Jan. 3, 1950 E. B. HOPPE 2,493,349

BAG WITH EXTENSILE SEALED LINER AND METHOD FOR MAKING SAME

Filed Nov. 30, 1946

Fig. 1.

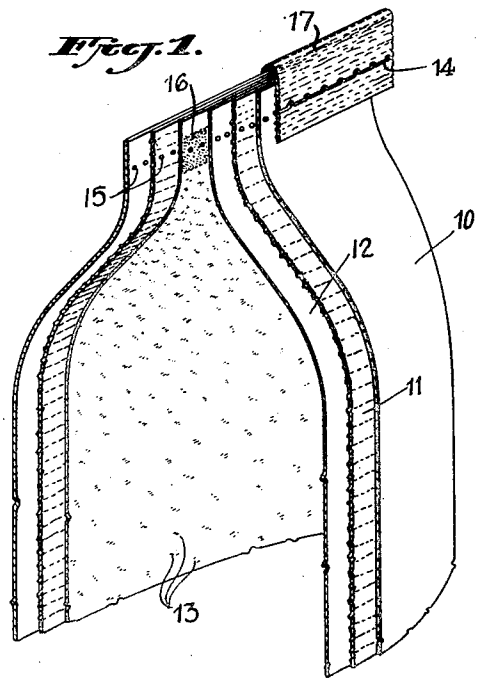


Fig. 2.

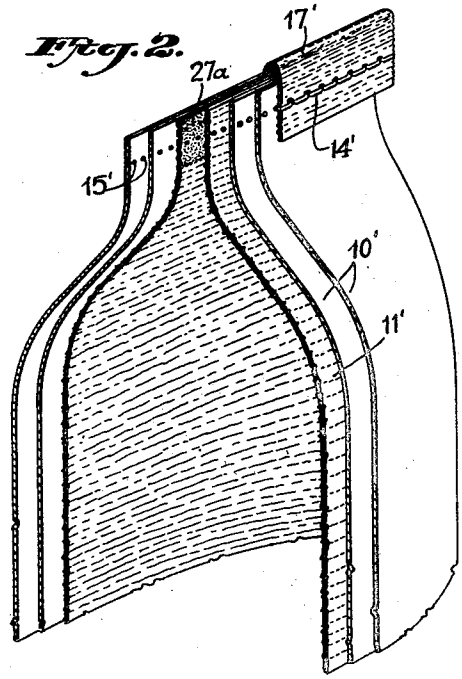


Fig. 3.

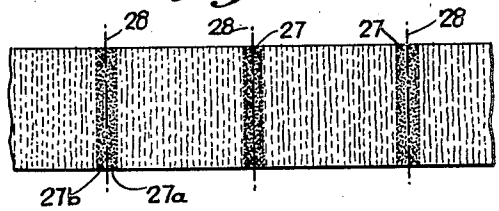
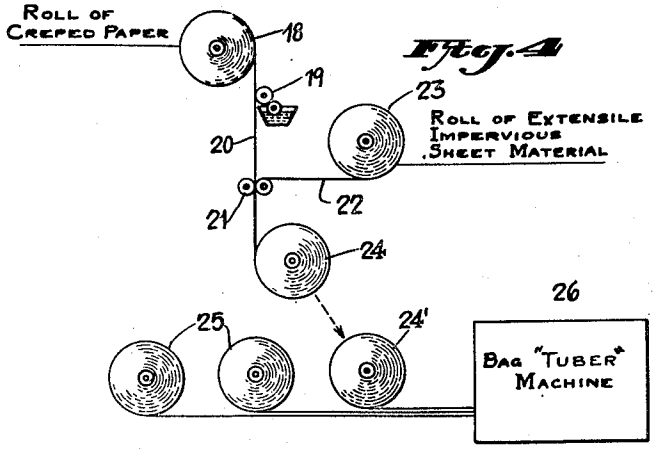


Fig. 4



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Patented Jan. 3, 1950

2,493,349

UNITED STATES PATENT OFFICE

2,493,349

BAG WITH EXTENSILE SEALED LINER AND METHOD FOR MAKING SAME

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Application November 30, 1946, Serial No. 713,274

2 Claims. (Cl. 229—55)

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This invention relates to multi-wall paper bags or shipping sacks formed of paper or the like and to methods for making same. More particularly the invention is concerned with such bags which are closed at one or both ends by a line of stitching, comprising either a sewed seam or a series of staples, and the bag being provided with a liner, the opposed wall surfaces of which are adhered and sealed together along just below the line of stitching, such sealing constituting part of an expansible lining for the bag.

It has heretofore been proposed to provide such multi-wall bags with an inner or liner ply of waterproof or impervious material, but difficulties have been encountered in providing for such bags suitable end closure seals in cases where the ends are closed by a line of stitching. Sewing or stapling a bag of paper or the like of course causes perforations which allow ingress or egress of fluids, fine dust or insects. If a lining is provided and sealed inside the seam, then when the bag is filled and consequently expanded the contents will press initially against the seal and tend to break the seal before the stress is taken up by the stitching. This is because the end portion of the bag when filled will be of a shape such that if the opposed surfaces of the inner ply are brought together and adhered just inside the line of stitching, the inner ply will in effect be somewhat shortened in a direction longitudinal of the bag. Consequently, the weight and pressure of the contents will be exerted against the inner ply, which at the closed ends of the bag will not be adequately reinforced by the outer plies against destruction of the line or band of sealing.

In accordance with the present invention a substantially fluid impervious or hermetically sealed liner may be provided in bags having one or both ends closed by a line of stitching, the liner being so arranged that the stress of the contents is taken up by the outer ply or plies without undue stress on the sealed inner ply. Preferably this is accomplished by forming the impervious liner of extensile sheet material which is surfaced, at least along a band which extends in part along just inside the line of stitching, with thermoplastic material so that the opposed liner walls along this band may be adhered and sealed together by the application of heat after the bag end is closed by the stitching. And since the liner is made extensile, at least to a limited degree sufficient to compensate for the above-mentioned shortening effect, the pressure of the contents of the bag when filled is transmitted to an outer ply or plies and to the line of stitching, thus relieving the line or band of sealing of any undue stress which might disrupt the same and nullify much of the advantage of using an impervious lining.

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Various further and more specific features and advantages of the invention will clearly appear from the detailed description given below, taken in connection with the accompanying drawings which form a part of this specification and illustrate, by way of example, preferred embodiments of the invention and the manner in which the invention may be carried out.

In the drawings:

Figure 1 is a perspective view partially broken away, showing one corner portion of a multi-wall bag embodying the invention in one of its preferred forms;

Fig. 2 is a similar view illustrating an alternative embodiment;

Fig. 3 is a view indicating the manner in which the inner ply sheet for making the bag of Fig. 2 may be prepared; and

Fig. 4 is a view schematically indicating a method according to which the bag of Fig. 1 may be made.

In Fig. 1 there is shown a corner portion of a bag which may have one or more outer plies as at 10, formed for example of kraft paper, and an intermediate ply as at 11, which may be formed of any suitable type of creped paper, the creping being such that the paper is extensile to a limited degree in a direction longitudinally of the bag. This creped paper may either be untreated or, if desired, may be treated by any of the various suitable well-known methods to render the same waterproof or impervious to fluids. As shown, the plies 10 and 11 envelop an inner or liner ply 12 which is formed of extensile and substantially fluid-impervious sheet material preferably of a thermoplastic nature such, for example as material known under the trade name of "Pliofilm," (if of a readily stretchable type) or preferably sheet material such as known under the trade names of "Stylene" or "Vistanex" (Standard Oil Company of New Jersey). Other well-known elastic heat sealable impervious materials are available.

The liner ply 12 is preferably adhered to the inside surface of the creped ply 11, at least at the high points of the creping where the liner ply comes in contact with the creped ply. In case the liner ply is of transparent material, the adhered areas will be apparent therethrough as indicated for example by the small dash line areas 13 in Fig. 1.

As will be apparent from Fig. 1, the end of the bag may be closed by bringing the opposed multiwalls together and securing same by a line of stitching as at 14 (which may be either a sewed seam as preferred, or a series of small staples). The application of such line of stitching, of course, involves making a series of perforations as at 15 through all of the plies and the stitches by themselves do not serve to tightly seal these perforations against the passage of moisture or small insets, etc. While many efforts have been made effectively to seal such perforations and in effect to seal the end of the bag, these attempts have usually involved application of tape with or without sealing material external of the line of sewing, or the application of sealing material to the end edges of the bag. Such attempts have not proven entirely satisfactory in that the sealing material or means, applied largely to the exterior of the bag, is subject to being displaced or may crack off, or there may be crevices at the corners of the bag or elsewhere, particularly in gusseted bags, which will not be properly sealed. With bags of the type shown, adapted to have an end closure in the form of a line of stitching, the load intended to be carried by the bag is generally substantial and such that a strong line of stitching is required to maintain the end closure, and a mere adhesive sealing of the inner ply in the usual case will not be effective unless and until such sealing is reinforced by the stitching. For the reasons hereinabove pointed out, if the inner ply is sealed along inside the line of stitching, this line of sealing rather than the stitching will be the first to assume the stress of the contents of the bag if the liner is of non-extensible material or is formed of paper which is no more extensile than the outer plies. In overcoming these difficulties with the present invention the opposed surfaces of the inner ply 12 at the end of the bag, preferably after the line of stitching is applied, are sealed together preferably by the application of heat to the thermoplastic material along a band such as indicated at 16. This band may preferably be of a width to extend a short distance both inside and outside the line of stitching, and in any event, is preferably made of a width so that it extends in part along just inside the line of stitching clear around the circumference of the bag, including gusseted areas if the bag is of a type having gussets along its sides. With such a band or line of sealing, and considering the fact that the liner ply is extensile as adhered to the somewhat extensile creped ply 11, it will be apparent that upon filling and expanding the bag, the liner will be free to stretch with respect to the outer ply or plies, at least sufficiently to compensate for the shortening of the liner ply due to the sealing, and whereby the stress applied to the filled liner ply will be largely transmitted to the outer ply or plies and to the line of stitching and thus relieve the adhered sealed area 16, inside the line of stitching, of any substantial stress.

As shown in Fig. 1, if desired, as will usually be the case, the end closure of the bag may include a folded over length of tape 17 formed of ordinary paper, creped paper or fabric in a position astride the multi-ply end edges and held in place by the stitching 14.

The bag, as shown in Fig. 1, if desired may be made manually by placing together or laminating the several plies previously cut to proper dimensions to form the desired bag, the superposed plies then being folded to form the bag tube, suitable

adhesive being applied to secure together the longitudinal edges, and the closing of one or both ends being accomplished in the manner above indicated. However, the construction of Fig. 1, despite its having a low strength highly flexible and extensile inner ply, lends itself particularly to being formed by the use of so-called bag "tuber" machines of various well-known types. Sheet material in the nature of a thin, very flexible and yieldable film would not ordinarily be expected to remain in proper place if it were passed through a bag tuber in the same manner as paper plies. However, with the present invention, any difficulty on this score is avoided by first adhering the impervious ply to the intermediate or creped ply 11. In this way the creped ply serves to limit the extensibility of the impervious film and hold it in proper shape and position during the automatic tube folding steps. Also, the creped ply protects the film against tearing or puncture during passage through the tuber machine.

Thus, as indicated in Fig. 4, a roll 18 of the creped paper may be provided from which the paper may be run off past a suitable device of well-known type as at 19 for applying adhesive. This device may comprise as indicated, a reservoir for the adhesive, at the surface of which a pick-up roll is rotated, this roll contacting with an applicator roll. If desired, the latter roll may be so positioned as to apply adhesive to the entire creped surface of the creped paper sheet or strip 20, or merely to the higher points of the creping. The creped sheet may then pass between a pair of closely spaced rolls 21, between which also passes a sheet 22 of the impervious material coming from a roll 23. Thus, at the rolls 21, the impervious sheet and the creped sheet are brought into contact and adhered together either throughout or at the high points of the creping as desired, to form a laminate which is rolled up as at 24, and stored for a sufficient time for the adhesive to set or harden, if the adhesive used is of such a nature as to require a time interval for proper setting. The adhesive may comprise suitable known forms of glue, or thermosetting or thermoplastic adhesives of well-known types. Also of course, if preferred, the impervious sheet, if formed of thermoplastic material, may be made of such a nature that as it is formed, it is applied in heated condition directly to the creped sheet so as to adhere thereto without additional adhesive.

As indicated at the bottom of Fig. 4, one or more rolls of paper as at 25, from which the outer ply or plies of the bags are to be made, are shown with sheets running therefrom into a tuber machine 26, along with a composite sheet from roll 24', the latter comprising the laminate such as stored at the roll 24. That is, the roll 24 may be moved to the position shown at 24'. In some cases if desired, the laminate may be so made as to be run directly into the tuber without storing, as in cases where no extensive period of time is necessary for the adhesive to set. In the tuber, the various plies are formed into a continuous multiwall tube in the usual way. Thereafter, this tube may be cut into bag lengths and the ends may be closed in the manner described and indicated in Fig. 1.

With the form of the invention shown in Fig. 2, two outer plies of paper 10' a re shown in conjunction with an inner ply 11' of creped sheet material which has been treated in any suitable well-known way to render the same moisture or waterproof, or impervious and unaffected by the particular kind of material which is to be packed

in the bag. With this form of the invention the main body portion of the creped ply need not have any thermoplastic ply adhered thereto. However, the surfaces of the opposite walls of the creped ply, where they come into contact at the end closure, may be formed of thermoplastic material as shown at 27*a*, whereby, before or after applying the line of stitching, these opposed surfaces may be heat sealed together, the sealing, as shown, extending along a band at least a part of which is just inside the line of stitching, preferably entirely around the mouth of the bag. The creping of the ply 11' is made such that this ply will have a limited degree of stretch longitudinally of the bag and sufficient to compensate when the bag is filled, for the relative shortening of this ply due to the sealing along below the line of stitching.

The bag of Fig. 2 may be made either manually or in a tuber, and in the latter event, before the creped ply enters the tube forming mechanism, bands of the thermoplastic adhesive, as indicated at 27 in Fig. 3, may be applied at spaced intervals corresponding to bag lengths. Then, after the multi-ply tube has been formed in the tuber, the tube is severed into bag lengths along lines such as indicated by the dot-dash lines 28 in Fig. 3, which run along the middle of the thermoplastic bands 27. Thus each band may be cut into two parts, as at 27*a* and 27*b*, so that one part provides sealing means for one end of one bag and the other part provides sealing means for the other end of the next bag.

With both forms of the invention as shown in Figs. 1 and 2, it may be in some cases be unnecessary for all of the ply 11 or 11' to be creped so long as a sufficient area thereof is creped to provide the necessary extensibility at areas adjacent the end closures. However, in most cases it will be found more convenient to use paper for this ply which has been entirely creped.

The form of the invention shown in Fig. 1 has substantial advantages over the form shown in Fig. 2 in that with the separate sealed inner ply 12, suitable known materials may be more readily selected for this ply which will be unaffected by the particular materials to be packed in the bag, and also this form of the invention lends itself to economical manufacture in a bag tuber in a form which may be effectively and substantially permanently hermetically sealed.

In case it is desired to use a material for the inner ply 12 which is not thermoplastic, the inner ply at the area of sealing 16, may be coated or surfaced with a suitable thermoplastic material the same or similar to that above described at 27*a* in Fig. 2. A well-known thermoplastic sealing material for this purpose is available on the market under the trade name of "Proxmelt." This material may be readily printed across the inner ply as indicated in Fig. 3, as it enters the tuber. The Proxmelt becomes non-tacky immediately after printing so that it passes through the tubers without difficulty.

With the bag of Fig. 2, if the main purpose of the sealing at the end closure is merely to prevent sifting or to prevent insect penetration, rather than moisture absorption, then the Proxmelt may be printed on natural creped kraft paper to form the liner 11'. On the other hand, if the bag is to be moisture proof, the thermoplastic may be printed for example onto creped asphalt laminated paper of suitable well-known types.

If desired with either of the forms of the invention shown in Figs. 1 and 2, the paper plies at 11, 11' may be made relatively extensile as compared with the outer ply or plies by means other than creping. For example, known methods are available for forming flat paper sheets which will have a considerably greater degree of stretchability than the usual kraft paper such as used for the outer ply or plies. With the form as shown in Fig. 1, for example, such a relatively stretchable sheet at 11 may have the impervious ply 12 adhered thereto before the sheets are run through the bag tuber and the paper sheet, having limited stretchability, will serve to hold the impervious film 12 in place, while the tubing operations are carried on.

The end closure means and method above described may, of course, be applied to the bottoms of open-mouthed bags or to both ends of bags which are closed by stitching, and the invention may be used on valved bags as well as those which are filled when the bag is open mouthed.

While several variations of the invention have been shown, it will be readily understood that other changes and variations may be made within the scope of the appended claims.

What is claimed and desired to be secured by Letters Patent is:

1. A multi-ply bag including an outer ply of paper, substantially non-stretching in normal use of the bag, an intermediate ply of creped sheet material, said plies enveloping a liner ply of substantially fluid impervious extensile thermo-plastic sheet material which is adhered on its outer surface at least to the high points of the creping of the creped ply, the plies all having a line of perforations along an end of the bag, and stitching means extending through said perforations to retain the opposed bag walls at such end in closed upstanding condition, the opposed contacting wall surface areas of the thermo-plastic ply, at least along a band just inside said line of perforations, being adhered and heat-sealed together, said latter ply having its extensibility limited by reason of its adherence to said creped ply, but being substantially and sufficiently extensile to compensate, when the bag is filled and expanded, for the relative shortening of the thermo-plastic and creped plies due to such sealing, and whereby the stress applied to the thermo-plastic ply when filled and sealed will be largely transmitted to other plies to thus relieve the adhered sealed areas of substantial stress.

2. A multi-ply bag, the outer ply or plies of which are formed of paper, substantially non-stretching in normal use of the bag, enveloping a liner ply of fluid impervious substantially stretchable thermoplastic material, and an intermediate stretchable paper ply, the plies all having a line of perforations along an end of the bag, and stitching means extending through said perforations to retain the opposed bag walls at said end in closed upstanding position, the opposed wall surface areas of said liner ply along a band just inside said line of perforations being adhered and sealed together, the inner surfaces of said intermediate ply being adhered to said liner ply only at closely spaced points throughout the area of the liner ply to retain the latter in place and limit its stretchability while it remains, at least adjacent said end, sufficiently stretchable longitudinally of the bag as compared with an outer ply or plies to compensate when the bag is filled and expanded for the relative shortening of said liner ply due to such sealing inside the stitching means, and whereby the stress applied to said liner ply when filled and sealed will be largely

transmitted to the other plies and to said stitching means to thus relieve the adhered sealed areas of breaking stress.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
565,587	Arkell	Aug. 11, 1896
686,877	Arkell	Nov. 19, 1901
807,011	Arkell	Dec. 12, 1905
1,767,770	Olsen	June 24, 1930
1,816,361	Coty et al.	July 28, 1931
1,955,310	Powell et al.	Apr. 17, 1934
2,000,989	Royal	May 14, 1935
2,020,300	Cundall	Nov. 12, 1935
2,028,145	Coty	Jan. 21, 1936
2,234,065	Vogt	Mar. 4, 1941
2,312,280	Avery	Feb. 23, 1943
2,330,015	Stokes	Sept. 21, 1943