Aug. 28, 1951 H. H. ORR 2,565,622

VALVE BAG

Filed Oct. 6, 1945 2 Sheets-Sheet 1

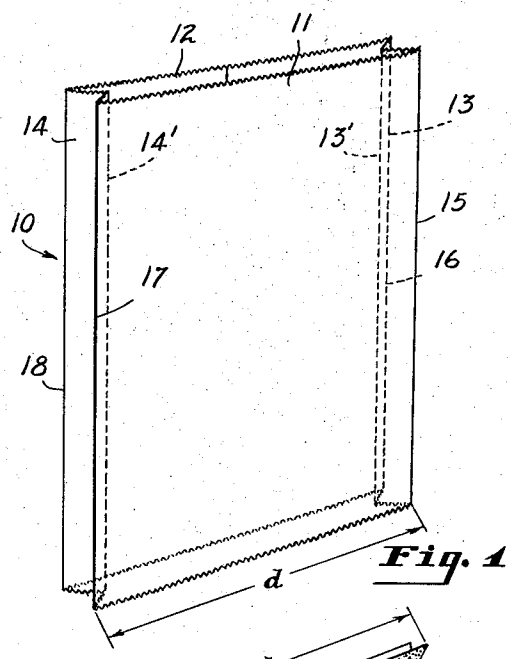


Fig. 1

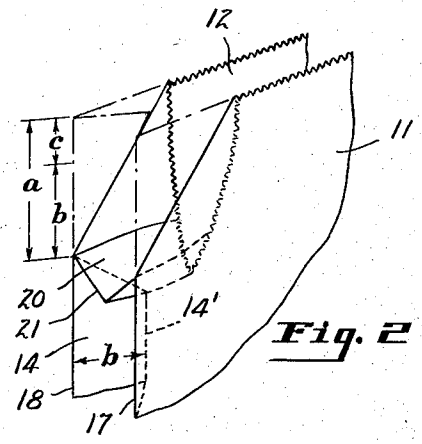


Fig. 2

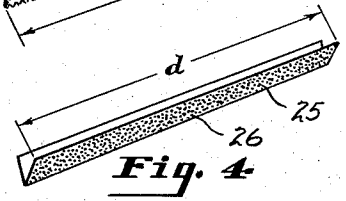


Fig. 4

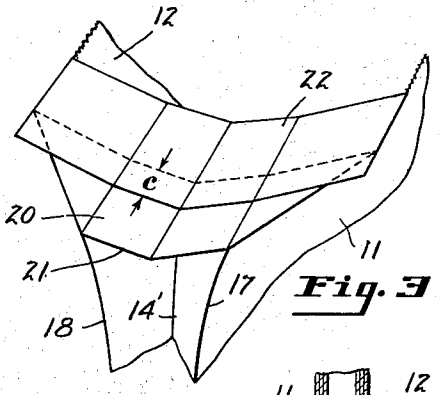


Fig. 3

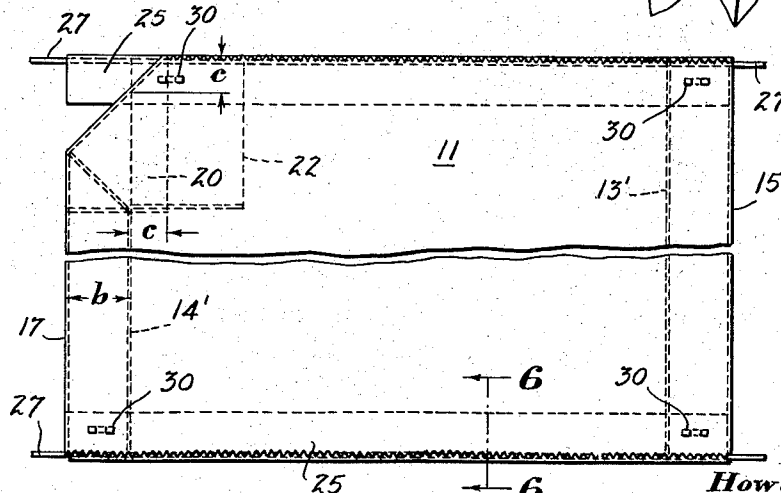


Fig. 5

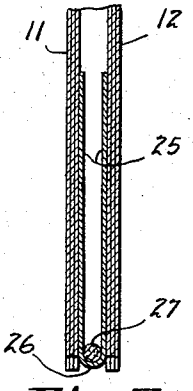


Fig. 6

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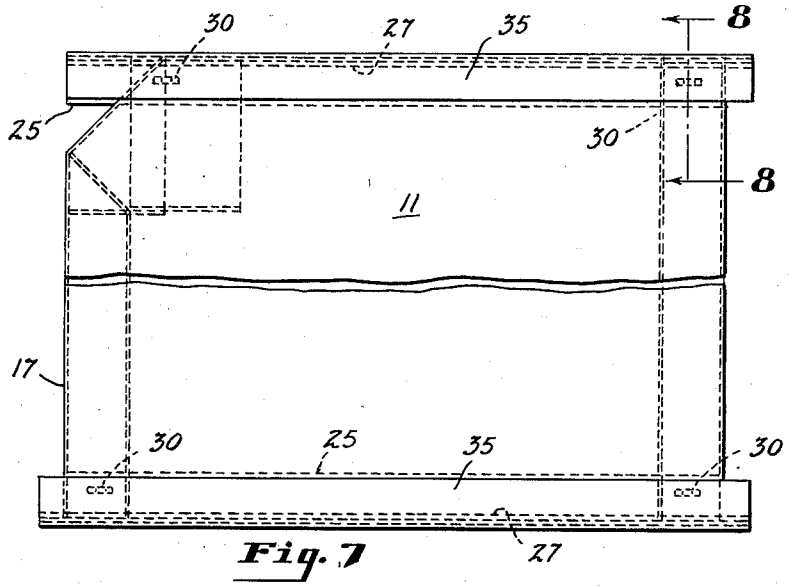


Fig. 7

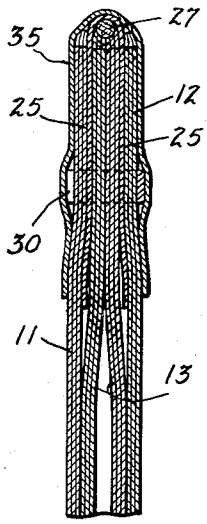


Fig. 8

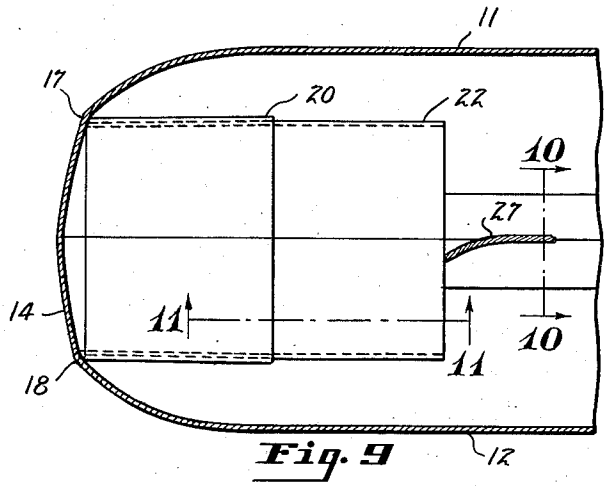


Fig. 9

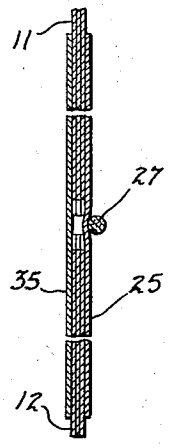


Fig. 10

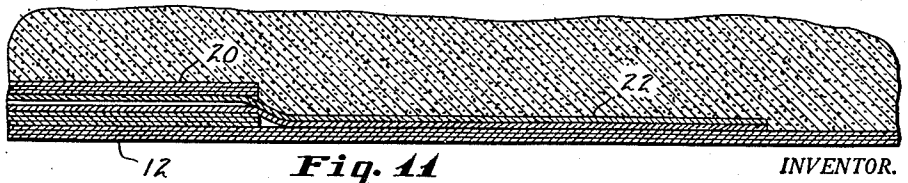


Fig. 11

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Patented Aug. 28, 1951

2,565,622

UNITED STATES PATENT OFFICE

2,565,622

VALVE BAG

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Application October 6, 1945, Serial No. 620,693

4 Claims. (Cl. 229—62.5)

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This invention relates to an improvement in paper bags, and, more particularly, to an improvement in multi-wall valve bags such as used for packaging powdered or granular materials, especially heavy powdered or granular materials such as cement, plaster, and the like.

It is an object of this invention to provide a multi-wall valve bag which does not waste a portion of the length of the tube of multi-ply paper from which the bag is formed in order to provide a valve structure for the bag. Heretofore, in cutting a bag-length from tubed multi-ply stock, it was necessary to cut away a portion of the tube to provide a projection beyond one corner of the bag-length, which projection was tucked in to provide the valve flaps for the bag. I effect a substantial economy in the manufacture of valve bags by providing a valve structure and a bottom structure which permits each bag-length to be severed straight across the multi-wall tube and also permits the full amount of multi-wall paper tubing in each severed bag-length to be used in the actual walls and bottom structures of my bag. As a consequence, approximately ten per cent more bags made according to my invention can be manufactured from a given length of multi-wall tubing than could be manufactured if the tubing were used to make prior art types of multi-wall bags of equal capacity.

It is a particular advantage of my invention that I not only effect a substantial economy in multi-wall paper tubing, but in doing so I also provide an improved and better sealing valve structure and a stronger bottom structure. Bags made according to my invention are practically sift-proof, both at the valve and at the junction of the bottom and the side gussets. Due to the sealing string used in sealing the junction between the bottom and the side gusset, the bag bottom is not sharply creased and thereby weakened during storage; the sealing string may also be used for ripping the bag open.

Other objects and advantages of my invention will be apparent from the following specification, claims and drawings, in which

Fig. 1 is a perspective view of a bag-length of multi-wall tubing from which my bag is made.

Fig. 2 is a detailed perspective view showing the manner of forming the valve pocket in a bag-length of tubing shown in Fig. 1.

Fig. 3 is a view similar to Fig. 2, but showing the application of the separate valve-flap or patch.

Fig. 4 is a perspective view of an inner bottom hinge strip folded for insertion in a length of tubing as shown in Fig. 1.

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Fig. 5 is an elevation of my bag partly completed.

Fig. 6 is a fragmentary cross-section taken along the line 6—6 of Fig. 5.

Fig. 7 is an elevation of my completed bag.

Fig. 8 is a cross-section taken along the line 8—8 of Fig. 7.

Fig. 9 is a detail fragmentary view showing the interior of the bag adjacent the valve when the bag is filled (contents removed in this view.)

Fig. 10 is a fragmentary cross-section showing the hinge-type of bottom employed in my bag, Fig. 10 being taken along the line 10—10 of Fig. 9.

Fig. 11 is an enlarged fragmentary cross-sectional detail taken along the line 11—11 of Fig. 9 and showing the bag valve closed by the contents of the bag.

The bag made according to my invention, as shown in the drawings, is made from conventional multi-ply paper tubing having inwardly pleated side-walls and being commonly used for making multi-wall paper bags; such tubing is comprised of a plurality of plies, each ply being formed into a tube by a longitudinal adhesively secured seam and the seam of one ply being offset with respect to the seam of an adjacent ply so that the thickness of the wall of the tubing is increased at the seams by only the thickness of one ply; to keep the plies from slipping with respect to each other, longitudinal bands of adhesive (not shown) are located between the plies. All adhesive, in my bag, used for forming the multi-ply tubing, as described above, or used elsewhere, as described below, is preferably of a flexible, non-embrittling type having a latex or similar rubbery base.

The tubing, as described above, is cut into desired lengths by suitable cutting means to provide a bag length 10, as shown in Fig. 1, having front and back walls 11 and 12 joined to the side walls 13 and 14 at the longitudinal folds 15—16 and 17—18, the inwardly pleated side walls 13 and 14 being folded along the longitudinal medial fold lines 13' and 14', respectively.

As shown in Fig. 2, the pleated side wall 14 is opened to form the valve tuck 20. The trapezoidal valve tuck 20 is made by creasing the wall 14 transversely along a line 21 extending between the folds 17 and 18 and then simultaneously folding inwardly the portion of the wall 14 above the line 21 and forming diagonal fold lines extending upwardly from the junction of the lines 17 and 18 with the line 21 to the serrated end of the bag-length; when the tube is flattened after forming the tuck 20, diagonal fold lines extending from the junction of the lines 17 and

18 with the line 21 to the line 14' will be formed in the wall 14 below the line 21, thus allowing the inwardly pleated side wall 14 to "make a right-angle turn" in forming the valve tuck 20. The distance *a* from the line 21 to the edge of the bag length is equal to the distance *b* from the fold 18 to the fold 14' plus the depth *c* of a margin allowed for the staples 30 which secure the corners or ears in the bottom structure described below. Thus, the tuck 21 projects into the bag beyond the fold line 14' for the distance *c* (see Fig. 5.)

With the valve tuck 20 formed, then the valve tuck is opened up so that it is flat or substantially so and the valve-flap 22 is adhesively secured thereto along a seam of a width *c* to form a composite valve structure. As shown in Fig. 3, the valve flap 22 is preferably a single-ply rectangle of paper having a length equal to the base of the trapezoidal valve tuck 20; the width of the valve flap 22 is simply the distance which one desires to have the valve structure extend into the bag. Whereas, the prior art valve flaps were formed out of the tubing from which the bag lengths were cut, thus tempting bag manufacturers to cut short valve flaps in order to reduce the waste of tubing cut away to form the valve flap, it should now be apparent that my composite valve may be provided with a flap of any desired length without wasting any tubing in forming the valve flap.

With the composite valve formed, the open ends of the bag length 10 are closed and my hinge type of bottom structure is formed by means of the inner hinge strips 25, the hinge strip 25 for the lower end of the bag length 10 being shown in Fig. 4. The hinge strip 25, as shown, is simply a single-ply strip of paper having any suitable width and a length *d* equal to the width of the front and back walls 11 and 12. The strip 25 is folded lengthwise along the line 26 into the trough-shape shown and the outer surfaces are coated with adhesive. A sealing string 27 is laid in the fold of the strip 25 and the strip 25 for the non-valved end of the bag-length is then inserted into the opened lower non-valved end of the tube so that the outer sides of the strip are adhered to the inner lower marginal surfaces of the front and back walls and the lower margins of the pleated side walls extend into the ends of the trough formed by the strip. By inserting the strip 25 until the fold line 26 is even with the end of the bag-length (see Fig. 6), the sealing string 27 is pressed into the ends of the pleated side walls 13 and 14, thus packing and sealing the joint between the ends of the pleated side walls 13 and 14 and the inner surface of the folded hinge strip 25. It is because of the packing effected by the sealing string 27 that it is desirable to cut the bag-lengths with a knife which will form a serrated edge; the serrations in the edge of the pleated side walls permit a better packing against the sealing string and permit the serrated edges to be deformed around it. See Fig. 8.) The upper valved end of the bag is similarly closed by another inner hinge strip 25, except, of course, that only one end of the strip and string seal the upper edges of the pleated wall 13, the other end extending between the edges of the folded valve flap 22, as shown.

To secure the sealing and packing of the ends of the pleated side walls and to strengthen the corners of the bag, the corners are stapled with the heavy staples 30 to secure the ends of the strips 25, the ends of the pleated side walls, and

the corners of the front and back walls together. At the valve, the upper corners of the valve-tucks, the front and back walls, and the inner hinge strip are likewise all stapled together, all staples 30 being spaced from the ends of the bag lengths within a suitable margin of the depth *c*. When so sealed and stapled, a partly completed bag 40 is formed, as shown in Fig. 5.

To complete the bag, supplemental outer hinge strips 35, somewhat longer than the inner hinge strips 25, but otherwise similar, are simply adhered over the top and bottom edges of the bag-length 10. The supplemental hinge strips 35 function principally as a reinforcement for the hinge type of end closure employed.

The completed multi-wall valve bag, as shown in Fig. 7, is, of course, stored in the flattened condition. As should be apparent from Figs. 6 and 8, the sealing string 27 also functions to prevent the hinge strips 35 and, particularly, the hinge strips 25 from being sharply creased during storage; such creases would otherwise seriously weaken the bottom structure of the bag.

To fill my valve bag, a filling nozzle is inserted into the opening provided by the valve tuck 20 and pulverent material is flowed into the bag in the usual manner, the pleated side-walls bellowing out and the front and back walls, being spaced by the bellowed side-walls, curving inwardly at the top and bottom to form, with opened hinge type of closures, the top and bottom closure structures for the bag. As the bag fills, diagonal gusset folds in the side walls form in the corners of the bag above the staples 30 at the location indicated by the dot and dash line 37 in the lower right hand corner of Fig. 7.

To close the filled bag, the bag is turned upside down and the weight of the contents flatten and close the valve-tuck 20 and valve-flap 22, as shown in plan in Fig. 9.

Because the staples secure the front, pleated side walls, and back wall together at the corners of the bag, ears are formed at the staples. Otherwise the entire bag-length 10 is utilized in forming walls and bottom structure in the bag. Fig. 10 shows the manner in which the ends of a bag-length are joined together by the opened hinge strips 25 and 35 at either the top or bottom of the bag, forming a substantially butt joint of the multi-ply walls adhesively secured by the hinge strips. The joint is nearly as strong as the multi-ply wall and far stronger than the sewn seams generally used heretofore; further, none of the material of the multi-ply tubing is lost in seaming, as heretofore.

Fig. 11 shows the manner in which my built-up valve provides a better closing valve than the valves which were used heretofore and in which the multi-ply wall stock was used in forming the valve flap. Such heavy multi-ply stock is stiff and resists sharp creasing. Thus, when the valve flap is made entirely of multi-ply stock, a leak permitting sifting remains just inside the creases of the flattened, closed valve. By using my built-up valve having a single ply flap, not only is it possible to provide a long flap without sacrificing tubed multi-ply valve stock, but the thin single ply flap 22 is sharply creased when flattened and closed, thus providing a substantially sift-proof seal for the less completely closed valve tuck 20 of heavy multi-ply stock. The single ply flap 20 is, of course, made of stock amply strong enough to seal the valve tuck and is of sufficient length and strength to prevent the valve tuck from being pushed out by the weight of the con-

tents; because of the tendency to provide the prior art bags with short valves, not only did such short valves tend to sift or leak but, under sudden loads, as by dropping, such short valve flaps would sometimes be forced inside out, allowing the contents to spill; in my bag, the flap renders the built-up valve too long to be turned inside out.

It is to be understood that specific features of my bag may be incorporated in bags which do not employ all the features of the above disclosed preferred embodiment of my invention; my invention, therefore, is not limited to the specific embodiment disclosed but may be modified in whole or in part without departing from the scope of my invention as set forth in the following claims.

What is claimed is:

1. A multi-wall valve bag comprising an open-ended bag-length of multi-ply paper tubing having reentrant pleated side walls and front and back walls, a valve tuck formed in one corner of said bag-length, a flap of paper adhered to said valve tuck and extending inwardly of said tuck to provide a valve flap, a hinge seal for the open non-valved end of said bag comprised of a strip of paper folded to enclose the ends of the pleated side walls and adhered to the inner surfaces of the front and back walls, a hinge seal for the open valved end of said bag-length comprised of a strip of paper folded to enclose the end of the pleated side wall opposite the valved corner and extending across said bag length to a point within the valve tuck, said strip being adhered to the inner surfaces of said front and back walls, and a sealing string located in the fold of each strip and held thereby against the end of a pleated side wall to pack and seal the space between the end of a side wall and the fold in a strip.

2. A bag as defined in claim 1 including staples securing said front and back walls, said pleated side walls and said sealing strips together at the non-valved corners of said bag to reinforce said corners and maintain the seal of the ends of the side wall and reinforcing hinge strips coextensive with the said first hinge strips, said reinforcing hinge strips being adhered to the outer surfaces of said front and back walls.

3. A hinge seal for the open-end of a bag length of paper tubing comprised of front and back walls joined by inwardly pleated side walls along parallel fold lines, said seal being comprised of an inner strip folded to enclose the ends of the pleated side walls and extending across the open end of said bag-length from the said fold lines at one corner to the said fold lines at the opposite corner, adhesive securing said inner strip to the inner surfaces of said front and back walls so that the fold in said strip is substantially flush with the edges of said bag-length, and a sealing string held in the fold of said sealing strip against the ends of the pleated side walls to pack the joint between the ends of said side walls and the fold in said strip.

4. A hinge seal for the open-end of a bag length of paper tubing comprised of front and back walls joined by inwardly pleated side walls along parallel fold lines, said seal being comprised of an inner strip folded to enclose the ends of the pleated side walls and extending across the open end of said bag-length from the said fold lines at one corner to the said fold lines at the opposite corner, adhesive securing said inner strip to the inner surfaces of said front and back walls so that the fold in said strip is substantially flush with the edges of said bag-length, and serrations in the ends of the said side walls, a sealing string held in the fold of said sealing strip against the serrated ends of the pleated side walls to pack the joint between the ends of said side walls and the fold in said strip, a staple securing said side walls, front and back walls and sealing strips together to reinforce the sealed corners and a reinforcing hinge strip covering the edges of said front and back walls and secured to the outer surfaces of said walls.

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