March 10, 1964 J. G. VERGOBBI 3,124,297

LINER BAG

Filed Jan. 30, 1961 2 Sheets-Sheet 1

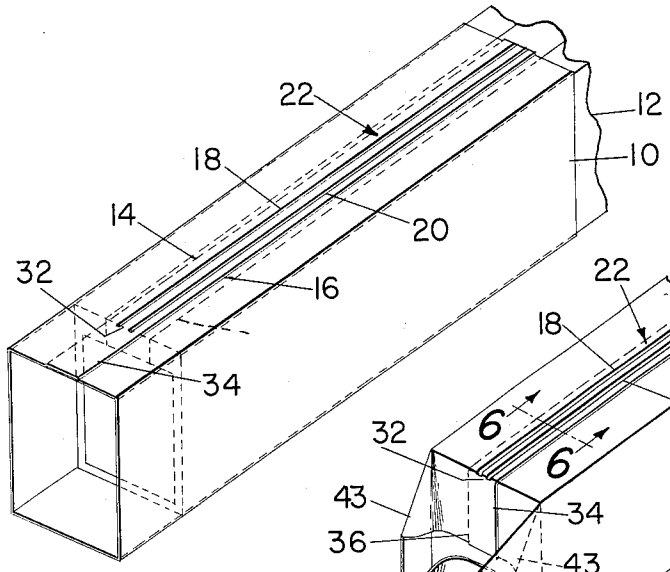


Fig. 1

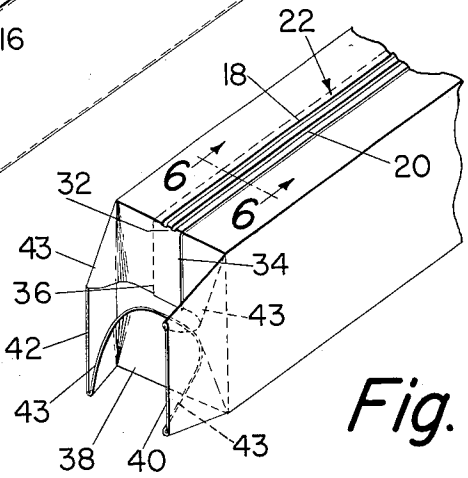


Fig. 2

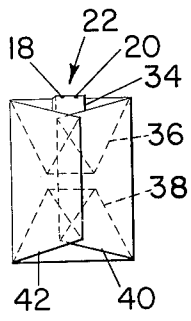


Fig. 3

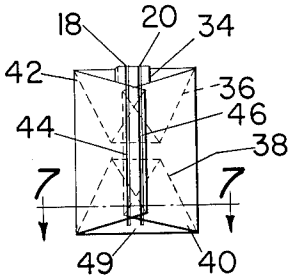


Fig. 4

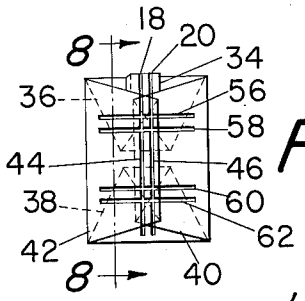


Fig. 5

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LINER BAG

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Fig. 6

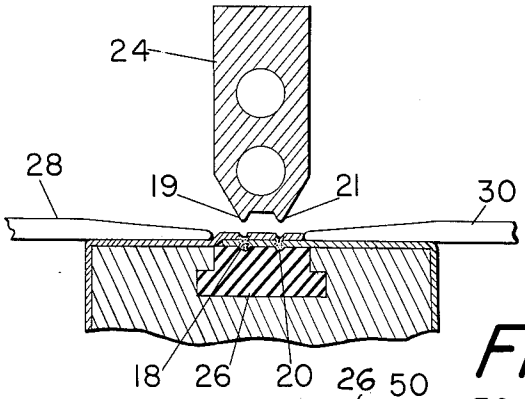
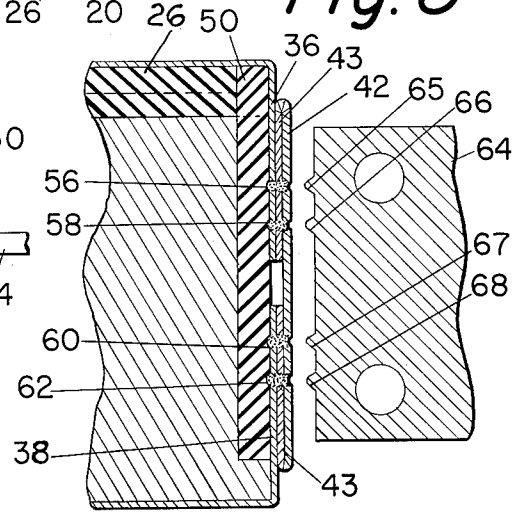


Fig. 8



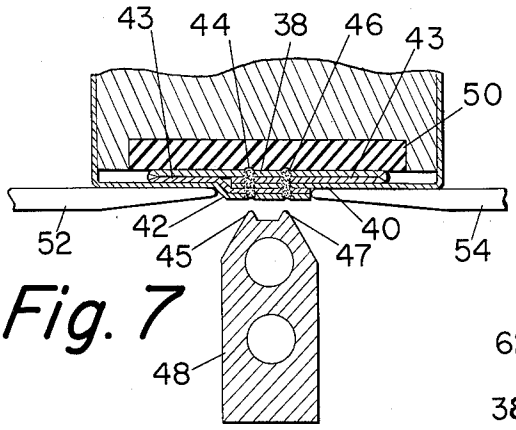


Fig. 7

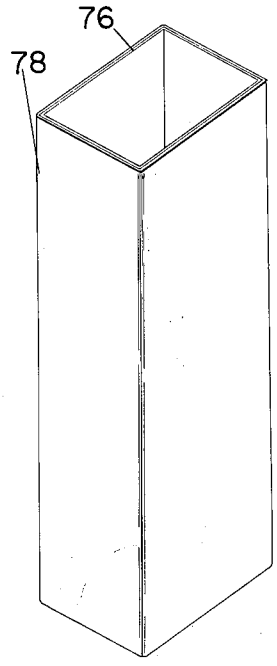


Fig. 10

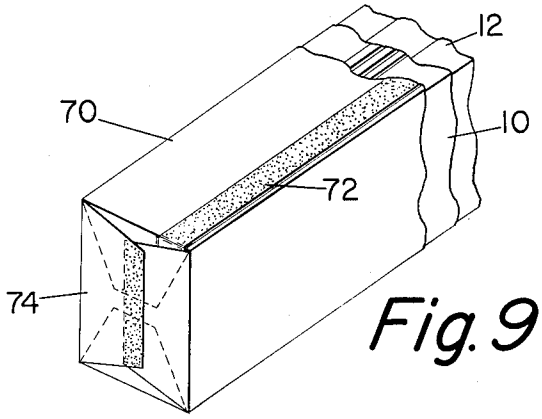


Fig. 9

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3,124,297

LINER BAG

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Filed Jan. 30, 1961, Ser. No. 85,538
2 Claims. (Cl. 229—48)

This invention relates to a liner bag for a package.

The invention has for an object to provide a novel and improved liner bag having an overlapping side seam and a folded bottom closure wherein novel provision is made for sealing the side seam and the bottom closure along predetermined lines or areas such as to produce a leakproof and airtight bag.

With this general object in view and such others as may hereinafter appear, the invention consists in the liner bag as hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a perspective view illustrating a sheet of liner bag forming material wrapped about a forming block and provided with a longitudinal overlapping side seam heat sealed to form a rectangular tube;

FIG. 2 is a similar view showing the extended portions of the tube being folded to provide a bottom closure;

FIG. 3 is an end view showing the completely folded bottom closure;

FIGS. 4 and 5 are similar views of the folded bottom closure showing the preferred sealing pattern employed to produce a leakproof bottom closure;

FIG. 6 is an enlarged cross sectional view of the heat sealed side seam taken on the line 6—6 of FIG. 2;

FIGS. 7 and 8 are enlarged cross sectional views of the folded bottom closure as taken on the lines 7—7 of FIG. 4 and 8—8 of FIG. 5, respectively, and showing the heat sealed portions of the bottom closure;

FIG. 9 is a perspective view of an outer bag wrapped about the forming block and the liner bag; and

FIG. 10 is a perspective view showing the completely lined bag.

In general the present invention contemplates a novel and improvel liner bag for a package wherein the liner bag may comprise a relatively thin thermoplastic sheet material, such as "Pliofilm," preferably transparent and capable of being heat sealed by the application of heat and pressure to overlapping portions thereof. In the illustrated embodiment of the invention the thermoplastic sheet material is wrapped about a forming block with the longitudinal marginal edges of the sheet arranged in overlapping relation, such marginal edges being sealed together along relatively narrow spaced lines by the application of heat and relatively slight pressure to form a tube. A portion of the tube extends beyond the outer end of the forming block for forming the bottom closure, and opposed walls of such extended portion are folded inwardly against the bottom of the block in overlapping relation. Each inwardly folded wall of the extended portion forms a tapering or trapezoidal shaped flap connected by triangular shaped gussetlike folds which overlie the first folded flaps and underlie the last folded flaps. In accordance with the present invention the folded and overlapping portions of the bottom closure are sealed along predetermined spaced lines by the application of heat and pressure in a pattern such as to provide an airtight bottom closure.

The present liner bag is adapted to be produced on a high speed packaging machine, known in the trade as a "Double Package Maker," wherein the liner bag is formed by wrapping a lining sheet about a forming block and sealing the overlapping portions of the side seam at

one station of operation; folding and sealing the bottom closure at a second station of operation; wrapping an outer bag or carton about the forming block and its liner bag and sealing the side seam of the outer bag at a subsequent station; and folding and sealing the bottom closure of the outer bag at another station, the completed lined bag or package being then stripped from the forming block ready to be filled and provided with a top closure.

Referring now to the drawings, 10 represents a relatively thin sheet of flexible thermoplastic liner bag material, overlapping portions of which are capable of being sealed together upon the application of heat and pressure. In producing the bag, as shown in FIG. 1, the liner sheet 10 may be wrapped about a horizontally extended forming block 12 to form an elongated tubular structure rectangular in cross section, the longitudinal marginal edges 14, 16 of the sheet being brought together in overlapping relation and sealed along two relatively narrow spaced lines 18, 20 by the application of heat and slight pressure to provide a longitudinally extended double line side seam disposed substantially medially of the side wall of the tube as indicated at 22. In practice the double line seam 22 may be produced by an elongated heat sealing bar 24, as shown in FIG. 6, provided with two spaced relatively narrow elongated sealing projections or ridges 19 and 21 which cooperate with a resilient portion of the forming block which may comprise an insert 26 of rubberlike or other resilient material capable of withstanding heat. The heat sealing operation effects softening and flowing together of the thermoplastic material of the overlapping portions to form fused or welded spaced line seals 18, 20. In practice the sealing ridges of the bar 24 and the cooperating resilient insert 26 in the forming block 12 may be coated with a suitable antistick material to prevent sticking of the softened liner bag material to the sealing elements.

During the operation of wrapping the liner sheet about the forming block, opposed folding elements 28, 30 are operated in a sequence to fold the marginal portions of the sheet across the upper surface of the horizontally extended block in a manner such as to arrange the marginal portions in overlapping relation, and in operation the folding elements 28, 30 remain at rest in the position shown in FIG. 6 to retain the edges of the sheet in overlapping relation during the heat sealing operation. It will be observed that portions of the liner sheet 10 extend beyond the end of the block to provide extended wall portions from which the bottom closure is formed at a subsequent station of operation. It will also be observed that the elongated double line side seam 22 extends only to the end of the forming block, that is, the side seam terminates substantially at the corner of the block at the point indicated at 32, leaving the major portion of the overlapping portions 34 of the extended wall free or unsealed. However, in operation the sealing bar 24 extends a short distance beyond the end of the block so that in practice the seal extends slightly beyond the end of the corner of the block.

Thereafter, the opposed walls of the extended end portions of the tube are folded inwardly against the end of the forming block in overlapping relation in a predetermined sequence to form the bottom closure as illustrated in FIGS. 2 and 3. In practice the upper and lower extended end walls are first folded inwardly simultaneously against the end of the forming block by suitable folding elements to provide tapering or trapezoidal shaped flaps 36, 38, respectively. Then, the remaining opposed extended end walls are folded inwardly against the end of the forming block by suitable folding elements to likewise provide tapering or trapezoidal shaped flaps 40, 42, re-

spectively, the first folded flaps 36, 38 being connected to the last folded flaps 40, 42 by triangular shaped gusset-like folds 43 which overlie the first folded flaps and underlie the last folded flaps as illustrated. It will be observed that the ends of the first folded flaps 36, 38 are spaced apart in the completed bottom fold, and the last folded flaps 40, 42 are folded in a sequence such that the end of the flap 42 overlaps a portion of the end of the flap 40 as shown.

It will be observed that the tapering flaps and the gusset-like connecting portions are open at their outer ends and that the last folded flaps 40, 42 overlie portions of the first folded flaps 36, 38. Accordingly, the pattern of heat sealing the bottom closure contemplates the provision of a double line heat seal across each flap to seal the overlapping portions of the flaps together and to close off any passageways between the open ends and overlapping portions of the flaps through which air may leak whereby to produce an airtight leakproof bottom closure for the bag.

As illustrated in FIGS. 4 and 7, the overlapping end portions of the flaps 40, 42 are sealed to each other and to portions of the underlying flaps 36, 38 by a vertical double line heat seal along spaced lines 44, 46 closing the open ends of the flaps 40, 42 and also closing the remainder or extended portion 34 of the overlapping side seam which occurs in the bottom closure. As illustrated in FIG. 7, the vertical end or bottom closure seal lines 44, 46 are produced by a heat sealing bar 48 having two spaced and relatively narrow sealing ridges 45 and 47 which cooperate with a resilient portion 50 of rubberlike or other resilient material provided in the end of the forming block. The vertical seal lines 44, 46 are coextensive with the side seam seal lines 18, 20, and in practice the sealing bar 48 may extend a short distance beyond the upper surface of the forming block so that the upper ends of the seal lines 44, 46 overlap the extended ends of the seal lines 18, 20 a short distance to assure a continuous side seam seal at the corner portion 32 of the forming block. It will be observed that the seal lines 44, 46 terminate short of the lower end of the block at a point 49 immediately beyond the overlapping ends of the flaps 40, 42 as shown. It will also be observed that the cross section shown in FIG. 7 is taken at a point wherein five plies of the thermoplastic material are heat sealed together comprising the flaps 40, 42, the connecting gusset portions 43 for each flap and the underlying lower flap 38. It will also be observed that the vertical double line heat seal is performed while the folding elements indicated at 52, 54 are at rest to retain the flaps in their folded condition during the sealing operation. The heat sealing operation effects fusion of the thermoplastic material along the lines 44, 46 to produce airtight seals as indicated in FIG. 7.

From the description thus far it will be seen that the present liner bag is provided with a heat sealed side seam and a vertically arranged heat sealed bottom closure seam which together provide a continuous seam in the side of the bag extending along the portion 34 of the end closure and across flaps 40, 42 to effectively seal the open ends of the last folded flaps 40, 42 together and seal the same to the underlying flaps 36, 38. Thus, any leakage between flaps 36, 38, flaps 40, 42 and the overlapping portions of extension 34 is effectively prevented. Thereafter, at a subsequent station of operation, two double line transverse heat sealing seams are applied to the bottom closure, as shown in FIG. 5, in a pattern such as to seal the open ends of the first folded flaps 36, 38 to the overlying portions of the flaps 40, 42. As herein shown, the upper transverse seam is formed by spaced elongated seal lines 56, 58 which extend across and beyond the marginal edges of flap 36 and terminate at each end inwardly of the sides of the block. Likewise, the lower transverse seam is formed by spaced elongated seal lines 60, 62 which extend across and beyond the marginal edges of flap 38 and also terminate at each end inwardly of the sides of the block. The transverse seal lines 56, 58 and 60, 62 intersect the vertical seal lines 44, 46 in the manner shown in FIG. 5, wherefrom it will be noted that the outermost seal lines 56 and 62 are located adjacent to but inwardly of the edges of the gusset folds of both flaps 40 and 42 to prevent all leakage in the region of the gusset portions 43 of the flaps 36 and 38.

As illustrated in FIG. 8, the transverse seals may be produced by a sealing pad 64 having a pair of spaced upper sealing ridges 65, 66 and a pair of spaced lower sealing ridges 67, 68 which also cooperate with the resilient insert 50 provided in the end of the block. The transverse sealing operation also serves to fuse the multiply layers of the material forming the bottom closure together to produce airtight seals, thus preventing any leakage between the flaps 36, 38 and the overlying portions of the closure. As seen in FIG. 8, the cross section is taken at a point wherein the underlying flap 36, intermediate gusset portion 43 and overlying flap 42 are fused together by the upper transverse seal, and the underlying flap 38, intermediate gusset portion 43 and the overlying flap 42 are fused together by the lower transverse seal.

It will be seen that the folded and sealed bottom closure thus defined provides an effective airtight and leakproof seal, each seal comprising a double line seal bonding or welding together the multi-ply portions in an area intermediate the ends of the flaps, each flap being sealed to adjacent underlying and overlying portions of the folded closure. While it is preferred to use double line seals, as shown, the invention also contemplates single line seals in the areas defined. In the illustrated embodiment of the invention each of the seal lines is preferably about 1/16 of an inch in width and the lines compressing each double line seal are spaced apart from 1/8 to 3/16 of an inch. Relatively narrow line seals are used in preference to relatively wider seal lines or areas since a greater concentration of heat may be applied along the narrow lines and the overlapping plies quickly fused together, and while the sealing elements are provided with an anti-stick coating, more difficulty is encountered in preventing sticking of the softened thermoplastic material to the wider sealing elements. It has also been found that a relatively wide heat seal is more subject to the formation of air bubbles between the overlapping plies with the result that frequently imperfect seals are formed. A relatively narrow line sealing element provides uniform contact and requires only slight pressure in order to eliminate air bubbles between the plies of material, and a spaced double line seal, as herein disclosed, assures an airtight seal.

While reference is made herein to first folded flaps and last folded flaps, when describing the formation of the bottom closure, in practice the flaps are folded concurrently from four sides during the initial portion of the folding operation, the first folding elements being retracted before the second folding elements complete their operation, and the latter being moved in a sequence such as to effect overlapping of the end of one flap with the end of the other. Also, in practice the second folding elements 52, 54 come to rest in spaced relation to retain all of the flaps in their folded condition during the vertical line heat sealing operation whereupon they are fully retracted.

After the completion of the liner bag bottom closure, as described, an outer sheet 70 of bag material may be wrapped about the forming block and the bag carried thereby, and the overlapping marginal portions of the sheet adhesively sealed together to provide a side seam as indicated at 72 in FIG. 9. The extended portions of the outer bag material may then be folded against the end of the block and adhesively sealed together to provide a bottom closure 74 as shown. The lined bag may then be removed from the forming block in the condition shown in FIG. 10 wherein 76 represents the liner bag and 78 represents the outer bag. The bag thus pro-

duced may be delivered to a filling machine where the product to be packaged is deposited in the lined bag.

The filled bag may then be provided with a top closure in any usual or preferred manner to provide an airtight sealed top closure. The illustrated lined bag shows the top or mouth of the liner bag flush with the top or mouth of the outer bag, and in practice this type of bag is adapted to be provided with a bellows or gusset type fold and heat sealed by the application of heat and pressure to seal the contacting mouth portions of the thermoplastic liner bag in airtight relation. A modified type of top closure may include a line seal across the flattened mouth of the thermoplastic liner bag. It will be understood that the present liner bag may also be used with advantage as a liner in other types of packages, such as a liner for a carton provided with the usual adhesively secured top and bottom closure flaps.

The illustrated package when provided with a "Pliofilm" liner bag having airtight seals, as described, is particularly adapted for use as a container for ground coffee. One of the known characteristics of the "Pliofilm" material is that it has some degree of porosity. Thus, any increase in pressure within the sealed liner bag caused by gas generated by the coffee may slowly escape through the bag material, and such pressure within the bag will prevent air from the atmosphere from entering the bag, thus maintaining the coffee in fresh condition. However, the present invention also contemplates bags made from other materials which may be non-porous, and when sealed as described will provide a hermetically sealed container.

While in the foregoing description the liner bag has been described as formed from a sheet of thermoplastic or thermoresponsive material it will be understood that other sheet materials may be used, and such materials coated in the predetermined areas to be sealed with heat and/or pressure sensitive adhesives such that the liner bag may be sealed along the predetermined seal lines as herein described.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A liner bag comprising a thermoplastic sheet of material folded to provide a rectangular tube open at one end and provided with a bottom closure, said bag having a side seam formed by overlapping marginal portions of the sheet material heat sealed along two relatively narrow spaced lines to fuse together the overlapping portions along said line, said seal lines extending to the bottom of the bag with the bottom end of the overlapping portions unsealed in the partially completed bag, said bottom closure comprising opposed inwardly folded end wall portions of the tube defining tapered flaps connected by intervening gusset folds and including a first folded pair of opposed flaps having their end portions in spaced relation, and a last folded pair of opposed flaps having their free ends in overlapping relation, said bottom closure having a pair of relatively narrow spaced heat seal lines coextensive with said side seam seal lines and extending across the overlapping portions of said last folded flaps to seal the open ends thereof and to fuse the flaps together and to the underlying flaps and the unsealed extended portion of the side seam occurring in the bottom closure, said bottom closure further including two pairs of relatively narrow spaced heat seal lines intersecting said last named bottom closure heat seal lines and arranged to seal the open ends of said first folded flaps and to fuse the same to the overlying flaps, the bottom closure heat seal lines along the overlapping portions of the last folded flaps and which are coextensive with the side seam seal lines at one end being arranged to terminate short of the adjacent side wall of the bag at the other end, and the intersecting heat seal lines being arranged to terminate short of the adjacent side walls at both ends of the seal lines.

2. A liner bag, comprising: a sheet of heat-sealable material folded to provide a rectangular tube open at one end and provided with a bottom closure, said bag having a side seam formed by overlapping marginal portions of the sheet material heat sealed to fuse together the overlapping portions for the full length of the side of the bag, said bottom closure comprising opposed inwardly folded end wall portions of the tube defining tapered flaps connected by intervening gusset folds and including a first-folded pair of opposed flaps extending toward each other having their end portions in spaced relation, and a last-folded pair of opposed flaps overlying the first-folded flaps and extending toward each other and having their free ends in overlapping relation, said bottom closure having a heat seal coextensive with said side seam seal and extending across the overlapping portions of said last-folded flaps to seal the ends thereof together and to the underlying first-folded flaps, said bottom closure further including a pair of spaced heat seals extending transversely of said bottom closure and intersecting said last-named bottom closure heat seal and arranged to seal the open ends of said first-folded flaps and to fuse the same to the overlying second-folded flaps, one transverse heat seal of said pair of heat seals being located adjacent to but inwardly of the edge of the gusset folds of each of the second-folded flaps, whereby to prevent leakage past the edges of the second-folded flaps at the gusset folds, the bottom closure heat seal along the overlapping portions of the last folded flaps and which is coextensive with the side seam seal at one end being arranged to terminate short of the adjacent side wall of the bag at the other end, and the intersecting heat seals being arranged to terminate short of the adjacent side walls at both ends of those heat seals.

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