

[54] **GUSSETED PINCH BOTTOM BREAKAWAY POUCH BAG**

[75] Inventor: **John J. Goodrich**, Pensacola, Fla.

[73] Assignee: **St. Regis Paper Company**, New York, N.Y.

[*] Notice: The portion of the term of this patent subsequent to Apr. 30, 1991, has been disclaimed.

[22] Filed: **Apr. 12, 1974**

[21] Appl. No.: **460,497**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 235,908, March 20, 1972, Pat. No. 3,807,626.

[52] U.S. Cl. **229/55; 229/57; 229/62; 229/66**

[51] Int. Cl.² **B65D 33/02**

[58] Field of Search 229/55, 56, 57, 62, 66

[56] **References Cited**

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Primary Examiner—William I. Price

Assistant Examiner—Stephen P. Garbe

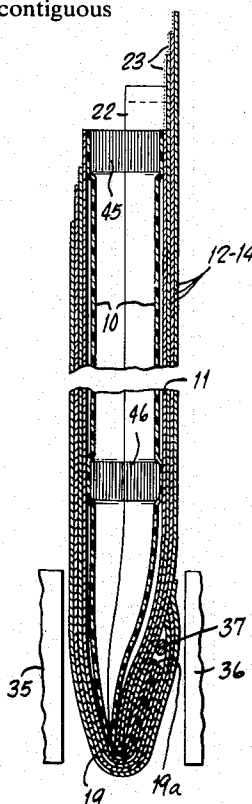
Attorney, Agent, or Firm—Raymond J. McElhannon, Esq.

[57] **ABSTRACT**

A bag of tubular form open at one end and closed at the other end, comprising a plurality of contiguous

plies of paper bonded together adjacent each of said ends, and an innermost ply of heat sealable plastic material lightly bonded adjacent said bag ends to the contiguous paper ply for manual detachment therefrom, said bag being longitudinally and reversely creased along diametrically opposed portions to provide a pair of oppositely disposed gussets interposed between front and rear wall portions, at least some of the inner plies being stepped progressively upward with respect to the outer ply in the front wall portion at the open bag end, at least the outermost ply being stepped upwardly with respect to the innermost ply in the rear wall portion at the open bag end to provide an exposed overlap rear wall portion with respect to the innermost ply of said front wall portion, at least portions of said gussets terminating at said open bag end within said overlap to provide exposed portions thereof, said overlap rear wall and exposed gusset portions being coated with an adhesive at said open bag end, the bag construction at said closed end being the reverse of that at the open end said plastic ply being heat sealed to closure adjacent said closed bag end, the bag closure at said end being otherwise completed by coating the exposed overlapping rear wall portion and exposed gusset portions with an adhesive and folding over with said sealed end of said plastic ply and sealed to closure against the opposite wall portion, said bonding together of said paper plies at said end thereby imparting to said closure the combined strength of all such plies, the open end of said bag being adapted for heat sealing of said plastic ply and closure similarly to that of said closed end and said bag when so closed at both ends being sift and leak proof and resistant to insect penetration, and being adapted for opening of said paper plies and removal of said plastic ply intact.

5 Claims, 20 Drawing Figures



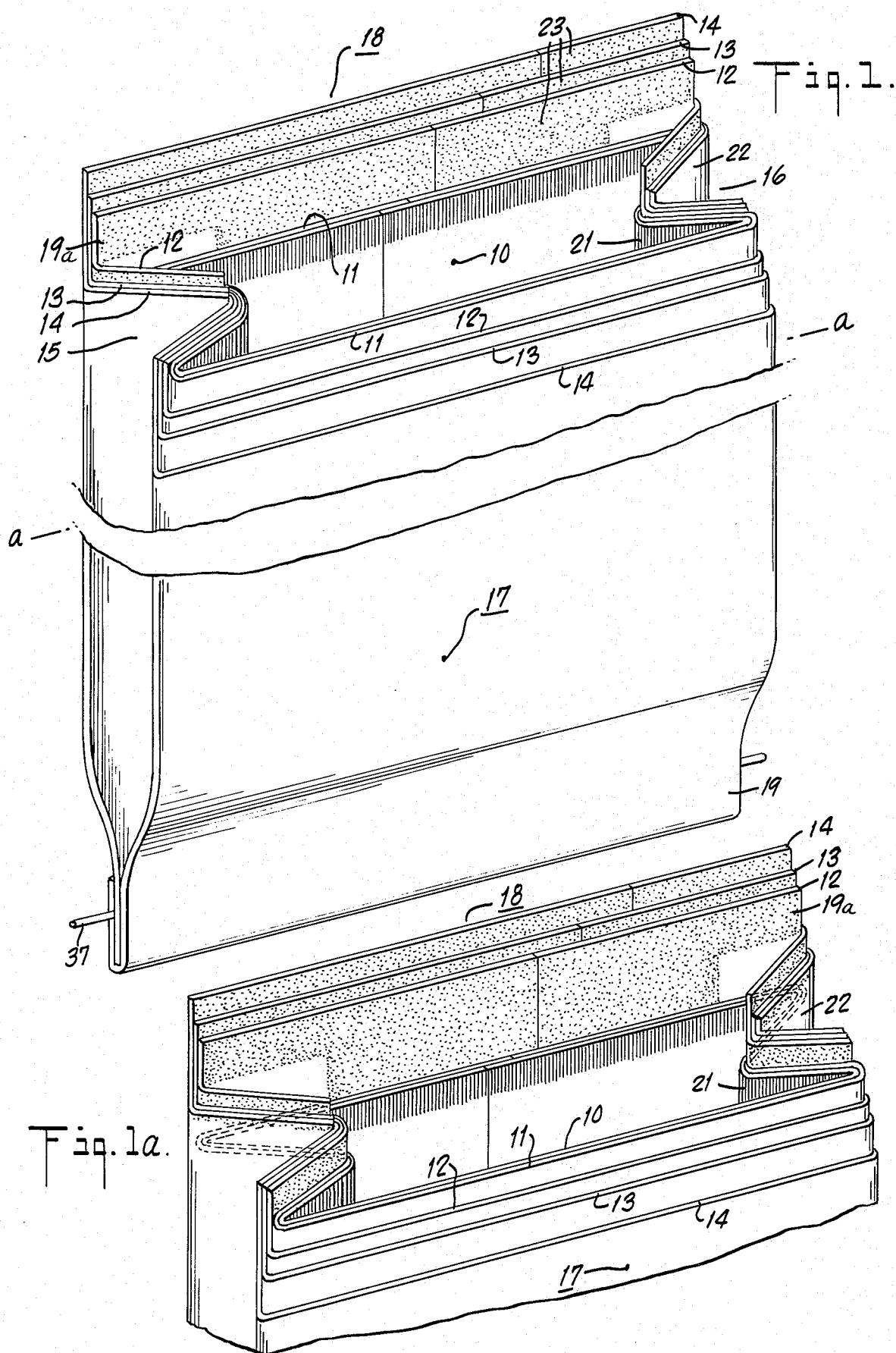


Fig. 3.

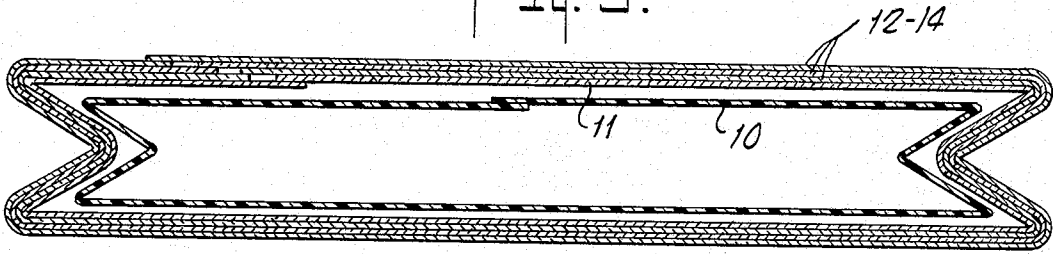


Fig. 4.

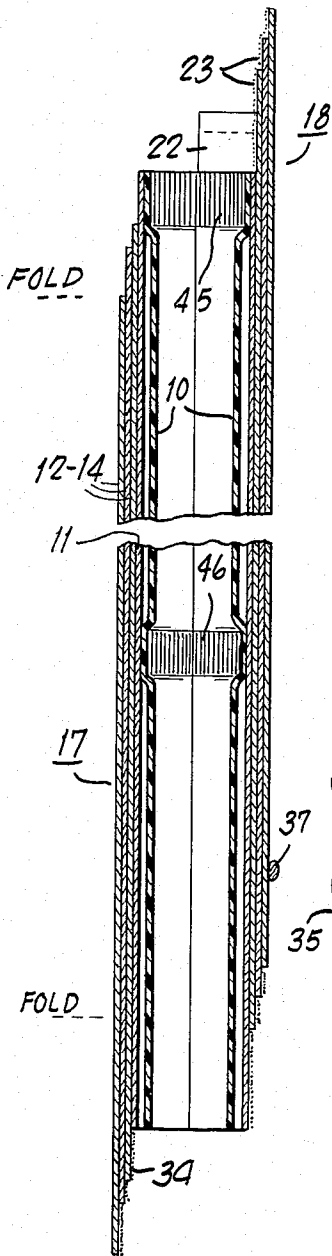
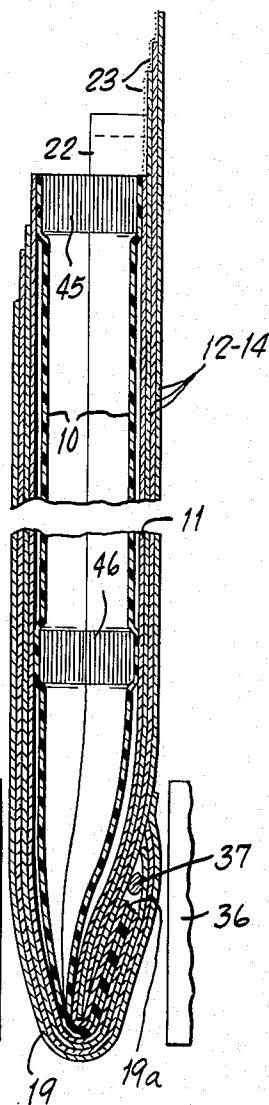


Fig. 2.



HOT AIR
BLAST

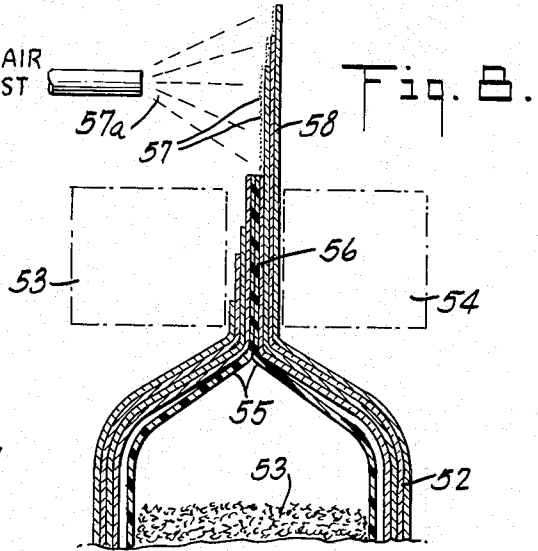


Fig. 8.

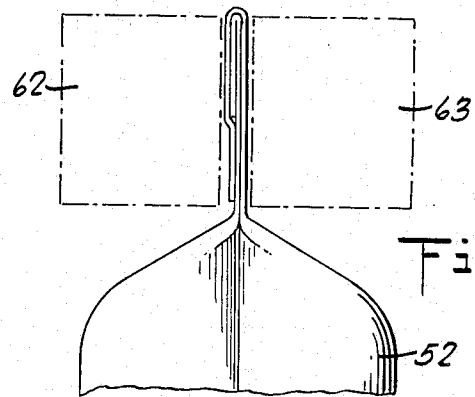


Fig. 9.

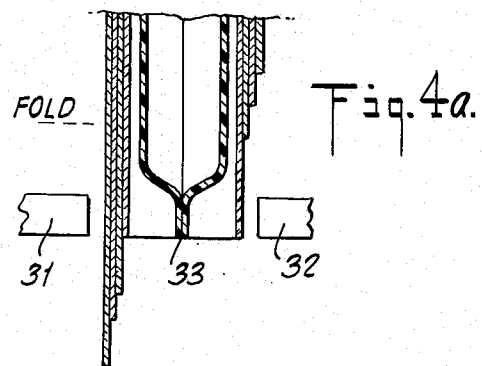


Fig. 4a.

Fig. 5.

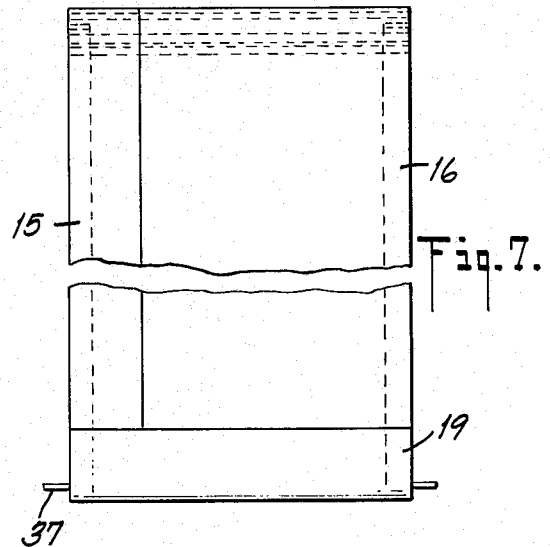
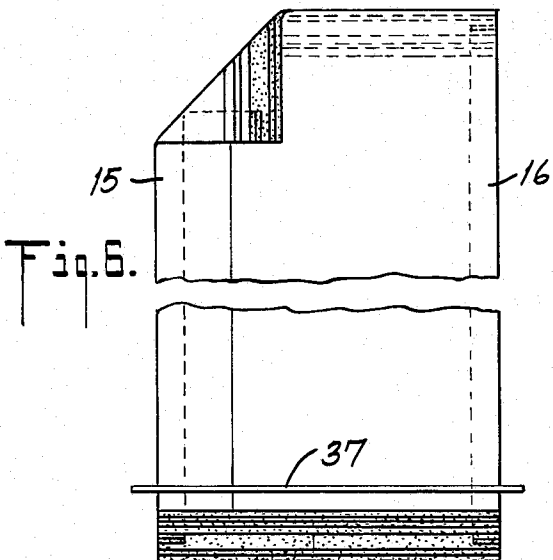
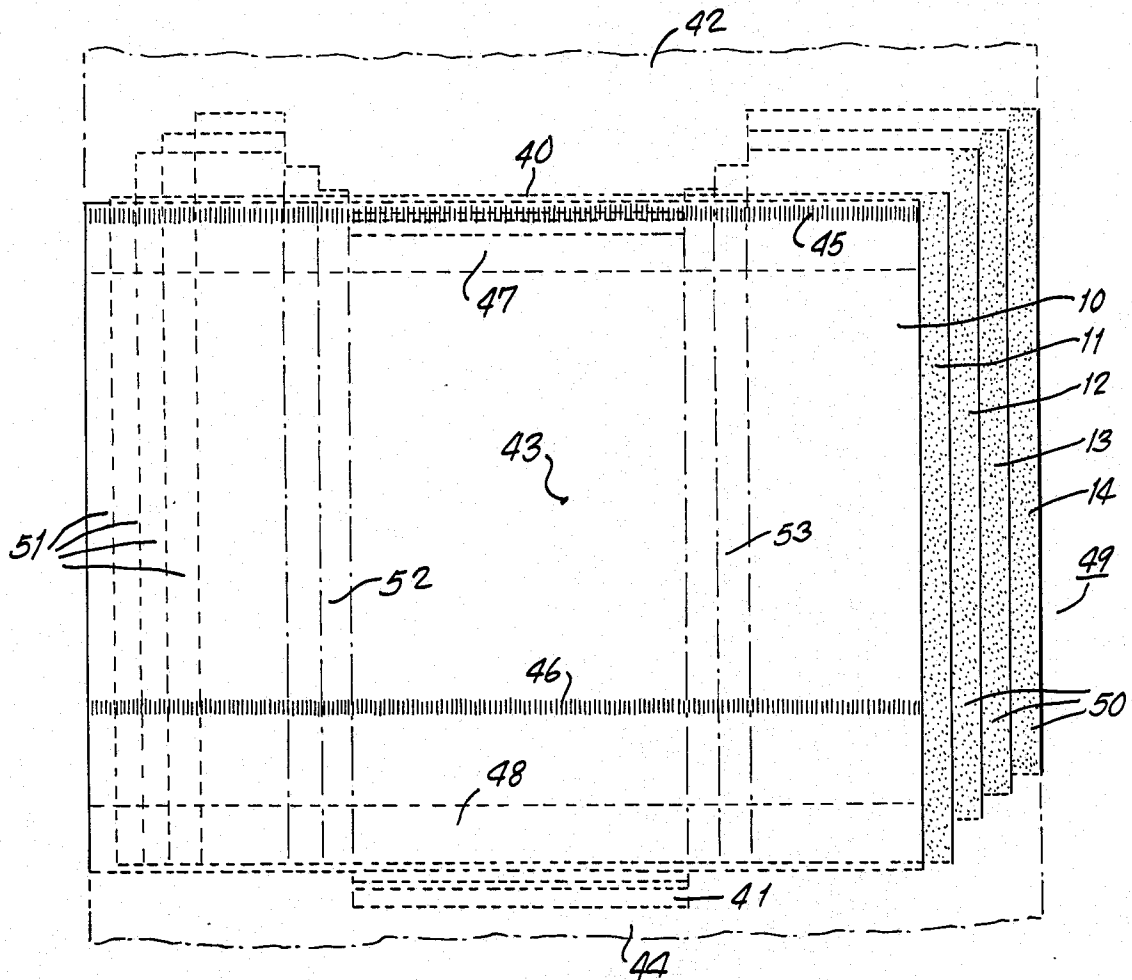


Fig. 10.

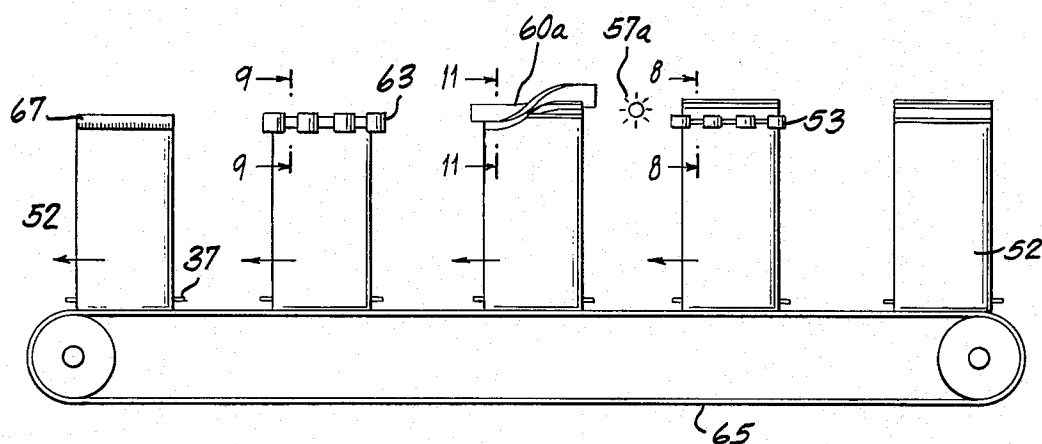


Fig. 11.

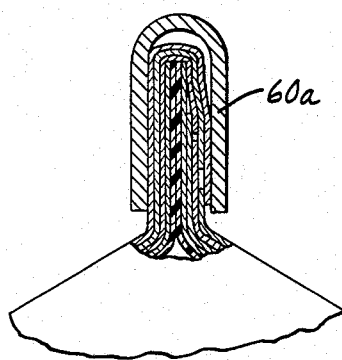


Fig. 12.

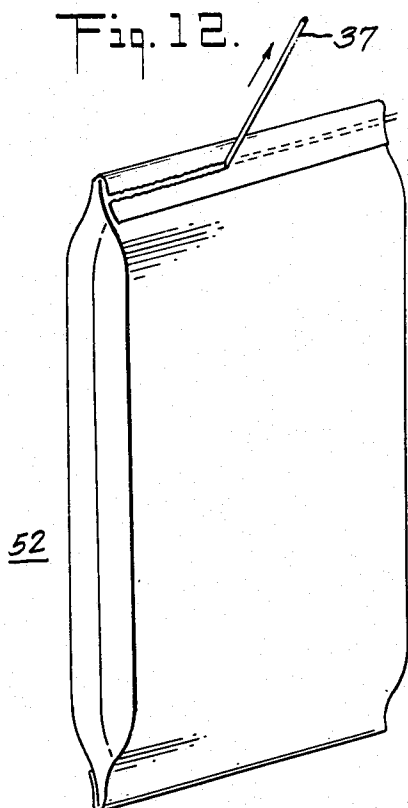


Fig. 13.

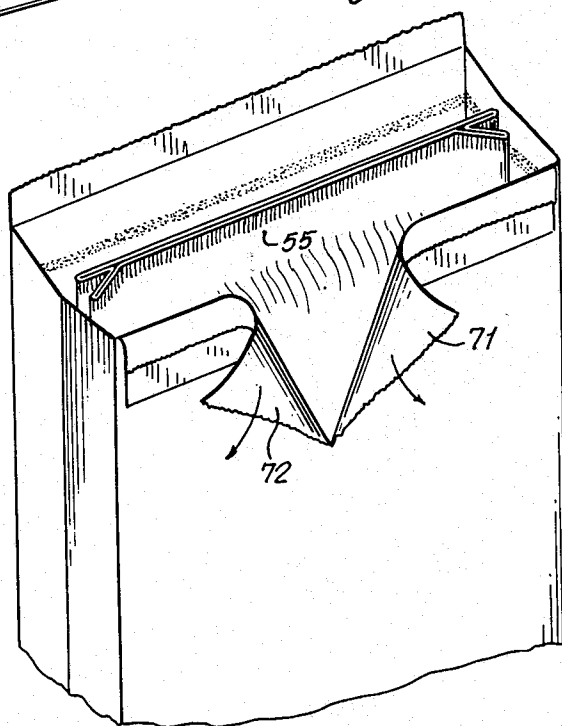
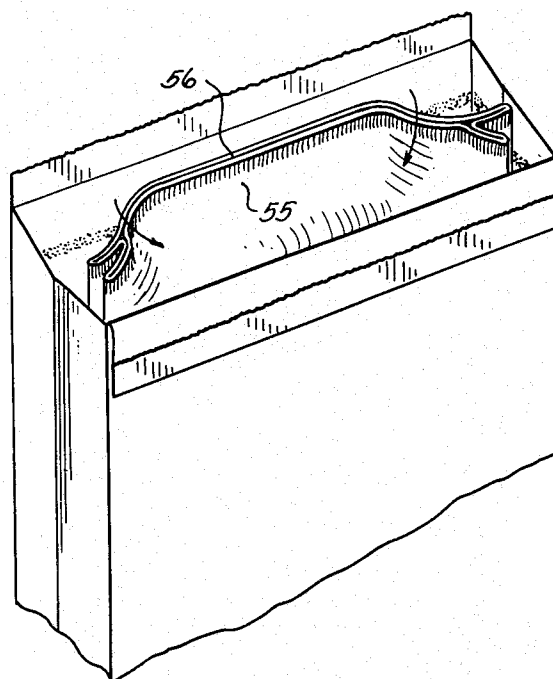
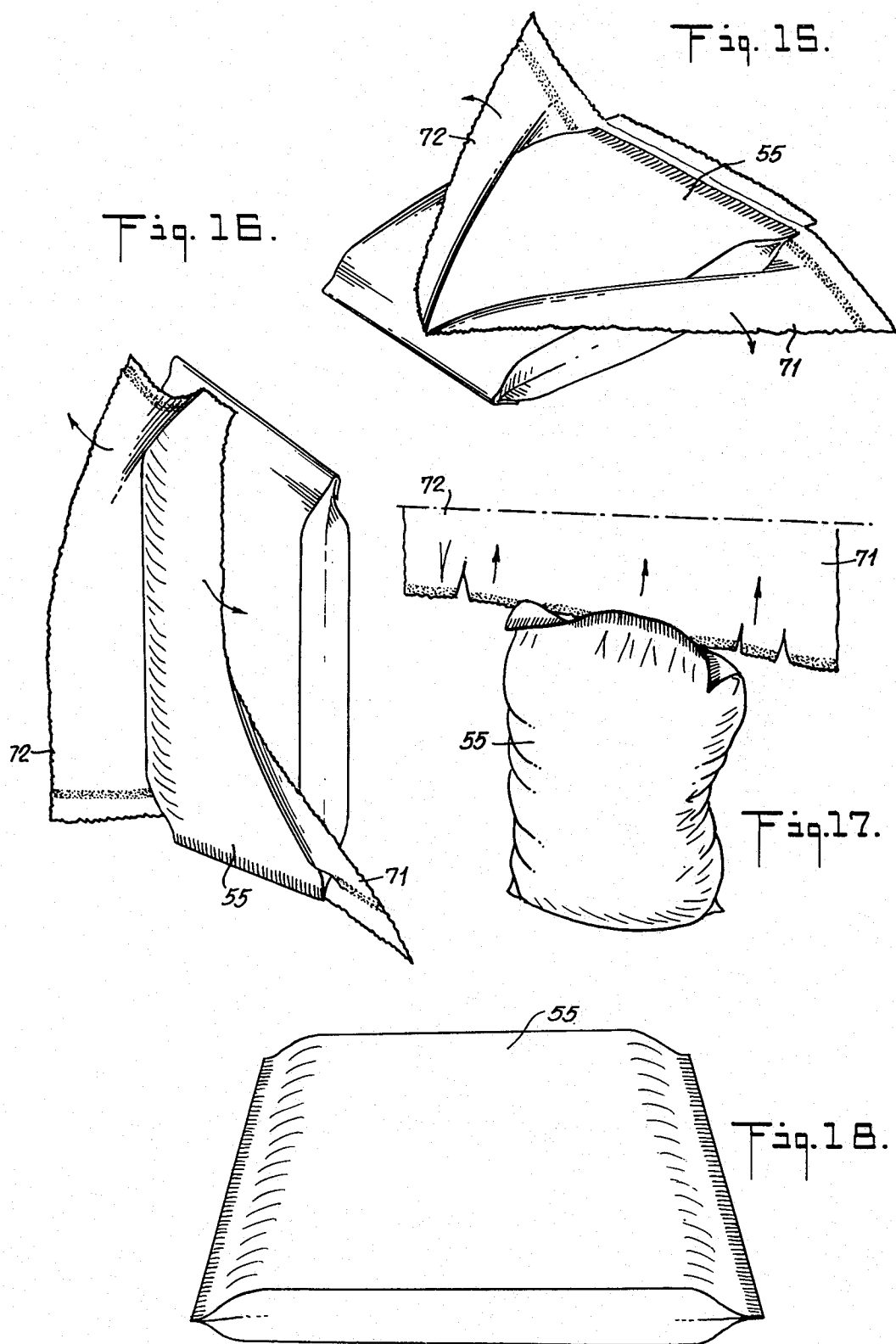


Fig. 14.



GUSSETED PINCH BOTTOM BREAKAWAY POUCH BAG

This application is a continuation-in-part of my co-pending application Ser. No. 235,908 now Pat. No. 3,807,626 filed Mar. 20, 1972, and incorporates the same by reference herein.

This invention pertains to improvements in multi-wall bags of the gusseted and so called pinch bottom, open mouth type and the production thereof, and to methods of filling and emptying the same under sterile conditions.

In bags of this construction as heretofore produced, a plurality of plies of flexible sheet material, such as paper, are laminated to one another in superimposed relation and formed into a tube having gusseted sidewalls interposed between front and back walls one of which overlaps the other at each bag end, one overlapping end in the bag as manufactured, being folded over and sealed against the opposite wall to provide an open-ended bag ready for filling, usually with a bulk, granular or powdery material, whereupon the opposite overlapping end is similarly folded over and sealed against the opposite wall thereby to seal the packaged material within the bag enclosure thus formed. Also in such bags as heretofore produced, the innermost ply is sometimes provided with a moisture impervious plastic coating, or an innermost ply of plastic material, which is permanently laminated to the innermost ply.

All such conventional bag constructions are objectionable for the packaging of comestibles, such as dry powdered milk, eggs or the like, in that during handling and shipment the bag exteriors become highly contaminated with dust, bacteria and other contaminating substances, to the extent that it becomes extremely difficult if not impossible to prevent contamination of the packaged material when the bag is opened to discharge the contents.

In an effort to prevent such contamination, one practice has consisted in the manual insertion into an open ended paper bag of a separately produced plastic pouch, and then after the pouch within the bag is filled, the pouch itself is manually tied closed at its open end and pushed down into the bag so that it does not interfere with closure of the bag itself, usually by sewing. This practice is objectionable in that it requires that the bag and pouch components be separately produced and the components manually assembled, which is unduly expensive. Also the manual tying of the pouch when filled and subsequent closure of the bag proper retards the closure operations. In addition the manual handling of the plastic pouch in the bag and pouch assembly and tying operations as well as the subsequent untying to discharge the contents, are sources of potential contamination.

The present invention eliminates these highly objectionable features of conventional bag constructions, in the provision of a multi-wall, gusseted bag having an innermost bag ply of a heat sealable plastic material, such as polyethylene, which in process of bag manufacture on a bag tuber is only lightly adhered to the contiguous paper ply, as by means of a pressure sensitive adhesive, for manual detachment therefrom and which is heat sealed transversely of the bag at the closed end, the bag closure at said end being otherwise completed by folding over said end with said heat sealed end of said plastic ply and sealing against the opposite wall.

Also when the bag is filled with a comestible or the like, the opposite end of the plastic ply is closed by heat sealing prior to folding over said end with said heat sealed end of said plastic ply, and sealing against the opposite wall at said end. The plastic ply is of such length as to be included in the sealed bag end closures provided by the outermost plies. The bag may thus be opened in the outermost plies leaving intact the plastic ply and therein packaged contents. And since the plastic ply is only lightly adhered to the contiguous ply, the outer plies may be torn or cut away and peeled off of the plastic ply without rupture thereof for removal of a thus completely sealed and impervious plastic ply container of the packaged material. For removal of the packaged contents without contamination, the exterior of this plastic container may be sterilized and the container slit and its contents discharged under wholly sterile conditions in a sterile atmosphere.

In bag constructions according to the invention containing three or more outer or paper plies, at least some of the plies exterior to the innermost paper ply are preferably stepped successively in both directions at the bag ends with respect to the innermost ply, to provide at each bag end a stepped up overlap portion which may be folded over with the innermost ply and adhesively bonded to the opposite bag surface. This greatly increases the overall bonding action at the bag ends and thereby enhances the strength of the bag closures. The gussets may also be stepped up at the bag ends with respect to the innermost ply, with the front and back panel portions thereof either flush cut, or with the back panel portions stepped up with respect to the front panel portions. Also at least some of the bag plies may additionally be stepped up in the gusset portions. All such modifications increase the bonding strength of the bag closures upon folding over the overlapping bag ends and sealing against the opposite bag wall portions.

The invention in other of its aspects comprises methods of filling and emptying bags of the constructions above described in a manner such that the bags may be filled with a material to be packaged and completely sealed within the plastic ply prior to closure of the open bag end, and the bag thereafter opened only in the outer plies and the plastic ply with its sealed in contents thence removed intact.

Having thus described the invention in its broader aspects reference will now be had for a detailed description of the above and other aspects to the accompanying drawings wherein:

FIG. 1 is a perspective view of a bag constructed in accordance with one embodiment of the invention, and FIG. 1a a similar fragmentary view of a further embodiment.

FIGS. 2 and 3 are longitudinal and transverse sections of FIG. 1 showing the constructional details.

FIG. 4 is a view similar to FIG. 2 but showing the bag prior to effecting the bottom bag closure.

FIG. 4a is a fragmentary sectional view of the lower end of FIG. 4 showing a step in the bag closure operation.

FIGS. 5-7 inc. illustrate a method of producing bags according to the invention, wherein FIG. 5 is a plan view of a web assembly for producing the bags as blanks shown in plan view in FIG. 6, while FIG. 7 is a plan view of a bag as produced from the bag blank of FIG. 6.

FIGS. 8-11 inc. are views illustrating closure of the upper end of the bag of FIGS. 1-3, after it is filled with material to be packaged, wherein FIG. 10 is a view in elevation illustrating the method and apparatus for sealing the upper end of the bag closed in successive steps, while FIGS. 8, 9 and 11 are fragmentary sectional views of FIG. 10 as taken at 8-8, 11-11 and 9-9 thereof, respectively.

FIGS. 12-18 inc. are perspective views of the steps of opening the filled and closed bag of FIG. 10, in such manner as to recover the sealed inner plastic ply and therein packaged contents without opening said ply.

Referring to FIGS. 1-4, the bag comprises an innermost ply 10 of a heat sealable thermoplastic material, and four outer plies 11-14 inc., made preferably of heavy kraft paper, although other suitable flexible sheet stock may be employed. The bag is gusseted along oppositely disposed sidewalls, as at 15, 16, interposed being relatively wide front and rear walls 17, 18.

The bag as manufactured is open at the top as shown and closed at the bottom with a pinch bottom closure as at 19, produced as described below. The paper plies 11-14 inc. are securely bonded to one another at the top and base of the bag as described below, while the plastic ply 10 is only lightly adhered to the contiguous paper ply adjacent the top and base of the bag and blank, as described below.

As best shown in FIG. 1, at the open bag end, the plastic and contiguous paper plies 10, 11 are preferably substantially flush cut, and the outer plies 12-14 preferably stepped successively downward with respect thereto as shown. In the back wall 18, the outer plies 12-14 are stepped as a group considerably upward with respect to plies 10, 11, to provide an overlap 19 of the back wall with respect to all plies of the front wall. In addition the outer plies 12-14 are preferably stepped successively upward with respect to each other as shown. Various upper terminations of the gussets 15, 16 may be employed, one embodiment of which is shown in FIG. 1 and another in FIG. 1a.

In FIG. 1, the front gusset panels, as at 21, are flush cut in all plies substantially coincident with plies 10, 11; while in the back gusset panels, as at 22, plies 12-14 are stepped up with respect to all plies of the front gusset panels, as shown, and ply 12 is additionally stepped up with respect to plies 13, 14, as shown.

In FIG. 1a, the ply stepping in the front and back walls is the same as in FIG. 1a. In the gussets, however, plies 12-14 inc. are stepped up with respect to plies 10, 11 in the front gusset panels 21, and plies 12-14 are further stepped up in the back gusset panels 22, with respect to these plies in the front gusset panels, in addition to which, ply 12 is further stepped up with respect to plies 13, 14 in the back gusset panels.

The ply steppings in the front and back walls and the gusset and gusset ply steppings shown in FIGS. 1 and 1a are merely illustrative of the many embodiments that may be employed in accordance with the invention, as encompassed by the appended claims.

As shown in FIG. 4, the bottom of the bag of FIG. 1 is complementary to or the reverse of that at the top.

Closure at the base of the bag to provide the pinch bottom closure 19, FIG. 1, is accomplished in two steps. The first step consists referring to FIG. 4a, in applying heat and pressure between the opposite walls of the blank adjacent the lower end, as by means of hot compression rolls or bars as at 31, 32. This heat seals

the oppositely disposed wall portions of the thermoplastic ply to each other as at 33, thus to provide a sealed closure of the ply at the bottom of the bag. A thermoplastic adhesive is then applied to the stepped end portions as at 34, FIG. 4, and the bag end folded over at the "fold" line and sealed against the opposite wall of the bag as shown in FIG. 2, and then compressed between compression rolls as at 35, 36, FIG. 2.

In order to provide for opening the bag as described below, a rip cord or tear string 37, as interposed as shown in FIG. 2, between the outer paper plies 12-14 inc., and the inner plies 10, 11, upon folding over and completing the bag closure in the manner above described.

Referring now to FIGS. 4 and 5, the bags of the invention may be quantity produced from superimposed webs 10-14 inc. of the plastic and paper plies. The individual webs are transversely perforated as at bag length intervals, as at 40 and 41, to impart the requisite end configurations to the blanks as above described. These perforations are for purposes of subsequently separating the web stock into successive bag blanks, as at 42, 43, 44. As shown in the drawing the perforations at one end of a blank, as at 40, are complementary to those at the opposite end, as at 41, to prevent waste of materials.

The plastic ply 10 is lightly adhered to the contiguous paper ply 11, adjacent the opposite ends of each blank, as at 45, 46. For this purpose a pressure sensitive adhesive is preferably employed such as an acrylic latex adhesive. The paper plies are permanently laminated to one another at the bag ends by means of glue applied between them over the areas 47, 48. The webs 10-14 inc. are successively stepped transversely of their lengths, as at 49, to provide longitudinally extending overlap portions to the paper webs 11-14 inc. to which glue is applied, as at 50, in order that the web assembly may be formed into a tube by folding over the stepped overlap portion 49 onto the oppositely stepped portions 51, and adhering while meantime heat sealing the overlapped portions of the plastic ply 10. During the tube forming operation, the web assembly is reversely creased along the lines indicated at 52, 53, to form the oppositely disposed gussets, as at 15, 16, in the resultant tubular blank of FIG. 6. A hot melt adhesive is applied to exposed overlap and gusset portions at the top and base of the bag blank as at 23, 34, FIG. 4. The blank is closed at the base in the manner above described with reference to FIGS. 4a and 2 to produce the completed bag as shown in FIG. 7.

Referring now to FIGS. 8-11 inc., the open end of a bag 52 after filling with material to be packaged, as at 53, is closed as follows. Referring to FIG. 8, the first step consists in compressing the opposed upper ends of the bag between hot pressure rolls, as at 53, 54, to heat seal the upper ends of the plastic ply 55 to one another, as at 56. A hot air blast 57a is next applied to heat-activate the thermoplastic adhesive 57 applied to the overlapping portion 58, of the outer plies. The next step as shown in FIG. 9 consists in folding over the bag end along the upper fold line of FIG. 2, and passing thence between compressing rolls, as at 62, 63.

The above sequence of operations is rapidly carried out with the mechanism of FIG. 10, wherein the filled bag 52 is transported on a travelling belt 65, with its open end passing first between the series of the hot pressure rolls 53, 54, for heat sealing to closure the

upper ends of the plastic inner ply, thence past the hot air blast 57a, for reactivating the thermoplastic bonding agent 57, FIG. 8, thence under the folding device 60a, for folding the bag end over onto the opposite bag surface, and thence between the series of pressure rolls 62, 63, for completing the bag closure, as at 67.

Referring to FIGS. 10 and 11, the open bag ends are rapidly closed by placing the open ended bags on a travelling belt 65 when they are transported between hot pressure rolls as at 53, for heat sealing the plastic ply, thence past a hot air blast 57a for reactivating the thermoplastic adhesive, thence under an end folding device 60a, and thence between pressure rolls as at 63 for sealing closed.

Referring now to FIGS. 12-18 inc., in order to remove from a bag 52 filled with a packaged material and sealed closed top and bottom as in FIG. 11, the thermoplastic ply and therein sealed packaged contents without rupturing said ply, the bag is opened in the outer plies only, by pulling on the tear cord 37 as in FIG. 12, thereby to expose as in FIG. 13, the upper sealed end 56 of the plastic ply 55. Since as above pointed out, the plastic ply is only lightly adhered to the contiguous paper ply, all paper plies may now be torn away from the plastic ply in the manner illustrated at 71, 72, in FIGS. 14-17 inc. and the unruptured plastic ply 55 as filled with the packaged contents, thus obtained intact, as shown in FIG. 18.

The heat sealable thermoplastic inner ply in bags of the invention may be made of various materials, such for example as polyolefines such as polyethylene and polypropylene, polyamides such as nylon and polyesters such as polyalkylene derivatives of polycarboxylic acids especially polyethylene terephthlate.

Reverting to FIGS. 2 and 5, the bonding together of the paper plies 12-14 inc. at the top and base of the bag thereby imparts to the bag closure at each end the combined strength of all said plies by reason of the integration of the plies thereat into a single ply of the thickness of all said plies. It will be noted with reference to FIG. 2 that in effecting the bag closure at the lower bag end, the plastic inner ply 10 and contiguous paper ply 11, are folded over as at 19a with the remaining outer plies for effecting the closure.

The bag of the invention as heat sealed to closure in the plastic ply at both bag ends and as further sealed to closure in the paper plies at both bag ends, provides a sift proof and leak proof bag throughout, and one which is resistant throughout to insect penetration.

I claim:

1. A bag of tubular form open at one end and closed at the other end, comprising a plurality of contiguous plies of flexible sheet material bonded together adjacent each of said ends, and an innermost ply of heat sealable plastic material lightly bonded adjacent said bag ends to the contiguous paper ply for manual detachment therefrom, said bag being longitudinally and reversely creased along diametrically opposed portions to provide a pair of oppositely disposed gussets interposed between front and rear wall portions, at least some of the inner plies being stepped progressively upward with respect to the outer ply in the front wall portion at the open bag end, at least the outermost ply being stepped upwardly with respect to the innermost ply in the rear wall portion at the open bag end to provide an exposed overlap rear wall portion with respect to the innermost ply of said front wall portion, at least

portions of said gussets extending above said front wall portion at said open bag end and terminating within said overlap rear wall portion to provide exposed portions of said gussets, said overlap rear wall and exposed gusset portions being coated with a reactivatable adhesive at said open bag end, the bag construction at said closed end being the reverse of that at the open end, said plastic ply being heat sealed to closure adjacent said closed end, the exposed overlapping rear wall portion and exposed gusset portions thereat being folded over with said heat sealed end of said plastic ply and sealed to closure against the opposite wall portion, said bonding together of said paper plies at said end thereby imparting to said closure the combined strength of all such plies, the open end of said bag being adapted for heat sealing of said plastic ply and closure similarly to that of said closed end and said bag when so closed at both ends being sift and leak proof, and resistant to insect penetration and being adapted for opening of said paper plies and removal of said plastic ply intact.

2. A bag of tubular form open at one end and closed at the other end, comprising a plurality of outer contiguous plies of flexible sheet material bonded together at each of said ends, but being otherwise detached from one another, and an innermost ply of heat sealable plastic material lightly bonded adjacent said bag ends to the contiguous outer ply for manual detachment therefrom, said bag being longitudinally and reversely creased along diametrically opposed portions to provide a pair of oppositely disposed gussets interposed between front and rear wall portions, at least some of the inner plies being stepped progressively upward with respect to the outermost ply in the front wall portion at the open bag end, at least some of the outer plies being stepped progressively upward with respect to the innermost ply in the rear wall portion at the open bag end and said rear wall portion extending above said front wall portion at said end to provide an exposed overlap rear wall portion with respect to said front wall portion, at least the rear portions of said gussets extending above said front wall portion at said end and terminating within said overlap rear wall portion to provide exposed portions of said gussets, said exposed rear wall overlap portion and exposed gusset portions being coated with a heat reactive adhesive in a dormant state at said open bag end, the bag construction at said closed end being reverse of that at the open end, said plastic ply being heat sealed to closure adjacent said closed end, and the overlapping rear wall portion and exposed gusset portions thereat being folded over with said sealed end at said plastic ply and sealed to closure against the opposite wall portion, said bonding together of said plies at said end thereby imparting to said closure the combined strength of all said plies, the open end of said bag being adapted for heat sealing of said plastic ply and closure similarly to that of said closed end, and said bag when so closed at both ends being sift and leak proof and resistant to insect penetration, and being adapted for opening of said paper plies and removal of said plastic ply intact.

3. A bag of tubular form open at one end and closed at the other end, comprising a plurality of at least three outer plies of flexible sheet material bonded together at said ends, respectively, but being otherwise detached from one another, and an innermost ply of heat sealable plastic material lightly bonded adjacent said bag ends to the contiguous outer ply for manual detach-

ment therefrom, said bag being longitudinally and reversely creased along diametrically opposed portions to provide a pair of oppositely disposed gussets interposed between front and rear wall portions, at least some inner plies being stepped progressively upward with respect to the outer ply in the front wall portion at the open bag end, at least some of said plies being stepped progressively upward with respect to the innermost ply in the rear wall portion at said bag end said rear wall portion extending above said front wall portion at said end to provide an exposed overlap rear wall portion with respect to said front wall portion, said gussets extending above said front wall portion and terminating at said open bag end within said overlap rear wall portion, and the rear portions of said gussets being stepped upwardly with respect to the front portions thereof to provide exposed front and rear gusset portions thereof, said exposed overlap rear wall portion and said exposed gusset portions being coated with a heat reactivatable adhesive in a dormant state at said open bag end, the bag construction at said closed end being the reverse of that at the open end, said plastic ply being heat sealed to closure adjacent said closed end, and the exposed overlapping rear wall portion and exposed gusset portions thereat being folded over with said sealed end of said plastic ply and sealed against the opposite wall portion, said bonding together of said plies at said end thereby imparting to said closure the combined strength of all said plies, the open end of said bag being adapted for heat sealing of said plastic ply and closure similarly to that of said closed end, said bag when so closed at both ends being sift proof and leak proof throughout and resistant to insect penetration.

4. A bag of tubular form comprising a plurality of at least three outer plies of flexible sheet material bonded together at each end thereof, and an innermost ply of heat sealable plastic material lightly bonded adjacent said bag ends to the contiguous outer ply for manual detachment therefrom, said bag having a front surface and an oppositely disposed rear surface extending beyond and overlapping said front surface at said open end of said tube when said bag is in its assembled condition, said bag being longitudinally and reversely creased along diametrically opposed portions to provide a pair of oppositely disposed gussets interposed between said front and rear surfaces, each of said gussets having an exposed front portion and an exposed stepped rear portion adapted to overlap said front portion within the overlapped area of said front and rear surfaces at said one end of the tube when said bag is in its assembled condition, at least some of the bag plies being stepped one beyond another at said end in each of said front and rear surfaces to provide exposed portions thereof, at least some of said bag plies being stepped one beyond another in each of said front and

rear gusset portions at said one end of said tube, a bonding agent in a dormant state applied to said exposed gusset portions and over said overlap portion of said rear surface at said one end of said bag, the bag construction at said closed end being the reverse of that at said open end, said plastic ply being heat sealed to closure adjacent said closed end, and the overlap rear surface portion and exposed gusset portions thereat being folded over with said sealed end of said plastic ply and sealed to closure against the opposite surface portion, said bonding together of said plies thereat thereby imparting to said closure the combined strength of all said plies, the opposite end of said bag being the reverse of said one end and adapted for heat sealing of said plastic ply and closure similarly to that of said closed end, and said bag when so closed at both ends being leak proof, sift proof and impervious to insect penetration throughout.

5. A bag of tubular form open at one end and closed at the other end, comprising a plurality of at least three contiguous plies of paper bonded together adjacent said ends, and an innermost ply of heat sealable plastic material lightly bonded adjacent said bag ends to the contiguous paper ply for manual detachment therefrom, said bag being longitudinally and reversely creased along diametrically opposed portions to provide a pair of oppositely disposed gussets interposed between front and rear wall portions, said rear wall portion being stepped upwardly at said open bag end beyond said front wall portion to provide an exposed overlap rear wall portion thereof, at least some of said plies being progressively stepped in each of said front and rear wall portions at said end of said bag, said gussets extending at said open bag end beyond said front wall portion and terminating within said rear wall overlap portion, to provide exposed front portions and exposed stepped up rear portions of said gussets, said exposed overlap rear wall portion and said exposed gusset portions being coated with a reactivatable adhesive, said closed bag end being the reverse of said open bag end, said plastic ply being heat sealed to closure adjacent said closed end, and the overlapping portion thereat being folded over with said sealed end of said plastic ply and sealed to closure against the opposite wall portion, said bonding together of said plies at said end thereby imparting to said closure the combined strength of all said plies, the open end of said bag being adapted for heat sealing of said plastic ply and closure similarly to that of said closed end, and said bag when so closed at both ends being sift and leak proof and resistant to insect penetration, and being adapted for opening of said paper plies and removal of said plastic ply intact.

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