

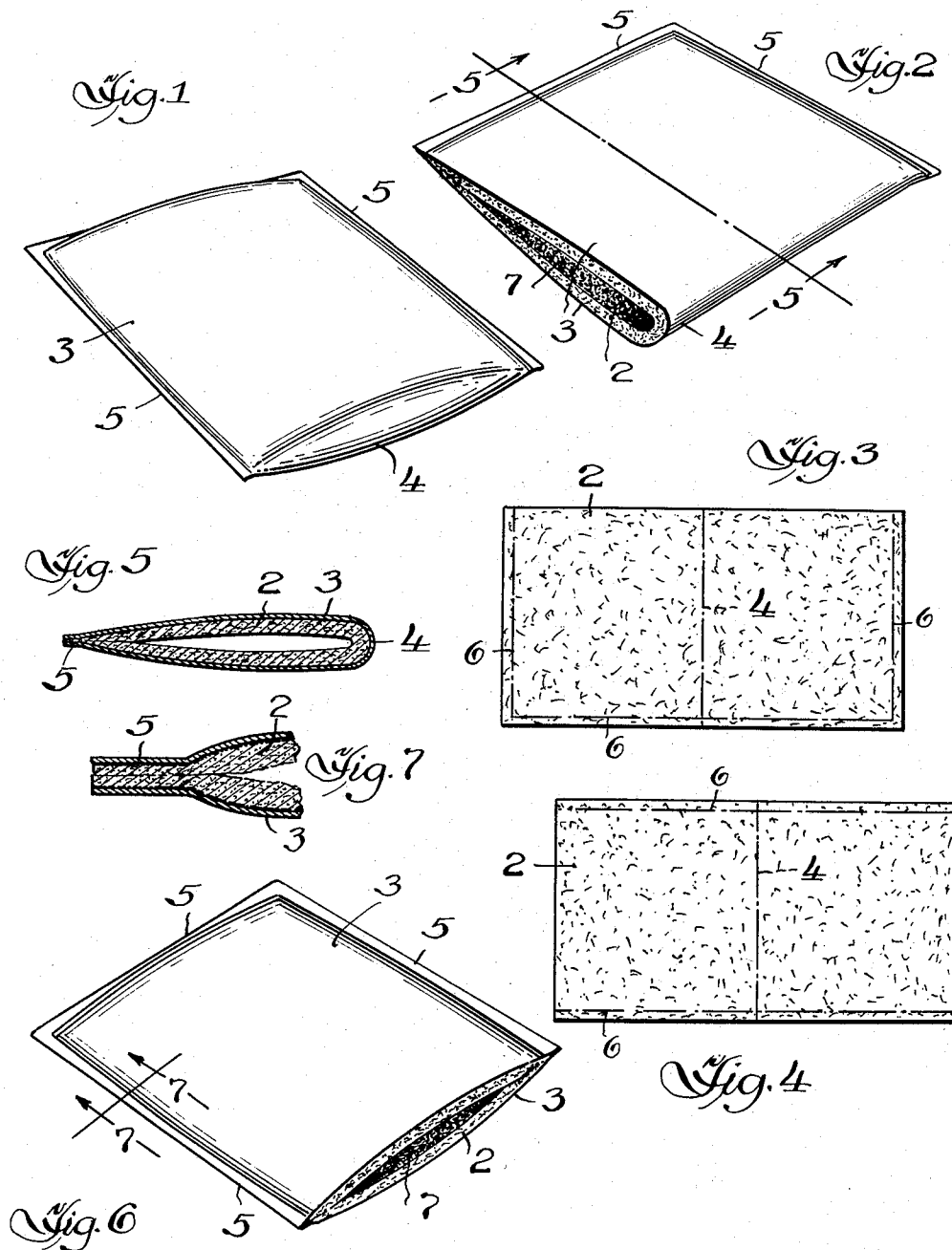
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## MEANS AND METHOD OF PACKAGING ARTICLES

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## MEANS AND METHOD OF PACKAGING ARTICLES

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This invention relates to a means and method of packaging articles, and is particularly concerned with a fibrous packaging material that may be readily sealed to protect the contents against breakage or deterioration.

The fibrous packaging material is soft enough so that it will not scratch or mar highly polished finishes and is sufficiently resilient to protect fragile articles from shock. The packaging material also affords effective protection against excessive heat, cold, moisture and dust.

The packaging material of the present invention comprises a soft, resilient web of thermoplastic fibrous material bonded to a suitable backing material, such as, for example, kraft paper or corrugated paper, and heat sealed along two or three edges to form a receptacle in the form of an envelope or pouch having one end open for the reception of the articles or articles to be packaged therein. The open edge of the receptacle may be closed in any suitable manner after the article or articles are inserted therein, as, for example, by stapling, or by heat sealing.

The fibrous web comprises a mass of nonabsorbent, nonmatting fibers of various lengths from about one-half inch to two inches. I prefer acrylic fibers (a copolymer of vinyl chloride and acrylonitrile) commercially available under the trademark "Dynel." Other thermoplastic fibers such as nylon, rayon, cellulose acetate, acrylic fiber (formed from a polymer of acrylonitrile) commercially available under the trademark "Orlon," fibers formed from copolymers of polyvinylidene chloride and polyvinyl chloride commercially available under the trademark "Saran," and the like, may be used. The fibrous web is not limited to thermoplastic fibers and may be made partially or entirely of fibers that are not thermoplastic.

The individual fibers are preferably arranged in a three-dimensional random arrangement and then wetted with a thermoplastic adhesive and brought into contact with the paper backing material to bond the individual fibers to each other and to the backing material. The fibrous web is not crushed or compacted by the bonding operation and retains its softness and resilience.

The adhesive preferred is polyvinyl acetate, although other thermoplastic adhesives such as polyvinyl chloride or copolymers of polyvinyl acetate and polyvinyl chloride produce very satisfactory results. Polyvinyl acetate has an unusually effective adhesive affinity for paper when the adhesive is heated to softening by high frequency dielectric heating, and the fibers cannot be separated from the paper backing by ordinary handling. The adhesive is preferably applied in the form of an aqueous emulsion or suspension, but may be applied as a solution in any desired solvent.

In accordance with the invention, the fibrous web and backing are folded along one edge so that heat sealing is required on only two edges to provide a receptacle or pouch having one open end. It will be obvious that if the fibrous web and backing sheet are not

large enough to be folded into a pouch of the desired size, one piece of the material may be superimposed on another and heat sealed along three edges. The articles to be packaged are inserted into the pouch and the open end is then closed, by heat sealing or by other suitable means such as stapling. If the open end of the pouch is to be stapled it may be desirable to provide a flap at the open end to provide a more effective closure.

The structure by means of which the above and other advantages of the invention 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 sealed package embodying the invention;

Fig. 2 is a perspective view of a pouch having one end open for receiving an article to be packaged;

Fig. 3 is a plan view of the blank for forming the pouch of Fig. 2;

Fig. 4 is a view similar to Fig. 3, showing a blank adapted to be formed into a pouch having an open top;

Fig. 5 is a cross sectional view, taken along the line 5—5 of Fig. 2;

Fig. 6 is a perspective view of a pouch heat sealed on three edges; and

Fig. 7 is a cross sectional view, taken along the line 7—7 of Fig. 6.

Referring to the drawing, the reference numeral 2 indicates a fibrous web bonded to a paper backing 3. Any suitable fibers may be used in the fibrous web, but it is preferred to use "Dynel" or other thermoplastic fibers, such as "Orlon," "Saran," nylon, and cellulose acetate fibers.

The fibers, ranging in length from one-half to two inches, are preferably arranged in a three-dimensional random arrangement in which individual fibers contact each other only at spaced points of contact, with a plurality of voids extending throughout the web. Generally no two fibers engage each other at more than one point, although each fiber engages several other fibers. The web is wetted lightly with thermoplastic adhesive which causes the fibers to adhere to each other at the spaced points of contact to form a soft, resilient web having a high loft. Straight fibers may be used with satisfactory results, but crimped or curled fibers are preferred because they provide greater loft and resilience. The fibrous web is brought into contact with the paper backing before the adhesive is set, and the fibers are bonded to each other at their spaced points of contact, and to the paper backing, without compacting the fibers, to form a continuous length of soft, resilient packaging material.

While any suitable thermoplastic adhesive may be used, polyvinyl acetate is preferred because of its superior adhesive affinity for paper when it is softened by heat and then set under pressure. Other thermoplastic adhesives, such as, for example, polyvinyl chloride, and copolymers of polyvinyl acetate and polyvinyl chloride also produce very good results.

After the fibrous web has been bonded to the backing sheet, the packaging material is cut into blanks of the desired size. Preferably the blanks have an area approximately twice as large as the surface area of the pouch and are folded along one edge, as indicated at 4, to form a doubled sheet of the desired size with the fibrous web on the inside. If desired, the composite sheet may be cut to the exact size of the pouch and two of the cut blanks superimposed with the fibrous web on the inside, as indicated in Fig. 6.

After the packaging material is folded, or two separate blanks are superimposed, with fibrous webs in contact,

selected edge portions are heated to softening by any conventional means, preferably by electronic means using high frequency waves to provide dielectric heating, and pressure is applied to seal the fibers and the paper backing along the heated edge portions, indicated at 5. The edges to be subsequently heat sealed to form the pouch are indicated in the blanks shown in Figs. 3 and 4 by the dot and dash line 6. One edge is left open, as indicated at 7, for insertion of the articles to be packaged.

The pouches are delivered to the user in open-ended condition, and the user inserts the articles to be packaged and then closes the open end, preferably by heat sealing. If staples are to be used for the final closure it may be desirable to provide a flap that can be folded over the open end to form a better closure. In such event, the packaging material is folded off-center, or separate blanks of different sizes are used to provide the flap.

The completed package, with an article completely enclosed within packaging material sealed on all edges, provides a maximum protection against shock, moisture, or excessive temperature. The heat sealing process fuses the paper and fibers into a unitary mass and the package cannot be opened without destruction of the pouch. Although the pouch is shown as having a rectangular shape, it is obvious that it may be made of any desired shape, particularly when separate sheets of the packaging material are used. If the article to be packaged has considerable depth, a plurality of separate sheets may be fitted around the article, and the edges of each sheet may be heat sealed to the adjoining edge of an adjacent sheet.

Although I have described a preferred embodiment 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. In a package, a sheet of packaging material comprising a web of nonabsorbent fibers bonded to a paper backing with a thermoplastic adhesive, said sheet being folded to move the edge portions of said sheet along its entire perimeter into superimposed relationship with the paper backing on the outside, and the nonabsorbent fibers and the paper backing comprising superimposed edge portions of said folded sheet being heat sealed into a unitary mass.

2. In a package, a sheet of packaging material comprising a fibrous web containing thermoplastic fibers bonded to each other and to a paper backing by a thermoplastic adhesive, said sheet being folded to move the edge portions of said sheet along its entire perimeter into superimposed relationship with the fibers on the inside, and portions of said fibrous web and said paper backing comprising superimposed edge portions of said folded sheet being heat sealed into a unitary mass.

3. In a package, a sheet of packaging material comprising a fibrous web containing acrylic fibers bonded to each other and to a paper backing by a thermoplastic adhesive, said sheet being folded to move the edge portions of said sheet along its entire perimeter into superimposed relationship with the fibers on the inside, and portions of said fibrous web and said paper backing comprising superimposed edge portions of said folded sheet being heat sealed into a unitary mass.

4. In a package, a sheet of packaging material comprising a web of acrylic fibers bonded to each other and to a paper backing by polyvinyl acetate, said sheet being folded to move the edge portions of said sheet along

its entire perimeter into superimposed relationship with the fibers on the inside, and portions of said web and said paper backing comprising superimposed edge portions of said folded sheet being heat sealed into a unitary mass.

5. In a package, packaging material comprising acrylic fibers bonded to each other and to a paper backing by polyvinyl acetate, edge portions of said packaging material being arranged in superimposed relationship with fibrous portions thereof facing each other along the entire perimeter of said packaging material, said superimposed edge portions being heat sealed into a unitary mass.

6. A package comprising an article to be protected, a plurality of sheets of packaging material completely enclosing said article, said packaging material comprising a fibrous web bonded to a paper backing sheet by a thermoplastic adhesive, the adjoining edge portions of said sheet of packaging material being superimposed with the fibrous portions thereof in facing relationship along the entire perimeter of said package, said adjoining edge portions of said fibrous web and said paper backing sheet being heat sealed into a unitary mass.

7. A method of forming a package comprising lightly wetting a plurality of fibers arranged in three-dimensional random arrangement with a thermoplastic adhesive to adhere said fibers to each other only at spaced points of intersection therebetween, adhering a paper backing sheet to said fibers with said thermoplastic adhesive to make a sheet of packaging material, arranging the edge portions of said packaging material in superimposed relationship along the entire perimeter of said package with the paper backing sheet on the outside, and heat sealing portions of said fibers and said paper backing sheet comprising superimposed edge portions of said packaging material into a unitary mass.

8. A method of forming a package comprising lightly wetting a layer of acrylic fibers with polyvinyl acetate, bringing a paper sheet into engagement with one surface of said layer of acrylic fibers, setting the polyvinyl acetate to bond said fibers to each other and to said paper sheet to make a sheet of packaging material, arranging the edge portions of said packaging material in superimposed relationship along the entire perimeter of said package with the paper backing sheet on the outside, and heat sealing the acrylic fibers and portions of said paper backing sheet comprising superimposed edge portions of said packaging material into a unitary mass.

9. A method of forming a package comprising bonding a fibrous web to a paper backing sheet with thermoplastic adhesive to make a sheet of packaging material, folding the sheet of packaging material to position all three open edges of said folded sheet in superimposed relationship with the paper backing sheet on the outside, and heat sealing portions of said fibrous web and said paper backing sheet comprising superimposed portions of said packaging material into a unitary mass along two of the open edges, inserting an article through the remaining open edge, and then heat sealing said last mentioned edge to enclose said article in the packaging material.

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