubber latex may be used in accordance with my invention, alone or in combination with a synthetic rubber latex. A suitable synthetic rubber latex which may be used as the adhesive is the rubbery copolymer of butadiene and acrylonitrile sold under the trademark "Carbopol." If desired, there may be incorporated into the natural rubber latex or the mixed natural and synthetic rubber latex small amounts, about 0.25 to 3.0%, of a resin which serves to add quick tack and strength to the adhesive.

The adhesive applied to the fibers is dried to a non-tacky state, either naturally or artificially, without compacting the layer of fibers. This prevents the adhesive coating on any fiber from adhering to any other fiber except at the points where the fibers are in contact with each other in the uncompressed, three-dimensional, random arrangement in which the fibrous layer is initially formed. When the fibers are compressed after the adhesive is dried, as, for example, when the packaging material is folded over an article and placed within a carton, the fibers which are brought into contact by the compression will not adhere to each other. The resiliency of the fibers will cause them to spring back to their original positions when the compressing force is released, as, for example, when the article is removed from the package. The packaging material may then be used to package another article, even of different shape.

As previously stated, it is important that the random, three-dimensionally arranged fibers be adhered to each other only at the points of contact to which the adhesive is originally applied. The adherence of the fibers to each other at their points of contact keeps the fibers in place and thereby maintains the loft and resiliency of the packaging material. In FIG. 5 a plurality of random, three-dimensionally arranged fibers 3 are shown with adhesive adhering them together at their points of contact. The adhesive is dried in this position of the fibers. In FIG. 5 fibers are shown in their normal uncompressed relationship, and in FIG. 3 the package is shown with the fibers temporarily compressed. As soon as the compressing force is released, the compressed fibers will spring back to the positions shown in FIG. 5 because of the resiliency of the individual fibers and the elastic nature of the adhesive.

The adhesive is applied to one surface of the layer of fibers, preferably as a spray, and the adhesive is then dried to a non-tacky state. Thereafter the fibrous layer is turned over, and the uncoated side is sprayed with adhesive. The sheet 4 of backing material is brought into contact with the newly sprayed surface of the fibrous layer and pressed thereagainst to adhere it to said surface. The freshly applied adhesive is then dried to form a permanent bond between the backing sheet and the fibers.

The packaging material formed as described above is uncompressed, yet is self-sustaining and has considerable strength in its lateral, longitudinal and transverse dimensions. It is an excellent air retainer and the insulating value thereof is very high. Because of the random, three-dimensional arrangement of the fibers, there are innumerable intercommunicating voids in the fibrous layer,

and the packaging material can be compressed without loss of loft or balling of fibers.

The resiliency and loft-retaining qualities of the packaging material are due primarily to the random, three-dimensional arrangement of the fibers, and to the thin, elastic adhesive coating which fastens the fibers together only at their spaced points of contact. The use of crimped or curled fibers increases the resiliency of the packaging material over that attained with straight fibers. A cross section of a layer formed from crimped or curled fibers appears as a series of bridges in all directions and planes, thus giving greater loft than the same amount of straight fibers.

The packaging material is preferably formed in a continuous length and is cut into individual pieces of any desired dimensions, in accordance with the size of the carton 6 into which the packaging material, and the article 7 protected thereby, are to be inserted. Although the unit comprising the packaging material and the article protected thereby may be wrapped in any wrapping material, it is preferred to place it in a carton to provide a package of neat, uniform appearance.

The packaging material will conform to the interior space of the carton without bulging the container walls. The article may be adequately protected by placing it on a sheet of the packaging material, folding the sheet of packaging material along a single line, preferably parallel to the flutes of the corrugated paperboard, and stuffing the unit in a carton. However, it has been found, particularly with end opening cartons, that additional advantages are obtained by folding the sheet of packaging material along a transverse line spaced from the center of the sheet. The off-center fold forms an extra flap 8 having a length approximately equal to the height of the carton, as shown in FIG. 3. The flap 8 is tucked in at the same time the end flap 9 of the carton is closed. The flap 8 provides better insulation value for the package as well as additional protection against shock. Additionally, the flap 8 provides an easy means of removal of the unit from the carton. The resiliency of the fibers causes the flap to project outwardly of the open end of the carton when the end flap 9 of the carton is opened.

The different sizes of cartons to be used may be kept to a minimum because articles of different sizes may be packaged in cartons of uniform size within reasonable limits.

It is possible to use a single sheet of packaging material designed for packaging an article of a certain size to package a plurality of articles of smaller sizes. A single sheet of packaging material will protect a plurality of articles packaged therein just as effectively as it protects a single article, provided the articles are spaced apart far enough to provide a wall of uncompressed fibers between adjacent articles.

When used with boxes having a separate preformed bottom and cover, the packaging material may be used in separate sheets cut to the box size. One sheet may be positioned in the bottom of the box with the fibrous layer uppermost, the article or articles to be packaged laid on the fibrous layer, and a second sheet of packaging material superimposed on the article or articles, with its fibrous layer facing downward, before the cover is applied. If a rigid backing material is used for the packaging material it will provide additional structural strength for the box.

The fibrous layer forms a nest or pocket for each article, and only the fibers in the immediate proximity of the packaged article are compressed. Accordingly, a wall of substantially uncompressed fibers extends around the outer edges of the packaged article. Whenever the package is subjected to shock, the uncompressed fibers absorb the initial shock, and any secondary shock that might occur is absorbed by the partially compressed fibers which cradle the packaged article and the flutes of the corrugated paperboard. The combination of the resilient

fibrous layer and the corrugated paperboard provides a unique cushioning effect.

While I have described several preferred embodiments of my invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of the structure may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

I claim:

1. The method of making a packaging material which comprises intermingling a plurality of fibers in uncompressed three-dimensional arrangement to form a layer of fibers, applying adhesive lightly to one surface of said layer, drying said adhesive to a non-tacky state, applying adhesive lightly to the opposite surface of said layer, moving a sheet of corrugated paperboard into contact with said last mentioned surface of said layer, and then drying said last applied adhesive to a non-tacky state to bond the fibers of said last mentioned surface to each other and to said corrugated paperboard while said fibers are in said uncompressed, random arrangement.

2. The method of making a packaging material which comprises intermingling a plurality of fibers in uncompressed three-dimensional arrangement to form a layer of fibers, applying adhesive lightly to one surface of said layer moving a sheet of corrugated paperboard into contact with said surface, and then drying said adhesive to a non-tacky state while said fibers are in said uncompressed, random arrangement to bond said corrugated paperboard to said fibers.

3. A package comprising a sheet of corrugated paperboard having a layer of uncompressed, curled, resilient fibers bonded thereto, an article positioned between two oppositely disposed portions of said fibrous layer and embedded in a pocket formed jointly by said portions of the fibrous layer and conforming intimately to its shape throughout its surface area, and a container enclosing said corrugated paperboard and said article.

4. A package comprising a sheet of corrugated paperboard, a layer of fibers bonded to each other and to one surface of said sheet, an article positioned on said layer of fibers whereby the fibers in proximity to said article are partially compressed, said article being partially embedded in a pocket formed by the partial compression of the fibers in proximity to said article and conforming intimately to its shape throughout its surface area, the fibers of said layer not in proximity to said article being uncompressed and a container enclosing said corrugated paperboard and said article.

5. A package comprising an article to be protected, a sheet of corrugated paperboard having a layer of curled, resilient fibers bonded thereto, said sheet of corrugated paperboard being folded over two surfaces of said article to completely enclose said article with said fibers in intimate engagement therewith throughout its surface area, and an outer enclosure housing said article and said sheet of corrugated paperboard folded over said article.

6. A package comprising an article to be protected, a sheet of corrugated paperboard having a layer of resilient fibers bonded thereto, said paperboard being folded over two opposite surfaces of said article whereby fibers in engagement with either of said surfaces of the article are partially compressed, the fibers spaced outwardly of the perimeter of said article being substantially uncompressed to provide lateral cushioning for said article, and a con-

tainer enclosing said corrugated paperboard in its folded condition to hold said article cradled between said partially compressed fibers.

7. A package comprising a folded sheet of corrugated paperboard having a layer of resilient fibers bonded to its inner side, an article positioned between the folded portions of said corrugated paperboard, said article being cradled between said resilient fibers and completely enclosed thereby, and means holding said corrugated sheet in its folded condition.

8. A package comprising an article to be protected, a sheet of corrugated paperboard, a layer of resilient fibers bonded thereto in random three-dimensional arrangement, said sheet of corrugated paperboard being folded over two surfaces of said article to completely enclose said article with said fibers in intimate engagement therewith throughout its surface area, and an outer enclosure housing said article and said sheet of corrugated paperboard folded over said article.

9. A package comprising an article to be protected, a sheet of corrugated paperboard having a fibrous layer bonded to one surface thereof, said sheet of corrugated paperboard being folded over two surfaces of said article to completely enclose said article with said fibrous layer in intimate engagement therewith throughout its surface area, one end of said folded sheet projecting beyond the other end thereof, a carton enclosing said article and said sheet of corrugated paperboard folded over said article, said projecting portion of said sheet being bent within said carton toward the other end of said sheet.

10. A package comprising an article to be protected, a sheet of corrugated paperboard having a fibrous layer bonded to one surface thereof, said sheet of corrugated paperboard being folded over two surfaces of said article to completely enclose said article with said fibrous layer in intimate engagement therewith throughout its surface area, one end of said folded sheet projecting beyond the other end thereof, said projecting end of said sheet being folded to extend toward the other end thereof, a carton enclosing said article and said sheet of corrugated paperboard folded over said article, and a closure flap integral with said carton, said flap holding the projecting end of said sheet in its folded position.

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