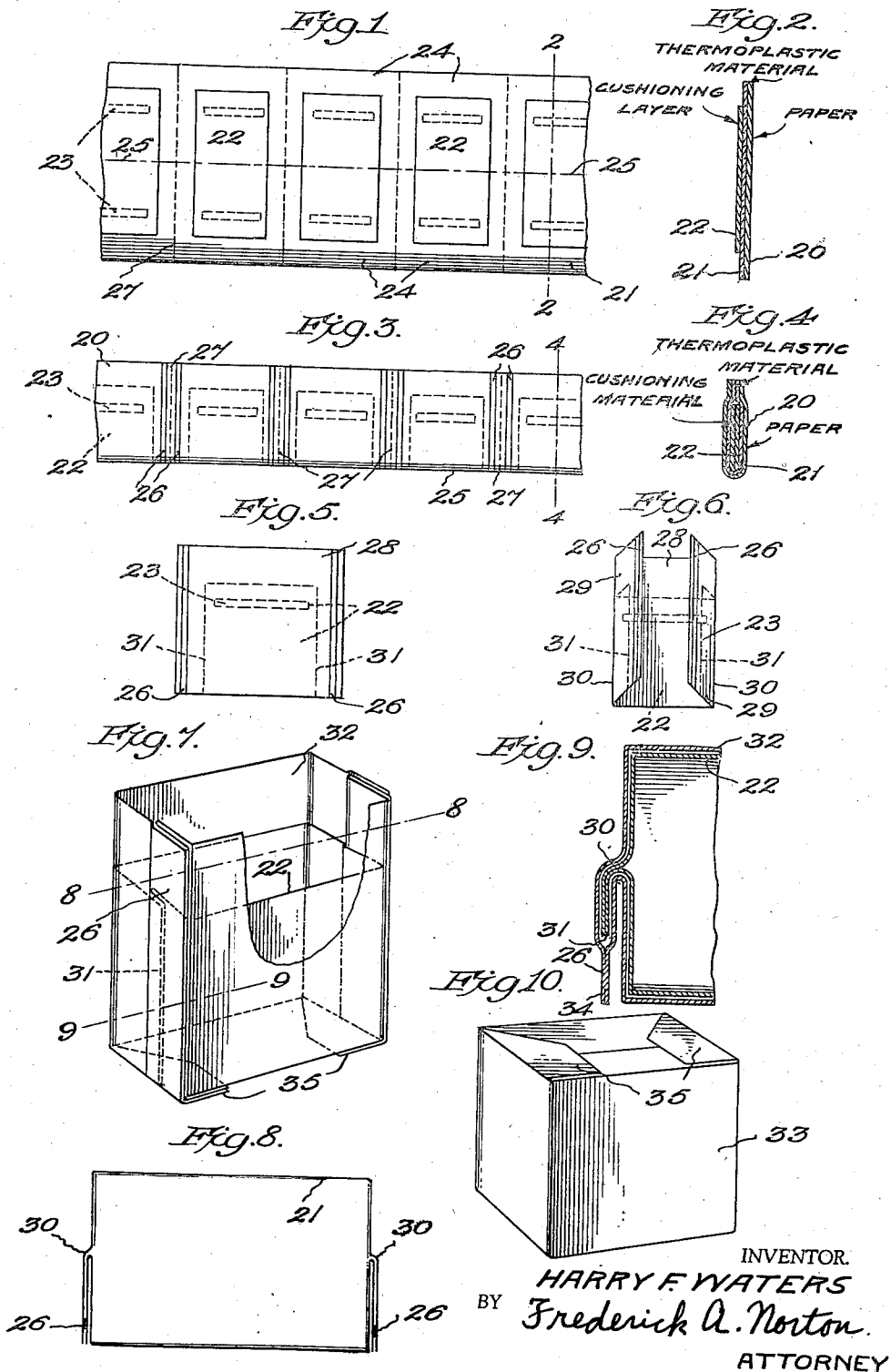


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FLUID-TIGHT PACKAGE

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FLUID-TIGHT PACKAGE

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4 Claims. (Cl. 229—55)

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The present invention relates to fluid-tight packages formed of composite sheet materials, and more particularly to such packages having inner cushioning surfaces.

This application is a division of my application Ser. No. 331,907, filed April 27, 1940, for Puncture-proof composite sheets and method of making the same.

Heretofore, various composite sheets were proposed for the purpose of fluid-tight packages. Generally speaking, these prior sheets included a base of non-fusible character and a thermo-plastic and fusible coating or layer on said base which determined the fluid-tight character of the finished product and made it possible to unite and to seal a sheet of this type with sheets of similar type by the application of heat and pressure. While these prior sheets were satisfactory in operation for fluid-tightly packaging liquids and certain other commodities which had to be sealed and preserved against the effect of atmospheric influences, difficulties were experienced particularly in packaging granular materials such as, for example, coffee. As those skilled in the art know, it is desirable to pack fresh roasted and ground coffee in a vacuum atmosphere or in an atmosphere devoid of air and substantially constituted of carbon-dioxide. When coffee was packed in a flexible-walled, fluid-tight container and the air was removed from such container, the external pressure had the effect of strongly pressing the container walls against the sharp granules of the contents. Especially when the packed coffee was of the steel-cut variety, extremely sharp edges were present on the individual granules and these edges tended to cut through the paper when this was pressed against the granules by the external atmospheric pressure. As a result, frequently leakage points or areas developed and made the value of this type of vacuum-packing problematical. Although it was already suggested to provide liner materials of accentuated thickness and strength which were capable of resisting cutting effects of sharp granules, such liner materials were relatively expensive and increased the cost of the packaging method. Likewise, as far as I am aware, none of the various other suggestions and proposals made in the past was completely satisfactory and successful on a practical and commercial scale.

It is a feature of novelty of the present invention to provide fluid-tight packages having a cushioning layer generally not fusible or fluid-tight in character constructed and arranged to reinforce the liner in the region where it is exposed to the mechanical effects of the contents,

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but leaving intact the regions where a heat-seal fusible material is to be provided.

Other and further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawing, in which:

Fig. 1 illustrates a plan view of a composite sheet in the form of a strip or web for forming fluid-tight packages and having a flexible cushioning layer or member attached to pre-determined regions thereof;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 depicts the strip or web shown in Fig. 1 after it has been folded about its longitudinal medial line;

Fig. 4 is a section taken on line 4—4 of Fig. 3;

Fig. 5 illustrates a plan view of a portion of the strip shown in Fig. 3 after it has been separated into unit lengths and has been heat-sealed at two edges thereof to form an envelope;

Fig. 6 shows a perspective view of an envelope formed from the structure of Fig. 5 with its lateral marginal portions bent up;

Fig. 7 is a perspective view of the envelope shown in Figs. 5 and 6 in its squared-up position and having its bottom formed and sealed;

Fig. 8 is a section taken on line 8—8 of Fig. 7;

Fig. 9 is a section taken on line 9—9 of Fig. 7, the thickness of the materials being greatly exaggerated for reasons of clarity; and

Fig. 10 is a perspective view of a finished fluid-tight package formed from the envelope shown in Figs. 1 to 9.

Figs. 1 to 8 illustrate an embodiment of my invention in which the fluid-tight and puncture-proof character of a package is obtained by the provision of a cushioning layer provided on top of the composite sheet. This cushioning layer or member does not have to be of a fluid-tight or fusible character, its only object being to provide mechanical reinforcement of the sheet and of the finished package against puncturing influences. The structure and the operation of this modified sheet will be best understood in connection with the description of the procedure of forming a fluid-tight package therefrom.

The general structure and arrangement of this sheet will be readily understood from Figs. 1 and 2, showing a composite sheet in the form of a strip or web for the continuous production of fluid-tight packages. This sheet or strip comprises a base 20 constituted of paper or of some similar flexible and sheet-like material. This base is provided with a thermo-plastic and fusible covering layer 21, generally covering the complete

surface of the base. This suitable covering layer may be provided by means of a coating method or by means of a calendering method of the type disclosed in my co-pending application, Serial No. 329,254, filed on April 12, 1940, now Patent No. 2,228,647, of January 14, 1941. On top of covering layer 21 I provide individual rectangular elements 22 of a suitable cushioning material secured to the fusible covering layer 21 by lines 23 of a suitable adhesive preferably of the type which remains flexible after drying, such as latex. Cushioning members 22 have only the object of reinforcing the inner surface of this composite sheet or liner against mechanical influences and they do not have to contribute to the fluid-tightness of the finished package which is provided by liner 21. Likewise, it is not necessary to have cushioning layers 22 of a thermo-plastic or fusible character but it is sufficient to provide such restricted dimensions thereof that they will leave at least the major portion of the heat-sealing regions of the finished sheet or strip uncovered so that such uncovered fusible regions may be united by the application of heat and pressure. In the instant case the dimensions of cushioning members 22 are such as to permit heat-sealing of the strip in the regions around the same, denoted by reference character 24, which subsequently will form the seams of the finished package, as it will appear hereinafter. Although various flexible materials may be used for the cushioning members 22, I prefer to employ a thin but very strong and tough paper having a very dense and puncture-resisting structure such as glassine paper.

In forming a package from the finished strip, the first step is to fold the strip along its longitudinal center line 25. This, same as all of the other subsequent operations, may be accomplished manually, but, in actual practice generally, automatic machinery will be employed, such as a forming plate in connection with conventional auxiliary devices. Figs. 3 and 4 show the strip after it has been folded along center line 25. The strip may be heat-sealed along spaced transverse lines forming transverse seams 26 which divide the space between the folded-over portions of the strip into container spaces. Hereafter, the strip may be cut along lines 27 whereby individual fluid-tight envelopes are obtained. The appearance of one of these envelopes is shown in Fig. 5. It will be readily observed in this figure that the finished envelope is completely flat, is sealed by seams 26 at two edges thereof and has its top edge 28 open for the introduction of materials to be packed therein. Attention is directed to the circumstance that cushioning member 22 will form an inner layer or envelope within the outer envelope and due to the presence of glue lines 23 this cushioning member or envelope will open and close together with the outer envelope. Of course, instead of the provision of these glue lines bonding only certain portions of the cushioning member to the envelope, the complete surface of the cushioning member may be bonded to the envelope by means of a similar adhesive. It will be noted that the side edges and the top edges of cushioning member 22 do not extend into the seams 26 so that in this region only the corresponding portions of thermo-plastic layer 21 are placed into a face to face contact. Of course, there is no objection to having the side edges of the cushioning member extending into a portion of the heat-seam in order to have them firmly bonded with and locked in the seam. After the envelope with

the innermost cushioning and protective layer has been completed, its lateral marginal portions 29 may be folded back, this having the object of placing seams 26 beyond fold lines 30 and thereby to provide additional protection for the seam. In addition, it will be observed that due to the dimensions of cushioning member 22, its side edges 31 will likewise be beyond fold lines 30 so that these edges are also protected and are placed into a region which is not accessible to contact with the contents packed within the inner space of the finished envelope, or container. The envelope may now be squared-up (Fig. 7) and its bottom portion may be folded in. This squaring-up operation may be accomplished by means of a suitable device such as a mandrel, may be accomplished manually or may be carried out by previously attaching the finished envelope to an outer carton formed separately or simultaneously with the formation of the envelope as this is disclosed, for example, in my co-pending application, Serial No. 329,254, filed on April 12, 1940, now Patent No. 2,228,647. It will be readily seen in Fig. 7 that cushioning member 22 will provide a complete inner bag or container within the finished squared-up envelope so that after the finished container is filled with contents, such as coffee, the granules of the contents will be at no place in direct contact with the thermo-plastic layer or film 21. Thus, a very strong protection will be obtained against puncturing influences and generally speaking, the danger of puncturing by sharp grains of the packed material will be eliminated.

The exact structure of the interlocking portions of the outer envelope and of the inner cushioning layer or bag will be best understood from Fig. 9 which is a section taken on line 9-9 of Fig. 7, the dimensions of the thermo-plastic-coated or covered paper sheet 32 and of the cushioning layer or sheet being greatly exaggerated for reasons of clarity. Likewise, to increase the clarity of illustration, the paper base and the thermo-plastic layer on the inner face thereof have been illustrated as a single layer 32, rather than two layers 20 and 21, as in Figs. 1 to 4. Fig. 9 clearly shows that the lateral ends of outer envelope 32 are fluid-tightly sealed by means of a seam 26 and that fin 34 thus formed is turned down flat along the end walls of the squared-up envelope, or container. The side edges 31 of cushioning member or bag 22 are placed face to face against each other and are carried beyond medial fold line 30 and extend into the base portion of fin 34. They are retained in this position by friction which in itself assures sufficient stability of the structure. As a modification, it is also possible to further extend the side edges 31 of the cushioning member to partially protrude into seam 26 whereby a more rigid interlocking of envelope and cushioning member is obtained. This interlocking effect may be further accentuated by coating or printing at least the lateral terminal regions of cushioning member 22 with a thin layer of a thermo-plastic material which is fused during the provision of seam 26 and provides a strong and permanent bond between envelope and cushioning member.

After filling the internally lined or cushioned container, the air is preferably withdrawn therefrom and the mouth portions of the container are hermetically sealed by means of a completely flat top seal provided by the application of heat and pressure. The upper marginal portions of the container may be folded down in the form

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of tabs 35 similar to the corresponding tabs of the bottom portions of the container. Preferably, the dimensions of cushioning member 22 are so determined as to have it extend sufficiently upwards toward the mouth opening of the container to prevent direct contact between the granules of the packed material and the inner walls 32 of the package. In fact, in some cases it is advantageous to extend the upper edges of the cushioning member or bag until the region where the top transverse seam is provided whereby the packed material will be completely and positively surrounded by the cushioning member.

The external appearance of the finished package 33 is illustrated in Fig. 10. While this package has been shown as of a completely rectangular structure, it will be obvious to those skilled in the art that after removal of the internal atmosphere from the package, the walls thereof will collapse around the contents, and, as a result, the shape of the package will be distorted to a smaller or greater extent.

Of course, it will be readily appreciated that a wide variety of thermo-plastic materials may be employed for forming the self-sustaining films and coatings incorporated into the composite sheets of the invention. Preferred thermo-plastic materials are, for example, certain types of rubber compounds, particularly rubber hydrochloride products sold under the name of Koroseal and Pliofilm, certain vinyl resins such as particularly a vinyl derivative sold under the name Vinylite V, which is a co-polymerized vinyl chloride and vinyl acetate. Of course, various other thermo-plastic and re-fusible materials may be used and at present a large number of such materials is available on the market, as those skilled in the art know. It is essential that the thermo-plastic and re-fusible material should be capable of providing flexible, tough, non-tacky, moisture-proof and gas-proof films of a self-sustaining character.

Likewise, the laminating agent employed in connection with the embodiments of the invention shown in Figs. 3 and 4 of my parent application, above-identified may be of various character in accordance with the thermo-plastic material to be laminated. Generally, the laminating agent should contain a thermo-plastic material similar to the one of which the thermo-plastic layer to be laminated is constituted, a suitable solvent therefor, and a plasticizing agent, for example a plasticizing agent sold under the name of "Santicizer 15," "16" or "17," and comprising respectively ethyl phthalyl ethyl glycolate; butyl phthalyl butyl glycolate; and methyl phthalyl ethyl glycolate. As a practical example, a laminating agent constituted of about 60 parts by weight of acetone, about 20% by weight of a suitable vinyl resin, and about 20% by weight of Santicizer 17 provides good results for laminating a self-sustaining thermo-plastic sheet constituted of a similar vinyl resin. This laminating agent is a viscous liquid which may be readily spread on or applied to the surfaces to be laminated.

It is essential that the self-sustaining thermo-plastic material forming the top layer of the composite sheet should originally contain a smaller amount of the same plasticizer than the laminating agent so that after the lamination, the plasticizer present in the laminating agent in a higher relative amount should migrate into the top layer where such plasticizer is present in a lower relative amount. I have found that when it was at-

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tempted to directly incorporate such accentuated amounts of plasticizer into the top film such film became tacky and difficult to use and to laminate, while when such high percentage of plasticizer was gradually obtained by the slow migration of the plasticizer from the laminating agent into the top layer, such tackiness was avoided and a desirable yielding and stretchable, very slowly aging film was obtained. The probable reason for this curious phenomenon is that the migratory plasticizer, while permeating most of the thickness of the top layer, will not be present in the uppermost surface or "skin" portion thereof which thus will act as a non-tacky protective layer. Of course, my invention is independent from the correct or incorrect nature of this theoretical consideration.

In some cases when the top layer to be laminated is constituted of a polyvinyl alcohol or of regenerated cellulose, it is possible to use an aqueous solution of glycerine and gelatine as a laminating agent, the glycerine being the migratory plasticizer proper while the gelatine acts as a type of inhibitor to prevent unduly rapid migration of the plasticizer.

The paper employed as a base may be any suitable paper according to the type of application contemplated, for example kraft paper. The flexible cushioning member or layer may be a strong and dense paper of reduced thickness, such as glassine paper. As a rule, the cushioning member or layer is not relied upon for maintaining the fluid-tight character of the package and, consequently, does not have to be of a fluid-tight material for the cushioning member or to provide a cushioning member which is fusible on at least one face thereof.

It is to be observed that the composite sheets of the invention may be employed for the production of fluid-tight packages in a manner similar to prior liner materials but at the same time are capable of eliminating the danger of leakage due to pin holes, punctures and similar mechanical defects.

Moreover, the invention contemplates a novel type of composite strip having individual cushioning members incorporated therein which may be of any extremely inexpensive character but, nevertheless, may have a very great mechanical strength without interfering with the heat-sealable character of the finished package.

Although the present invention has been described in connection with a few preferred embodiments thereof, variations and modifications may be resorted to by those skilled in the art without departing from the principles of the present invention. Thus, while the cushioning member has been illustrated as formed simultaneously with the formation of the package or envelope proper, it may be also provided in the form of a pre-fabricated bag or envelope which is subsequently inserted into the fluid-tight and heat-sealable envelope. I consider all of these variations and modifications as within the true spirit and scope of the present invention as disclosed in the foregoing description and defined by the appended claims.

I claim:

1. A composite strip for the continuous production of puncture-proof fluid-tight packages which comprises in combination a strip of flexible material fusible on at least one face thereof, and a plurality of puncture-resistant flexible cushioning members spacedly secured to the fusible face of said strip, said strip being adapted to be sep-

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arated into unit lengths for the formation of individual packages, each of said unit lengths including at least one cushioning member arranged in such position as to cover the portions which in the finished package will be in direct contact with the packed material and to leave uncovered the portions which are to be heat-sealed during forming and after the filling of said package.

2. In paper containers having inner thermoplastic surfacings formed integral with the paper and interfused to form hermetic wall and closure seams, the improvements comprising cushioning glassine liners adhered to said thermoplastic surfacings and covering the entire inner surface of the containers when in finished, sealed-off condition.

3. In paper containers having inner thermoplastic surfacings formed integral with the paper

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and interfused to form hermetic wall and closure seams, the improvements comprising cushioning glassine liners adhered to said thermoplastic surfacings adjacent the mouths only of the containers, and covering the inner surfaces thereof when the said containers are in finished, sealed-off condition.

4. A paper container comprising a wrapping which is hermetically sealed, said container being formed of a composite paper sheet having an inner thermoplastic liquid-proof surfacing and a separate cushioning glassine layer adhered to the liquid-proof surfacing, the whole being folded into a closed shell and sealed closed by the interfusion of juxtaposed sections of the inner thermoplastic surfacing.

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