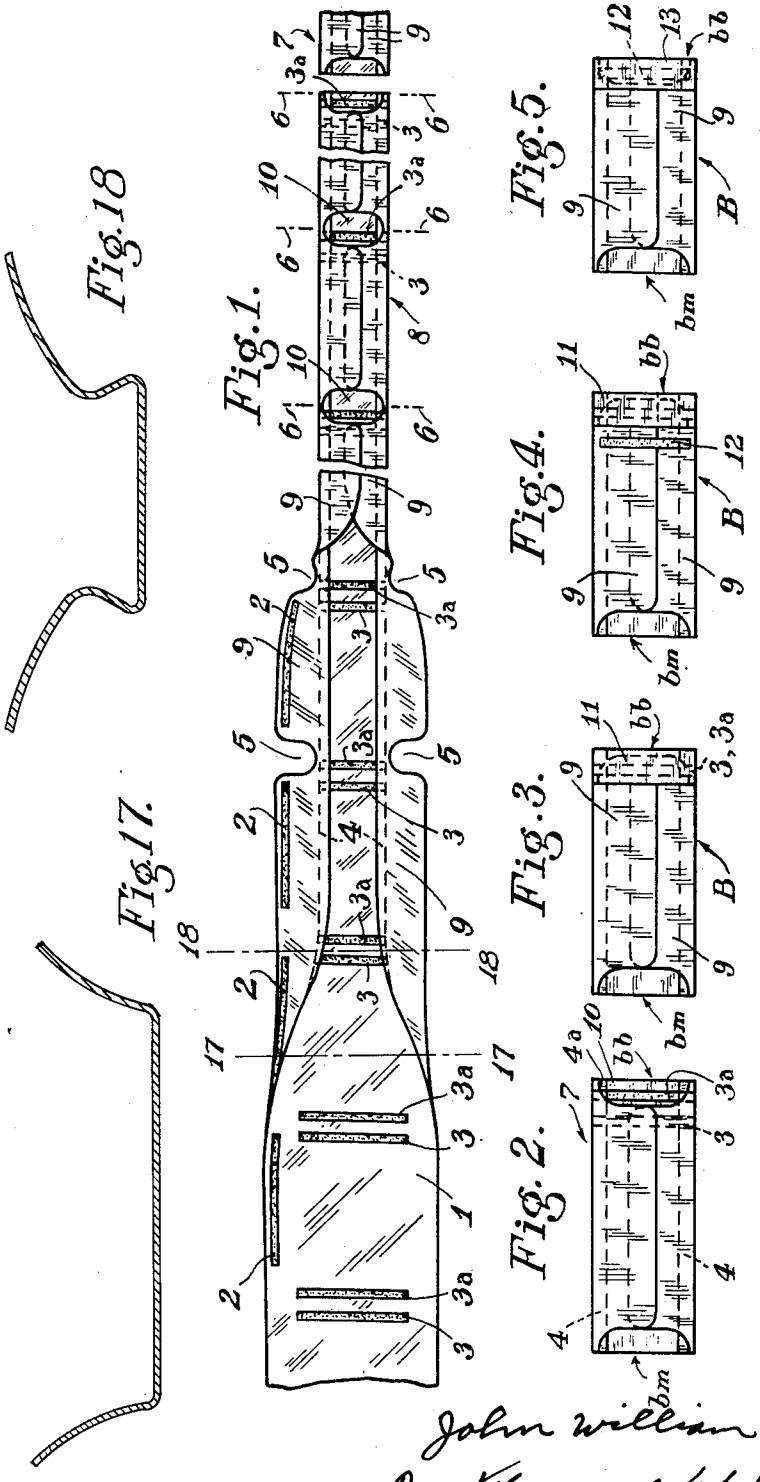
March 13, 1956 J. W. RANDALL 2,737,860

METHOD OF MANUFACTURING TUBULAR BAGS, ENVELOPES AND LIKE CONTAINERS WITH FOLDED ENDS

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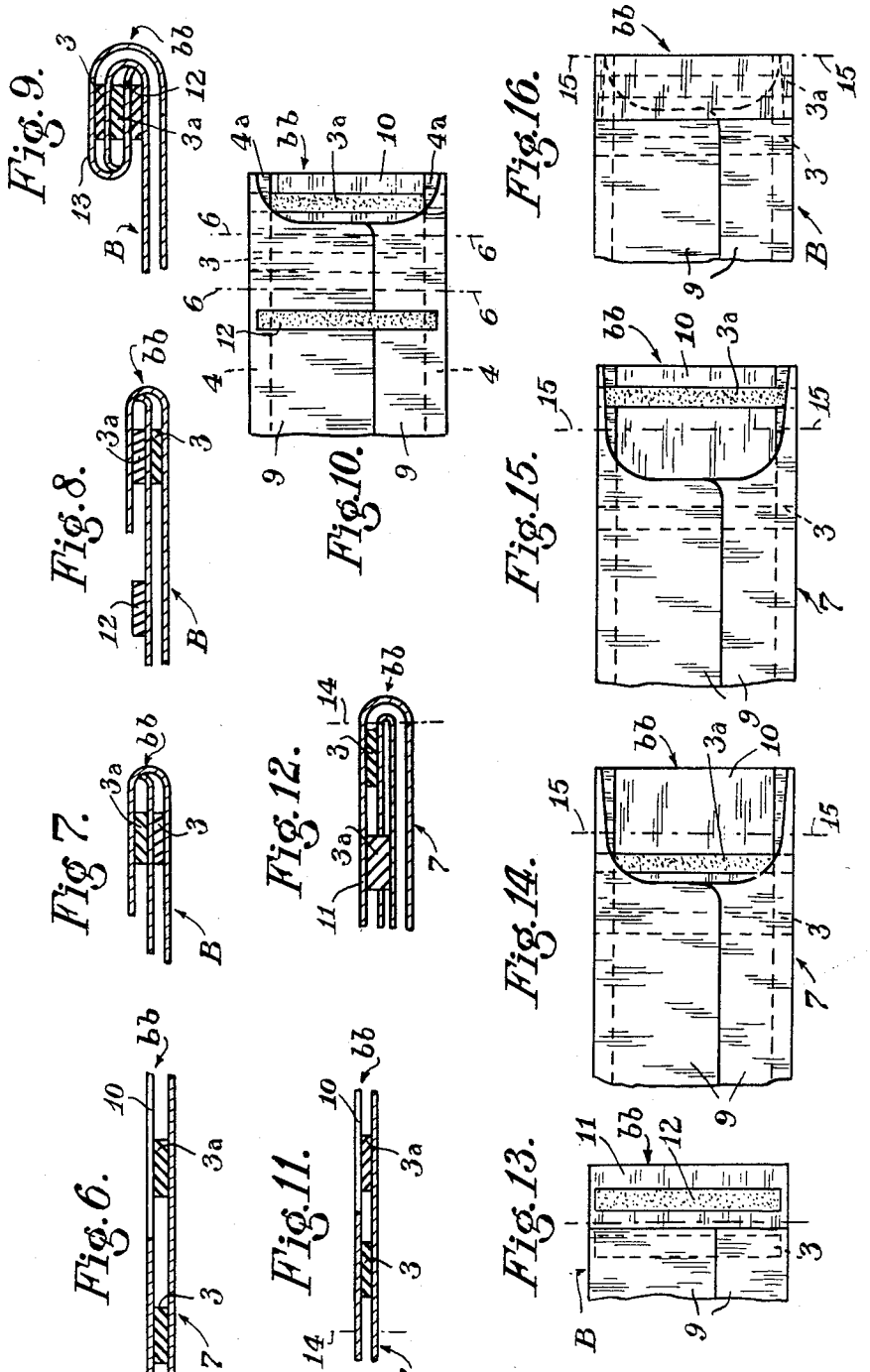


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METHOD OF MANUFACTURING TUBULAR BAGS, ENVELOPES, AND LIKE CONTAINERS WITH FOLDED ENDS

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10 Claims. (Cl. 93—35)

The present invention relates to the manufacture of bags, envelopes and like containers, hereinafter referred to as bags, from paper, cellulosic and other flexible sheet materials suitable for the purpose, and is applicable with considerable advantage, although not restricted, to the manufacture of bags from machine made bag tubes formed from continuous webs of bag-making material.

Bags formed by folding over one end of a bag tube of suitable length and securing the infolded face of the fold to the external wall of one side of the bag tube and securing the opposed faces of the folds together (when two or more bottom folds are formed) are satisfactory in use for many purposes but are not properly powderproof. Thus, finely granular powders and like substances tend to work around and between the bottom folds of such bags, particularly at the corners or ears of the folds, thus forcing the folds apart and eventually bursting the bags in addition to leaking therefrom.

In order to overcome the above mentioned disadvantage, in manufacturing bags with double fold bottoms produced by forming a bag tube from a web of material and then twice folding over the bottom end of a tubular bag length severed therefrom, it has previously been proposed to apply transverse stripes of adhesive to the inner face of the web, prior to forming the bag tube therefrom, so that the internal walls of each tubular bag length severed from the bag tube formed from the web are united by a single stripe of adhesive extending across the entire width thereof at the place intended to become the folded bottom of the bag, and then to apply two stripes of adhesive to the external wall of one side of the severed tubular bag length in the region of the bottom end folds thereof, in order to secure the two bottom folds, when made, to the external wall of the bag tube and to each other.

The primary object of this invention is to provide a modified and improved method of producing tubular bags with powderproof bottom end folds, and another object of the invention is to produce modified and improved forms of tubular bags with powderproof bottom end folds.

According to the present invention, provision is made of a method of producing a tubular bag with a folded bottom whereby adhesive is applied to that surface of a bag blank which will constitute the bottom end fold area of the internal walls of a bag tube formed from the blank, and a portion of each of the longitudinal margins of the blank is cut away in the said bottom end fold area so that when the bag tube is formed by folding the longitudinal margins of the blank inwards over the centre part thereof, the internal walls of the formed bag tube are united and sealed by the adhesive in its bottom fold area and across the entire width thereof, while some part of the internally applied adhesive is exposed through an opening formed by the cut away marginal portions of the bag blank so as to secure the inturned face of the transverse bottom end fold or first such transverse end fold to a wall of the bag tube and seal the bottom end fold so formed to close the bottom end of the bag tube.

If the bag formed as above described is to be provided with a second bottom end fold or two or more subsequent bottom end folds, at least one additional stripe of adhesive will be applied to the external wall of one side of the bag tube in the bottom end fold area thereof, prior to completing the said bottom end fold or subsequent bottom end folds in order to secure the said second or subsequent end folds, when made, to the bag tube side. Alternatively, or in addition to the use of the last mentioned externally applied stripe or stripes of adhesive, a stripe or stripes of adhesive may be applied to the external face or faces of one or more of the subsequently formed bottom end folds in order to secure the fold or folds to the side of the bag tube.

The method of this invention is equally applicable to the manufacture of plain or flat bags with single fold or multi-fold bottoms and gusset-sided satchel bags with single fold or multi-fold bottoms and lends itself with considerable advantage to the production of either flat or satchel bags with scalloped mouths.

Both flat and satchel bags produced by the method of this invention are rendered powderproof for the reason that the bottom of the bag tube, including the bottom corners or ears thereof, are completely sealed even before the bottom end folding is effected and the first bottom end fold then unites with the exposed portion of the internally applied adhesive to form a second seal disposed to the outer side of the seal formed by adhesively uniting the internal walls of the bag tube.

Modes of carrying the method of this invention into effect, more particularly as applied to the production of gusset folded satchel bags with double folded bottoms from a continuously formed machine-made bag tube will hereinafter be further described, by way of example and without implied limitation of the scope of the invention, with reference to the accompanying purely diagrammatic drawings in which:

Fig. 1 shows, in top plan view, the successive stages of forming a web of paper or other suitable bag-making material into a continuous bag tube with longitudinal gusset folds and cut-away bottom end fold areas and obtaining tubular bag lengths therefrom for the production of tubular bags in accordance with the invention;

Figs. 2–5 are top plan views of the tubular bag lengths, drawn to a larger scale, showing the successive stages of forming a gusset sided satchel bag of tubular formation with a double fold substantially powderproof bottom;

Figs. 6–9 are greatly exaggerated fragmentary cross sectional views of the bottom end fold areas and folds of the tubular bag lengths shown in Figs. 2–5 respectively;

Fig. 10 is a fragmentary top plan view, drawn to a larger scale, to show in detail the disposition of the transverse adhesive stripes applied to the bottom end fold area of the tubular bag length;

Fig. 11 is a greatly exaggerated fragmentary cross sectional view of the bottom end fold area of a tubular bag length showing the relative disposition of the internally disposed adhesive stripes and transverse bottom end fold line when the bag length is to be closed by one bottom end fold line only;

Fig. 12 is a cross sectional view similar to Fig. 11 but showing the single bottom end fold formed to close the bottom end of the tubular bag length;

Fig. 13 is a fragmentary top plan view showing an alternative disposition of the transverse adhesive stripe for securing the second bottom end fold to the bag tube and sealing it.

Figs. 14 and 15 are fragmentary top plan views, drawn to a larger scale, showing alternative relative positions of the transverse adhesive stripes and fold line of the first bottom end fold in the bottom end fold area of the tubular bag length, and

Fig. 16 is a corresponding fragmentary view showing the first transverse bottom end fold formed.

Figure 17 is an enlarged sectional view on line 17—17 of Figure 1.

Figure 18 is an enlarged sectional view on line 18—18 of Figure 1.

Referring to Fig. 1 of the accompanying drawings, a web **1** of paper or other suitable bag-making material may be fed from a supply reel to gusset-fold forming and bag forming means of any suitable form of tubular bag making machine. In travelling from the first gusset-fold forming means, the web **1** receives adhesive from a first adhesive-applying station having means for applying the usual longitudinal seaming stripes of adhesive **2** to the inner face of one longitudinal margin of the web and means for applying at least two narrow transverse stripes of adhesive **3**, **3***a* to the inner surface of the web, the length of each transverse stripe being equal to the full width of the flat folded bag tube subsequently produced from the web plus the combined depths of the longitudinal gusset folds produced in forming the bag tube from the web. Alternatively, the transverse adhesive stripes **3**, **3***a* may extend across the entire width of the unfolded web.

Again alternatively, the area bounded by each pair of transverse adhesive stripes **3**, **3***a* may be covered by a single wider stripe or patch of adhesive.

Each pair of adhesive stripes **3**, **3***a*, or wider adhesive stripe or patch is disposed in the bottom end fold area of a tubular bag length subsequently to be severed from the formed bag tube.

The adhesive-treated web is then engaged in the first gusset fold means which serve to tuck in the longitudinal marginal portions of the web to form the first gusset folds **4** therein. After the first gusset folds **4** are made, portions are removed from each longitudinal margin **9** of the web to provide slots or notches **5** oppositely aligned and extending inwards almost to the depth of the first gusset folds **4** and disposed so as to extend to each side of the transverse lines **6** along which the tubular bag lengths **7** are subsequently severed from the continuously formed bag tube **8**.

The web may thereafter be engaged in final gusset-fold and tube forming sections or means which complete the second gusset folds **4***a* and infold the longitudinal margins or flaps **9** of the web into overlapping relation for securing together by the previously applied seaming stripes of adhesive **2**, thereby forming the bag tube **8**. In this tube-forming operation, the inner faces of the infolded longitudinal margins or flaps **9** are united to inner faces of the gusset folds, **4**, **4***a*, and the central part of the web **1** by the stripe **3** of each pair of transverse stripes of adhesive (or a part of each wider stripe or patch of adhesive) previously applied to the inner face of the web. At the same time, the oppositely aligned slots or notches **5** are brought together with the open ends thereof in register to form elongated e. g. substantially oval slot-like openings **10** through which some part of the other stripe **3***a* of each pair of transverse adhesive stripes (or some part of each single wider stripe or patch of adhesive) is exposed.

The bag tube **8** thus formed is then severed along the transverse severing lines **6** intersecting the adhesive-exposing slot-like openings **10** formed by the said notches or slots **5**. As shown in Fig. 2, each tubular bag length **7** severed from the continuous bag tube **8** has one end thereof, i. e. the bag mouth end *bm*, entirely clear of transversely applied adhesive while one of the mouth end edges is cut away or scalloped. The other end of the bag length **7**, i. e. the bottom fold end *bb*, has the inner walls of its sides secured together and sealed by the internally applied transversely extending stripes of adhesive **3** and the bottom fold end of that one of the said sides formed by the longitudinal fold flaps **9** is cut away or scalloped to expose the internally applied adhesive stripe **3***a*, as also shown in Fig. 6.

The tubular bag length **7** is then progressed to bottom end fold forming means and the first bottom end fold **11** made, thus bringing the inturned face of the bottom fold and exposed part of the internally disposed adhesive stripe **3***a* into contact with the external bag wall formed by the infolded marginal portions **9**. The bottom end fold **11** is secured by the adhesive to the side of the bag tube, whilst the adhesive forms a second seal between the external wall of the bag tube and those parts of the second formed gusset folds **4***a* and internal wall of the opposite side of the bag tube which are exposed through the opening formed in the first mentioned side of the bag tube. Thus, the bag B as shown in Figs. 3 and 7 is produced.

In the further alternative arrangements shown in Figs. 14, 15 and 16, the slot-like openings **10** are widened so that one of the sides of the bottom fold end *bb* of the severed bag length **7** is cut away or scalloped to a considerable depth, thereby to enable the first bottom end fold **11** to be formed by transversely folding the scalloped bottom end part upon itself about the fold line **15**. When the fold line of the first bottom end fold is thus disposed, the transverse stripe of adhesive **3***a* which is exposed by the cut away or scalloped bag tube end, may be set to one side of the fold line so as to be contained in that part of the bottom end fold area of the bag tube which is covered by the folded over bottom end fold **11**, as shown in Fig. 14, or may be disposed to the opposite side of the fold line **15** so as to be contained in the area of that part of the bag tube which is folded over to form the bottom end fold **11**. In either case, as shown in Fig. 16, the adhesive stripe **3***a* will act to secure the inner face of the bottom end fold **11** to the internal wall of the opposite side of the bag tube and seal the end closing fold thus made.

The tubular bag length with its bottom end once folded to form the tubular bag B is then forwarded to a second adhesive-applying station to receive a stripe of adhesive **12** applied across the external wall of the bag side in the area to be covered by the second bottom end fold when made, as shown in Figs. 4 and 8.

The bag B is then presented to a second bottom end fold forming means and the once folded bottom end *bb* thereof again folded so that the infolded face of the second bottom fold **13** is brought into contact with the externally applied transverse stripe of adhesive **12** and secured thereby to the wall of the bag. Alternatively, the externally applied fold-securing adhesive stripe **12** may be applied before the first formed bottom end fold **11** is made, as shown in Fig. 10.

Again alternatively, as shown in Fig. 13, the transverse stripe of adhesive **12** for securing and sealing the second bottom end fold **13** can be applied to the external face of the first formed bottom end fold **11** prior to the formation of the second bottom end fold. If so desired, adhesive stripes **12** may be applied to the external faces of both the first formed bottom end fold **11** and the external wall of the bag tube so as to meet face to face when the second bottom end fold **13** is made.

The above described bottom end closing fold forming procedure may be limited to the formation of the aforesaid first bottom end fold **11**, in which case the step of applying the external transverse stripe of adhesive **12** to the bag tube or bag need not be taken. In this case, as shown in Figs. 11 and 12, it is at present preferred to fold the open bottom of the severed bag tube length **7** about a transverse fold line **14** forwardly inset beyond both of the transverse stripes of adhesive **3** and **3***a* so that both adhesive stripes are carried over with the bottom end

fold 11 and the adhesive stripe 3a, which is exposed through the opening 10, is brought into contact with the bag wall in forwardly offset relation to the adhesive stripe 3, thereby to secure the single bottom end fold 11 to the wall of the bag tube and effect a second or double seal which assists in rendering the closed bag bottom powderproof.

The omission of the gusset fold forming operations from the above described procedure is all that is necessary to produce plain or flat tubular bags with single or double fold bottoms by the method of the present invention.

It it is desired to produce bags with straight lip mouths, the aforesaid notches 5 will be disposed entirely to one side of each transverse severing line 6 of the web so that in each case the entire notch lies in the fold area of the bottom end of the bag length severed from the bag tube.

The method of this invention may also be applied with advantage to the manufacture of powderproof bags from pre-cut individual blanks which are first folded longitudinally into either a plain or gusset folded form of bag tube and the bottom end thereof transversely folded to form a closed and sealed bottom of the bag.

We claim:

1. A method of producing a tubular bag with a folded bottom end, including the steps of applying at least one longitudinal seaming stripe of adhesive to at least one of the longitudinal margins of a bag blank, applying adhesive transversely across that surface of the said bag blank which will constitute the bottom end fold area of the internal walls of a bag tube formed from the said bag blank, cutting away a porton of each of the said longitudinal margins of the said bag blank to leave marginal openings in the said bottom end fold area thereof, the transversely applied adhesive and openings being relatively positioned to expose a portion of the adhesive transversely through the openings, folding the said longitudinal margins of the said bag blank inwards over the longitudinal centre part thereof so that said longitudinal margins overlap and are secured together by said seaming stripe of adhesive to form said bag blank into a bag tube, and said marginal openings combine to form a slot-like opening in the said bottom end fold area of one side of the bag tube, and so that the internal walls of the formed bag tube are united and sealed by the transverse adhesive in the said bottom end fold area and across the entire width thereof folding the bottom end of said bag tube along a transverse fold line so as to secure the said transverse bottom end fold to a wall of the said bag tube by means of the adhesive exposed through the said opening in the bag tube side and thereby sealing the said bottom end fold so formed to close the bottom end of the said bag tube.

2. The method claimed in claim 1, including the step of applying adhesive to the inner surface of the said bag blank in at least two stripes extending transversely of the blank so that at least one of the said adhesive stripes lies between opposed inner walls of the sides of the said bag tube whilst at least one other of the said transversely extending stripes of adhesive is in part exposed through the said opening formed in the said bottom end fold area of one side of the said bag tube.

3. The method claimed in claim 1, including the step of applying a wide patch of adhesive to the said bag blank transversely thereof so that one part of the said patch lies between opposed inner walls of the sides of the said bag tube, whilst the other part of said adhesive patch is exposed through the said opening formed in the said bottom end fold area of one side of the said bag tube.

4. The method claimed in claim 1, including the step of disposing the said transversely applied adhesive which unites the inner opposed walls of the said bag tube so that one part of the said adhesive is contained in the area of that bottom end part of the said bag tube which is folded over to close and seal the bottom end of the said bag tube, and the other part of the said transversely applied adhesive is contained in the bottom end fold area of the said bag tube which is covered by the said folded over end part of the said bag tube.

5. The method claimed in claim 1, including the step of disposing the said transversely applied adhesive which unites the inner opposed walls of the said bag tube so that the whole of the said adhesive is contained in the area of that bottom end part of the said bag tube which is folded over to close and seal the bottom end of the said bag tube.

6. A method of producing a tubular gusset folded satchel bag with a folded bottom end, including the steps of applying at least one longitudinal seaming stripe of adhesive to at least one of the longitudinal margins of a bag blank, applying adhesive transversely across the surface of the said bag blank which will constitute the bottom end fold area of the internal walls of a bag tube formed from the said bag blank, cutting away a portion of each of the said longitudinal margins of the said bag blank to leave marginal openings in the said bottom end fold area thereof, tucking in the said longitudinal margins of the said bag blank to form the first longitudinal gusset folds therein, folding the said margins inwards over the longitudinal centre part of the said blank so that the second gusset folds are formed and the said margins overlap and are secured together by the said seaming stripe of adhesive to form the said bag blank into a gusset folded bag tube, and said marginal openings combine to form a slot-like opening in the said bottom end fold area of one side of the said bag tube, said transversely applied adhesive extending across the said web for a distance at least equal to the entire width of the formed flat folded bag tube plus the depth of each gusset fold formed therein, so that the opposed internal walls of the formed bag tube and said gusset folds are united and sealed by the adhesive in the said bottom end fold area and across the entire width thereof, while some part of the transversely applied adhesive is exposed through the said opening formed in the bag tube side, and folding the bottom end of the said bag tube along a transverse fold line so as to secure the said transverse bottom end fold to a wall of the said bag tube by means of the adhesive exposed through the said opening in the bag tube side and thereby sealing the said bottom end fold so formed to close the bottom end of the said bag tube.

7. The method claimed in claim 6, including the step of applying adhesive to the inner surface of the said bag blank in at least two stripes extending transversely of the blank so that at least one of the said adhesive stripes lies between opposed inner walls of the sides of the said bag tube, whilst at least one other of the said transversely extending adhesive stripes is in part exposed through the said opening formed in the said bottom end fold area of one side of the said bag tube.

8. The method claimed in claim 6, including the step of disposing the said transversely applied adhesive which unites the inner opposed walls of the said bag tube so that one part of the said adhesive is contained in the area of that bottom end part of said bag tube which is folded over to close and seal the bottom end of the said bag tube, and the other part of the said transversely applied adhesive is contained in the bottom end fold area of the said bag tube which is covered by the said folded over part of the said bag tube.

9. The method claimed in claim 6, including the step of disposing the said transversely applied adhesive which unites the inner opposed walls of the said bag tube so that the whole of the said adhesive is contained in the area of that bottom end part of the said bag tube which is folded over to close and seal the bottom end of the said bag tube.

10. The method as claimed in claim 1, including the step of applying the adhesive which is exposed through the said opening formed by the said cut away portions

of the said bag blank so that the said adhesive is contained in the area of that bottom end part of the said bag tube which is folded over to close and seal the said bottom end of the said bag tube and so that the said adhesive so exposed acts to secure the inturned face of the bottom end fold to an external wall of the said bag tube.

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