Nov. 11, 1969 C. K. WATTERS 3,477,348

METHOD OF MAKING A DECOMPOSITION RESISTANT BAG

Original Filed July 6, 1965 3 Sheets-Sheet 1

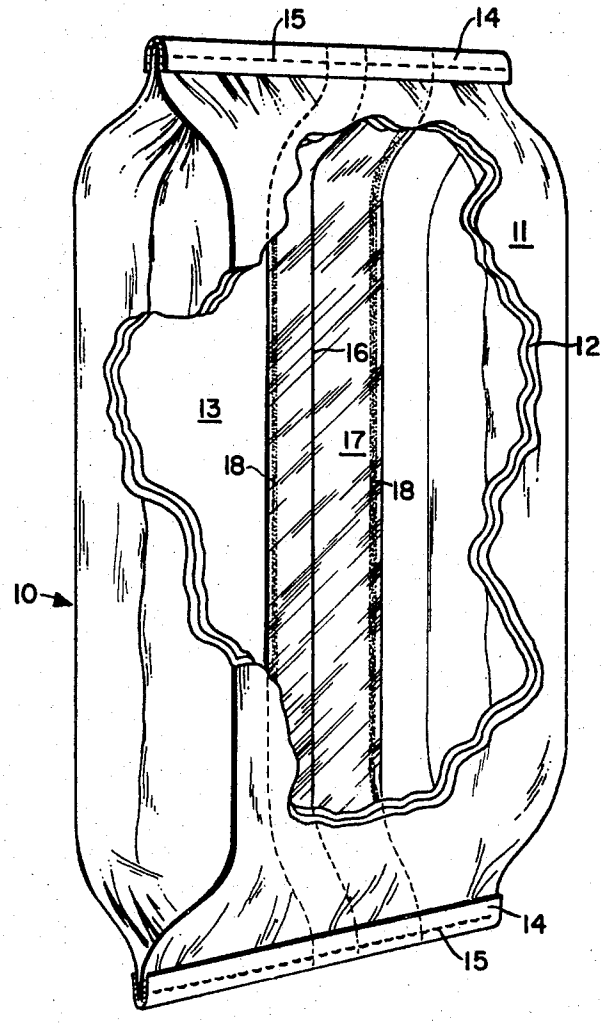


FIG. 1

METHOD OF MAKING A DECOMPOSITION RESISTANT BAG

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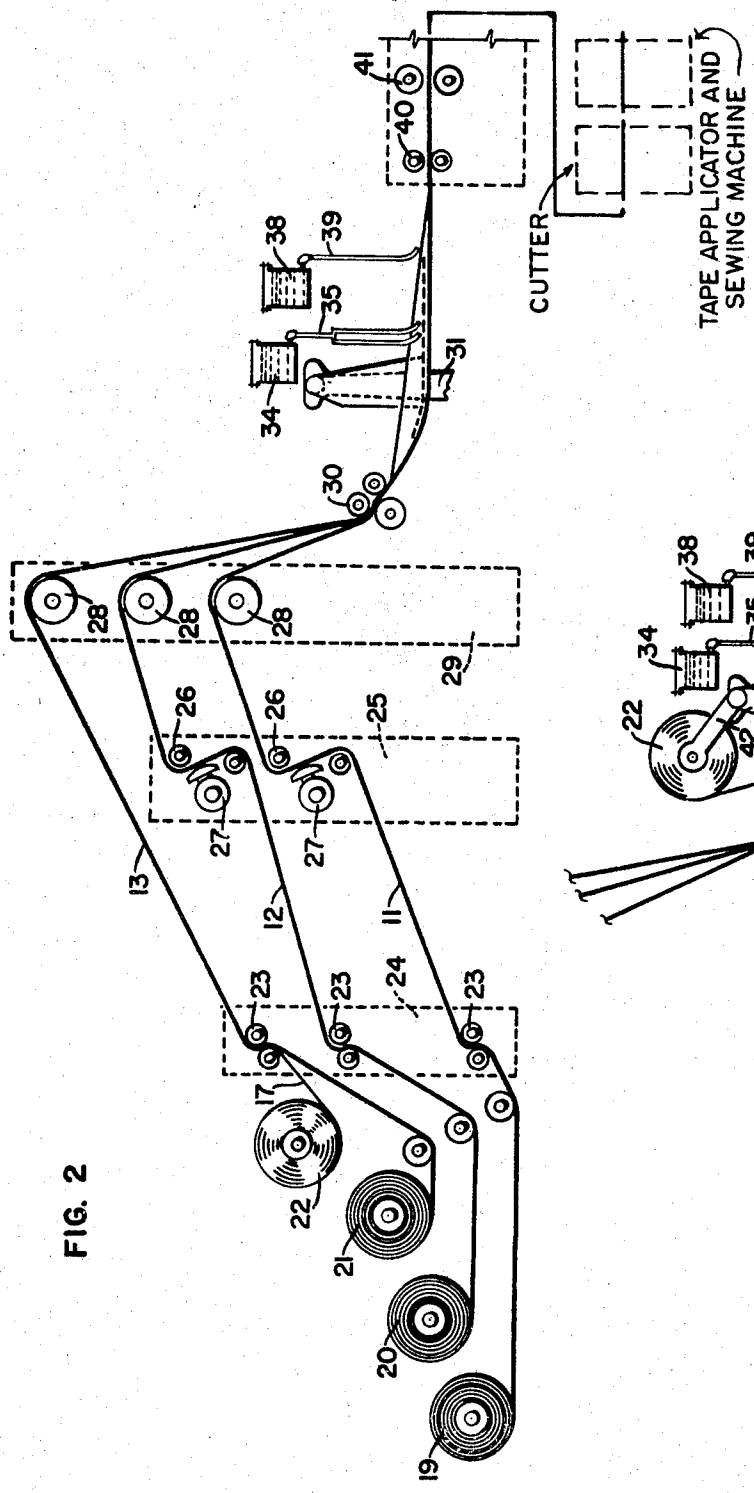


FIG. 2

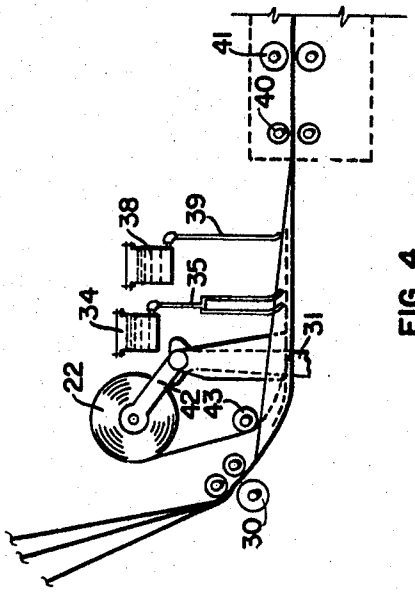


FIG. 4

METHOD OF MAKING A DECOMPOSITION RESISTANT BAG

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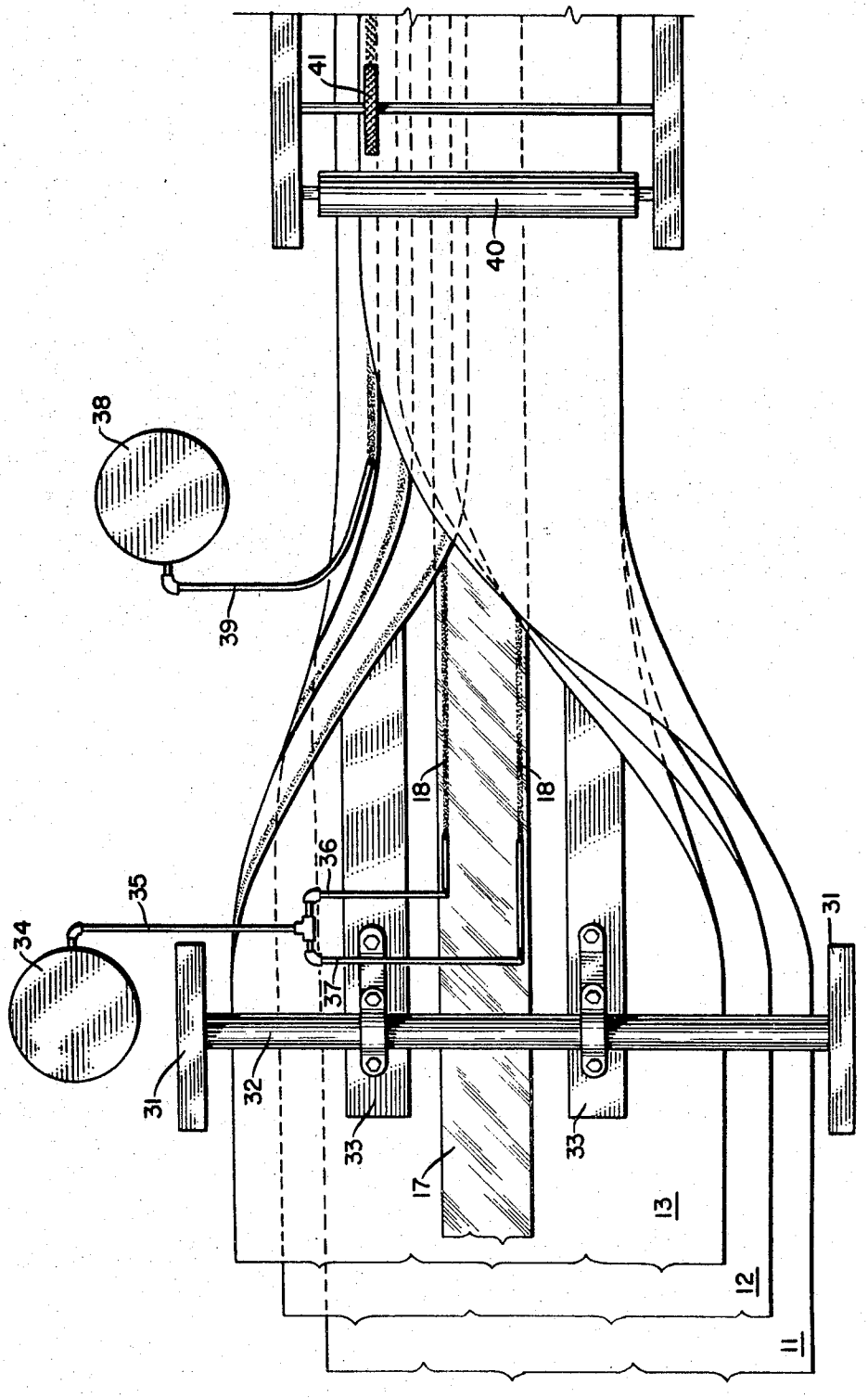


FIG. 3

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METHOD OF MAKING A DECOMPOSITION RESISTANT BAG

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Original application July 6, 1965, Ser. No. 469,778, now abandoned. Divided and this application Apr. 28, 1966, Ser. No. 560,341

Int. Cl. B31b *49/04, 1/60, 15/60*

U.S. Cl. 93—35

4 Claims

ABSTRACT OF THE DISCLOSURE

A process for forming one or more paper plies into a decomposition resistant bag having a lapped seam made with a conventional casein adhesive. A strip of plastic material overlies the lapped seam on the interior of the bag and is attached thereto by means of a decomposition resistant adhesive. The strip prevents acidic materials or fungi from attacking the casein adhesive used in the lapped seam of the bag.

This is a divisional application of Ser. No. 469,778 filed July 6, 1965, now abandoned.

This invention relates to a paper bag especially adapted for the packaging of materials which normally cause decomposition of paper bags. More particularly, the invention pertains to a bag adapted for packaging materials such as peat moss, and shredded oak or redwood bark.

Peat moss and shredded bark are commonly packaged in burlap or multi-ply paper containers for shipment. The acidic nature of these products, coupled with their moisture content, often cause the natural acids in these products to decompose the burlap or paper containers. Additionally, fungi naturally present in these products often attack the paper or the burlap. Efforts to overcome this problem have utilized multi-wall paper bags having the inner ply or plies of paper treated with fungicidal agents to resist the attack of the fungi (e.g., U.S. Patent 2,615,614). However, these containers are complex and expensive to manufacture and their cost often prohibits their use in packaging low cost commodities such as peat moss and shredded bark. Other packaging containers made from a single ply of heavy gauge polyethylene are currently being used for packaging these products. While these all-plastic containers overcome the deterioration problem, their higher cost involves a premium charge for products packaged in these containers.

An object of this invention is to provide a paper bag of simple and economic construction which is resistant to attack from acid and fungi.

An additional object of this invention is the provision of a paper bag resistant to attack from acid and fungi, which bag can be economically produced using conventional tubing machines.

A further object of this invention is the provision of a process for manufacturing an acid- and fungi-resistant bag.

The provision of the present invention relating to a

decomposition-resistant bag is provided by a bag having a tubular ply of paper with a longitudinally extending, lapped, adhesively bonded seam throughout its length. The paper is coated on its inner surface with a thin layer of flexible synthetic resin. A longitudinally extending band of flexible plastic sheet material is superimposed on the adhesively bonded seam in the interior of the paper ply. The plastic sheet is adhesively attached along both longitudinal edges to the inner surface of the ply of the paper. Means is provided to close at least one end of the tubular ply of paper.

An object of the present invention relating to the process for producing a decomposition-resistant bag may be carried out by advancing a flat paper web and advancing a narrow flexible strip of plastic material coextensively with the paper web. The strip of plastic material overlying the paper web intermediate its side edges. The paper web is then infolded to form a tube. One edge of the paper web is then adhesively joined to the opposite edge to form a lapped seam. The narrow flexible plastic strip is then adhesively attached to the inner surface of the infolded web over the lapped seam. The infolded web is then cut into lengths of bag stock and at least one end of the bag stock is closed to form the bag.

Referring now to the drawings wherein:

FIGURE 1 is a perspective view in elevation of a decomposition-resistant bag constructed in accordance with the present invention, with portions of the paper plies of the bag broken away;

FIGURE 2 is a schematic diagram of a tuber machine for forming multi-wall paper bags in accordance with the process of the present invention;

FIGURE 3 is a plan view of a portion of a tuber machine illustrating the method of applying a flexible plastic strip to the interior surface of the bag stock as it is folded into nested tubes; and

FIGURE 4 is a schematic elevational view of a portion of a tuber machine showing an alternative arrangement for supplying the plastic strip.

Referring now to FIGURE 1, there is shown a multi-ply gusseted bag, indicated generally by the numeral **10**, constructed in accordance with the present invention. The bag is formed of three nested plies of kraft paper, an outer ply **11**, an intermediate ply **12**, and the inner ply **13**. The bag is sealed at its lower and upper ends by means of folded paper tape **14** and thread stitching **15**. The bag is formed on a conventional tuber machine (such as shown and described in U.S. Patent 2,897,730) by folding flat paper webs into nested tubular form and adhesively sealing the edges of each individual paper ply together with a line of adhesive. The lapped seam **16** of the inner ply **13** is covered in its entirety by a longitudinally extending strip of flexible plastic material **17** which is adhesively attached to the inner surface of the inner ply **13** by means of lines of adhesive **18** along each edge thereof. Thus, it is seen that the flexible plastic strip **17** completely covers and seals off by means of adhesive **18** the seam **16** of the inner ply from contact with any product that is placed in the bag. The strip **17** is preferably polyethylene, however, any plastic material such as polypropylene, polyvinyl chloride, polyvinylidene chloride may be used. It has been found that the commonly used adhesives, particularly casein adhesives, are subject to attack by the acidic constituents and the fungi nor-

mally present in peat moss and in shredded bark. On prolonged storage the acid and/or fungi attack the adhesive and allow the bag to break open along the seam line, thus rendering the package ineffective.

Adhesive **18** used to attach the plastic strip **17** to the inner ply is preferably a synthetic resin adhesively applied by the hot melt technique. For example, a resin made by mixing about 33 parts of polyterpene beta-pinene polymer resin (Piccolyte 100) of melting point 100°–120° C., 11 parts of polybutene, 55 parts of polyethylene (M.W. range 2,000 to 10,000), and 1 part of an antioxidant such as 4,4-thio-bis (6-tert-butyl-m-cresol). Other hot melt formulations based on low molecular weight polyethylene are also satisfactory. These adhesives are highly resistant to attack by fungi and/or acids. The plastic strip **17** completely seals off the lapped seam **16** from attack from acid or fungi. This permits the use of common lower cost adhesives such as starch, dextrin, or protein based adhesives for making the lapped seam **16** which seals the inner ply **13**. This avoids having to use expensive hot melt adhesives in large quantities to seal the seams in all the plies of the paper bag.

The adhesive **18** is not required to be applied by the hot melt technique. Suitable adhesives may be applied as a latex or a solvent thinned solution. Rubber based adhesives using chlorinated rubber, synthetic rubber, and mixed rubber-resin formulations have been found suitable. Adhesives based on synthetic thermoplastic resins are also suitable, e.g. cellulose esters, alkyd and acrylic esters, polystyrene, polyvinyl acetate (especially preferred), and coumarone-indene types of adhesives are satisfactory. The primary requirements being that the adhesive **18** be moisture-proof and resistant to attack by fungi and that it make a good bond between paper (or polyethylene coated paper) and the plastic strip **17**.

The outer ply **11** and the intermediate ply **12** may be made from any heavy duty kraft paper. It is preferred to make the inner ply **13** from a heavy duty kraft paper which has a flexible plastic coating on the inner surface, i.e., the surface which comes in contact with the product contained in the bag. Many suitable polyethlene coated kraft stock papers are available commercially.

Referring now to FIGURE 2 the decomposition-resistant bag of the present invention may be made on any conventional tuber machine. In the schematic of FIGURE 2 the roll **19** provides the paper for the outer ply **11** of the bag, roll **20** of the paper for the intermediate ply **12**, and roll **21** the paper for the inner ply **13**. A roll of narrow flexible plastic material **22** is mounted above the uppermost roll of kraft paper **21**. Each web of paper passes through individual sets of guide rollers **23** mounted on stand **24**. The strip of plastic material **17** is fed in through the top set of rollers **23** to be carried through the machine in contact with the upper face of the inner ply of paper **13**. A second stand **25** supports two sets of rollers **26** which guide the paper webs into contact with the cross-paste rollers **27**. These cross-pasters apply dots of adhesive transversely to the moving outer and intermediate webs to attach these webs to each other and to the inner web. These cross-pasters are optional and may be omitted if it is not desired to interconnect the paper plies in the finished bag. The paper webs next pass over rollers **28** on stand **29** and then to press rollers **30** where the individual paper webs are superimposed along with the plastic strip **17**.

Referring now to FIGURE 3, the paper webs are offset slightly from each other thereby exposing an edge portion of each of the webs. Conventional longitudinal pasters (not shown) are provided in the tuber apparatus to apply a longitudinally extending band of adhesive along the exposed upper left hand edges of the inner and intermediate plies. Support brackets **31** carry a tubular crossmember **32** to which is attached spaced-apart forming shoes or mandrels **33**. The three superimposed paper plies are folded about these spaced-apart mandrels **33—33** to form the tubular bag stock. The strip of flexible plastic material **17** is positioned approximately in the center of the inner paper ply **13** and passes between the spaced-apart shoes **33**. A tank **34** is provided which contains a hot melt adhesive. A pipe **35** supplies the adhesive to pipes **36** and **37** which apply the adhesive **18** in a narrow band adjacent both edges of the plastic strip **17**. A second tank **38** also contains a supply of hot melt adhesive which is applied by pipe **39** to adhesively attach the lapped seam in the outer ply of the bag stock. Conventional adhesives may be used for this seam, however, a hot melt adhesive is preferred in order to provide a bag resistant to moisture.

Press roller **40** flattens the nested tubes into flat bag stock. A driven rotating wheel **41** presses the lapped seam of the outer ply of the bag stock firmly together to insure that the hot melt adhesive unites the two edges of the bag stock. The tube of bag stock then passes to a conventional cutting machine (not shown), which may be of the type described in U.S. Patent 2,581,801 (FIG. 24), where it is cut into bag lengths which may be closed by means of thread stitching and tape on at least one end which may be done using apparatus shown and described in U.S. Patent 2,749,966.

Referring now to FIGURE 4, an alternate embodiment of a portion of the tuber apparatus is shown wherein the roll of narrow flexible plastic material **22** is mounted on a bracket **42** that is attached to support bracket **31**. A small roller **43** guides the strip of plastic material into position between the two forming shoes **33—33**. This modification of the bag tuber machine is often preferred since it is easier to keep the narrow polyethylene strip centered up between the forming shoes **33—33** than when the strip of plastic material is placed in the rear of the tubing machine as shown in FIGURE 2.

While the bag exemplified in FIGURE 1 is a multi-wall bag, the invention is not limited to multi-wall bags but encompasses bags having only a single ply of material. For smaller packages a single ply of heavy duty kraft paper having both an exterior and interior polyethylene coating is often satisfactory. The outer polyethylene coating provides good weatherability permitting the peat moss or shredded bark bags to be stored outdoors and exposed to dampness without damage.

It is evident that the bag of the present invention provides a greatly improved container for marketing products which are prone to cause decomposition of the material used to make the containers. The provision of the polyethylene strip over the inner seam allows the use of a cheap adhesive material for forming the paper plies of the bag.

What is claimed is:

1. A process for producing a bag having at least one paper ply which bag is resistant to decomposition from attack by acid and fungi comprising:

(a) advancing at least one flat paper web;

(b) advancing a narrow strip of decomposition-resistant, flexible plastic coextensively with said paper web;

(c) infolding said paper web to form a flattened tube;

(d) joining one edge of said paper web to the opposite edge to form a lapped seam using an adhesive that is subject to attack by acid and fungi;

(e) attaching said strip of flexible plastic along a narrow portion of each of its longitudinal edges to the inner surface of said infolded web to position said strip over said lapped seam;

(i) said strip being attached to said web by means of an adhesive which is moisture proof and resistant to attack by acid and fungi, thereby protecting said lapped seam from attack by acid and fungi;

(f) severing said infolded web into lengths of flattened tubular bag stock; and

(g) closing at least one end of said bag stock to form said bag.

2. The process of claim 1 wherein said flexible plastic strip is polyethylene and said moisture-proof and attack-resistant adhesive is a hot melt adhesive.

3. The process of claim 1 wherein said flattened paper tube consists of a plurality of individual paper plies.

4. The process of claim 1 wherein said flattened paper tube has a coating of flexible plastic material on the surface to which is attached the strip of flexible plastic material.

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93—8, 36, 36.01, 36.9, 56, 77