

Jan. 16, 1934.

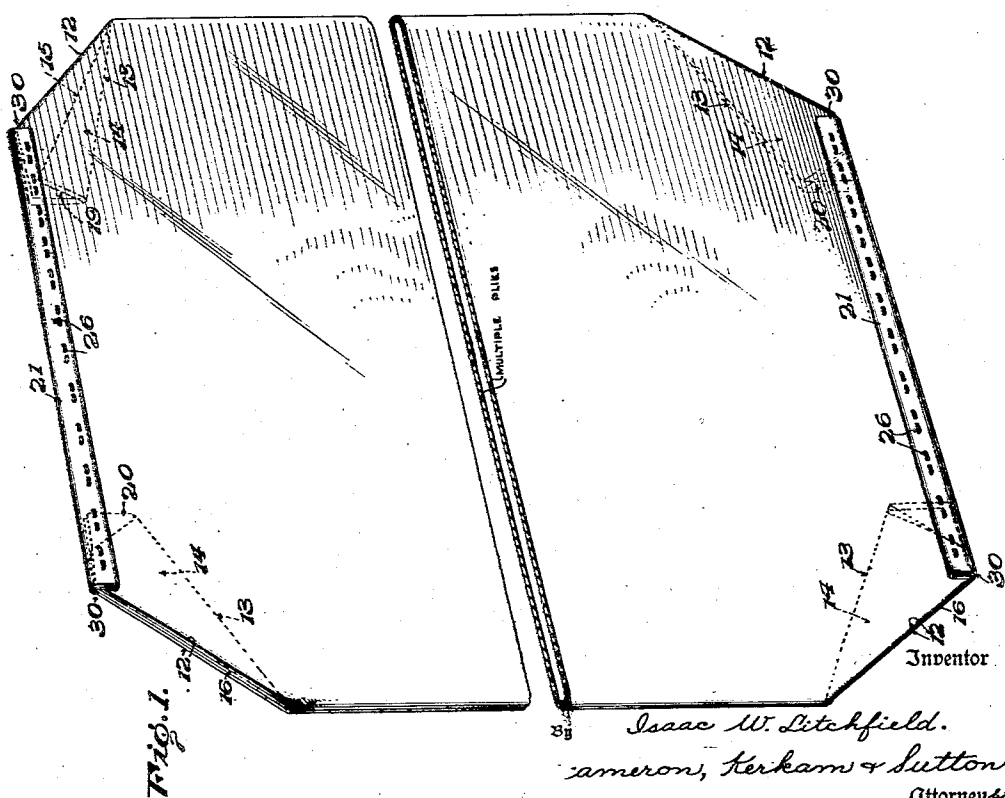
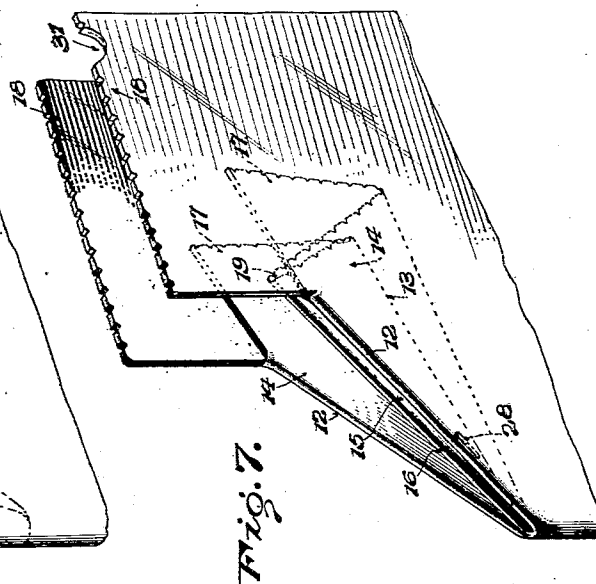
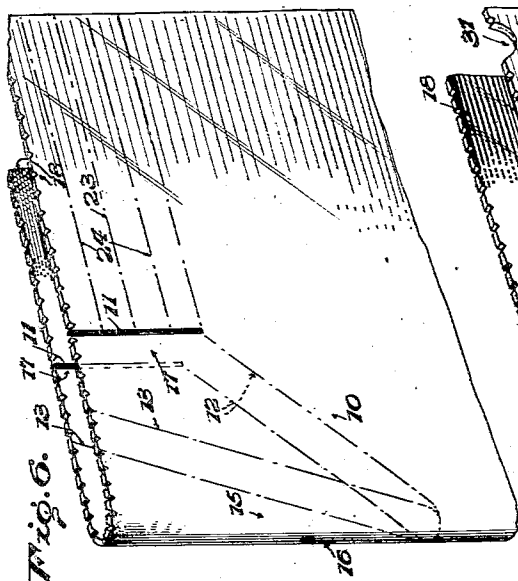
I. W. LITCHFIELD

1,944,089

BAG

Filed Jan. 12, 1931

2 Sheets-Sheet 1



Inventor

Isaac W. Litchfield.

Cameron, Kerkam & Sutton.

Attorney &

Jan. 16, 1934.

I. W. LITCHFIELD

1,944,089

BAG

Filed Jan. 12, 1931

2 Sheets-Sheet 2

Fig. 8.

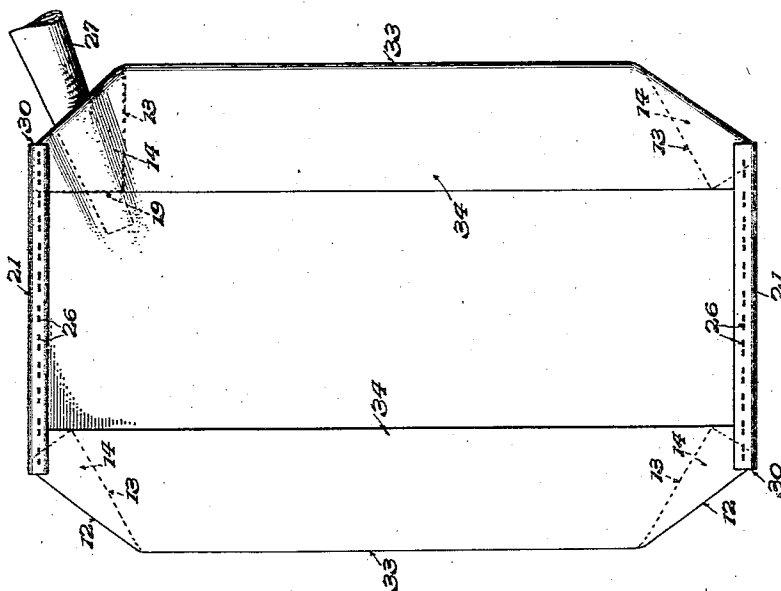


Fig. 3.

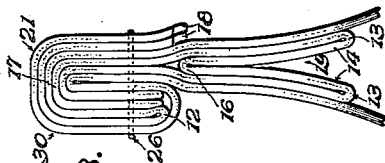


Fig. 5.

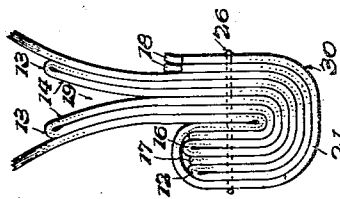


Fig. 2.

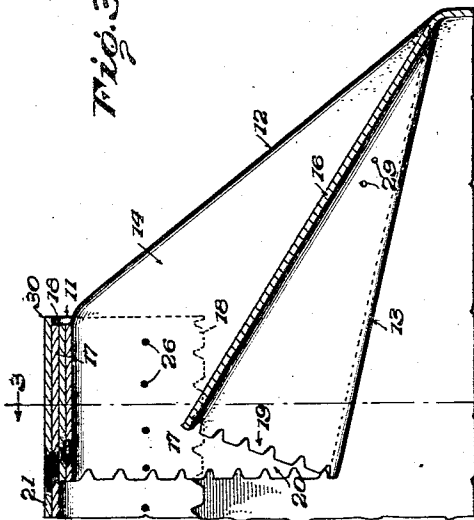
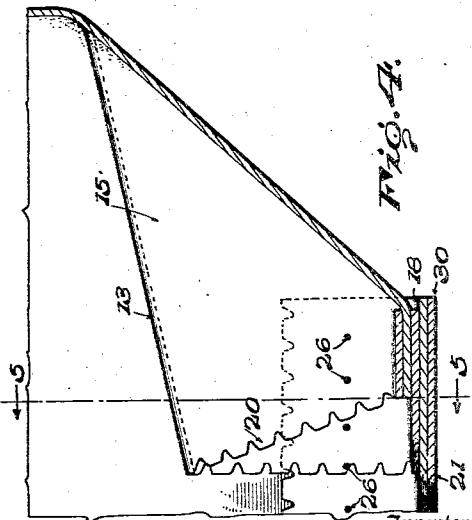


Fig. 4.



Isaac W. Litchfield.

By

Cameron, Kerkam & Sutton.
Attorneys

UNITED STATES PATENT OFFICE

1,944,089

BAG

Isaac W. Litchfield, Boston, Mass., assignor to
Bemis Bro. Bag Co., New York, N. Y., a corporation of Missouri

Application January 12, 1931. Serial No. 508,323

33 Claims. (Cl. 150—9)

This invention relates to bags and analogous flexible containers, and to methods of making the same, and more particularly to multi-ply paper bags, especially flat, valved bags, and methods of manufacturing such bags.

Experience has demonstrated that, particularly with relatively large bags such as are used as containers for cement or similar powdered or pulverulent materials, a flat, multi-ply bag having a closure wherein the bag material is first folded back on itself and then refolded back upon itself in the opposite direction, so as to make a reentrant four-ply fold, has superior strength and durability under the conditions to which such containers are subjected in the course of filling, transportation, storage and delivery. In loading and unloading bags of cement, for example, onto and from freight cars, trucks, etc., at the places where the cement is prepared or stored or used, the filled bags are frequently thrown or dropped through considerable distances. For the bag to remain intact without loss of any of its contents, under such conditions as well as the conditions of transportation and storage, the bag must have a capacity to withstand many and severe stresses without bursting or the opening up of any of its closures. It is also highly desirable to use bags which are closed at both ends and which have a valve at one corner, but in the manufacture of valved bags heretofore, it has been customary to make the closure by sewing a tape or other reinforcing member folded or formed about the lips of the bag, and such a closure may not possess the desired strength.

It is an object of this invention to provide a valved, multi-ply bag and method of making the same whereby the bag may have a closure or closures of the reversely folded reentrant type above characterized, so as to obtain the desired strength.

Experience has shown that bags of the type above referred to, when provided with strong closures, are weakest, i. e. are most likely to burst under rough handling, at or adjacent a crease line, and this is particularly the case if the crease is of such a character that the filling of the bag flexes the material at the crease through more than 180°.

It is an object of this invention to provide a bag and method of making the same whereby a flat (as distinguished from the gusset type) multi-ply bag, particularly of the valved type, may be provided having increased durability by reason of the manner in which the bag is formed.

Experience has also shown that with bags of generally rectangular outline provided with rein-

forced closure seams to obtain the desired strength, the corners are sufficiently stiff and sharp to at times abrade or even puncture adjacent bags during handling or transportation.

It is an object of this invention to provide a bag and method of making the same whereby a reentrant reverse fold may be used as a closure to obtain desired strength while the corners of the bag are so formed that they add to the strength and durability of the bag and at the same time the danger of injury to other bags is minimized.

Another object of this invention is to provide a bag and method of making the same whereby the corners are so constructed that they tend to act as cushions for the bag when thrown or dropped.

In the case of bags which are closed at both extremities except for a valved opening at one corner thereof, the bag is filled by inserting a spout into the valved corner and directing or forcing the material into the bag. As the bag fills, the contained air is forced from the bag, and in order that the material being introduced shall not escape, particularly if in a finely divided condition, the spout ordinarily fills the opening so that little air can escape around the spout, but considerable reliance must be placed upon the porosity of the paper for permitting the escape of air.

It is an object of this invention to provide a bag and method of making the same whereby provision is made for the escape of air at the corner opposite the valved opening while minimizing the escape of the solid material at said corner.

Another object of this invention is to provide a bag and method of making the same whereby the bag is so constructed that air may escape therefrom without dependence upon the porosity of the material, and therefore a less porous material, when desired for strength or other reasons, may be used, without preventing the proper escape of air during the filling of the bag.

Another object of this invention is to provide a valved bag and method of making the same whereby the valve is of improved construction so as to have an inherent resilience that tends to cause the valve to readily assume its desired closed position upon removal of the spout.

Another object of this invention is to provide a bag and method of making the same whereby an interfolded valve is produced.

It has heretofore been proposed to make a tubular blank for bags and cut one end of the blank on an irregular line which leaves an upstanding rectangular lug at one end of the blank for the

purpose of forming a valve. This has involved the loss of a strip of bag material from one side of each blank equal to the height of the lug multiplied by the width of the bag minus the width of the lug, or if pairs of bag blanks are cut in reversed relation so that the lugs of the pair are at adjacent ends, the loss of a strip of bag material equal to the height of the lug multiplied by the width of the bag minus two times the width of the lug. This waste, particularly with multiple blanks in the quantity manufacture of bags, involves very considerable quantities of paper.

It is an object of this invention to save the material heretofore discarded and employ it as a means for producing a reenforced closure for the bag, so as to give a stronger closure without use of additional material.

Another object of this invention is to provide a valved bag and method of making the same whereby material heretofore thrown away in shaping the blank may be used for the forming of a reversely-folded reentrant closure fold.

Another object of this invention is to provide a bag and method of making the same whereby a bag of the flat, as distinguished from the gusset, type, is provided with infolded or reentrant corners.

Another object of this invention is to provide a bag and method of making the same wherein the corners are provided with interfolds.

Another object of this invention is to provide a bag and method of making the same having infolded or interfolded sections wherein those sections, except in the case of the interfold of a valved corner, are properly caught and secured in the closure seam or seams of the bag.

When a reversely folded reentrant closure seam is employed, it is undesirable to have any sizable humps in the length of the closure, because such humps not only increase the difficulty of completing a tight closure at the humps, but they are points of weakness under the stresses of handling. At the same time, if the bag is provided with an infolded or interfolded corner to accomplish some or all of the objects above set forth, the infolded or the interfolded corner should be caught and secured in the closure seam.

It is an object of this invention to provide a bag and method of making the same whereby the corners are so formed that infolded or interfolded corners may be used and sections thereof may be properly caught in the closure seam without unduly increasing the thickness of the material at such points.

It has been discovered that, inasmuch as the tendency of the filled bag to burst appears to exist principally if not entirely at or adjacent the creased edges, when the closure seams are made sufficiently strong, the desired strength can be obtained by reenforcing the bag at and adjacent to the creases while one or more plies can be omitted at the intermediate portions of the bag, with a substantial saving in bag material.

It is an object of this invention to provide a bag and method of making the same, whereby the creased edges are given their proper strength and a saving of bag material effected at the intermediate portions of the bag.

Another object of this invention is to provide a bag and method of making the same, having any or all of the aforesaid advantageous features, which can be manufactured expeditiously, without waste of material, on the usual tube machines.

Another object of the present invention is to

provide a bag and method of making the same whereby the bag blank is so formed as to facilitate the completing of the closures by multiple stapling machines, enabling the same number and spacing of staples to be employed at both ends in securing the closure folds together.

Another object of this invention is to provide a multi-ply bag of the type heretofore characterized that is so constructed as to facilitate its being fed through a stapling machine.

Another object of this invention is to provide a multi-ply bag of the type heretofore characterized which has means to facilitate the finding of the center of the plies, i. e., the opening between the innermost plies.

Another object of this invention is to provide a valved bag having infolded or interfolded corners wherein the valved corner is distinguished in appearance to facilitate its selection.

Other objects will appear as the description of the invention proceeds.

While the invention is preferably embodied in a multi-ply bag, some of the foregoing advantages may be obtained in a single-ply bag. While in order to obtain the majority of the foregoing objects the bag is made as a flat bag, i. e. a bag whose blank is made as a flat tube, as distinguished from a gusset bag, some of the foregoing advantages, as those flowing from the infolding or interfolding of the corners, etc., can be obtained with bags of other suitable forms and manners of construction. Again, while in order to obtain the maximum strength it is preferred to form the closure seam by reversely folding the bag lips into a reentrant four-ply fold of the type above characterized, some of the foregoing advantages may be obtained with other types of closure seams, the terms "seam" or "closure seam" being used herein, unless otherwise qualified, to designate any suitable line of union, of whatever conformation, whether completed by sewing, stapling or otherwise. Again while it is preferred to complete the seam by stapling some of the advantages of the present invention can be obtained with seams completed in other manners. Also while the present invention has particular utility when applied to the so-called valved type of bag some of the foregoing advantages may be obtained with bags of other types of construction.

For purposes of illustration the invention is shown on the drawings as embodied in a flat multi-ply valved bag of the type known as a cement bag, and designed to receive 94 pounds of cement. It is to be expressly understood, however, that the drawing is for purposes of illustration only and is not to be construed as a definition of the limits of the invention, reference being had to the appended claims for that purpose.

Referring to the drawings, wherein the same reference characters are employed to designate corresponding parts in the several figures,

Fig. 1 is an elevation of a multi-ply valved bag of the flat, as distinguished from the gusset, type, embodying the present invention;

Fig. 2 is an enlarged fragmentary section through the valve;

Fig. 3 is a transverse section on the line 3—3 of Fig. 2;

Fig. 4 is a view corresponding to Fig. 2 which is typical of any one of the three remaining corners;

Fig. 5 is a transverse section on the line 5—5 of Fig. 4;

Fig. 6 is an enlarged fragmentary view in perspective to illustrate the cut and the lines upon which the folding is to take place.

Fig. 7 is a corresponding enlarged fragmentary view illustrating the interfold formed from the blank of Fig. 6; and

Fig. 8 is a view on a smaller scale to illustrate the filling of the bag, and also to illustrate another feature of the present invention.

As will be apparent to those skilled in the art, some of the features of novelty and advantage hereinafter explained in detail are available for use in bags of other types, forms and constructions than multi-ply, flat (as distinguished from gusset) bags closed by seams at opposite ends except for a valve at one corner, but I prefer to embody my invention in a bag of the type just characterized for a number of reasons, among which may be noted the following:—

As heretofore pointed out, bags whose seams are made of reversely folded reentrant folds have been found to be particularly strong and durable at the seams, particularly when the seams are completed by the insertion of staples, but when subjected to rough handling tend to burst at or near a line at which the bag material has been creased. In a gusset bag there are three creases at the gusset, and when the bag is filled the intermediate crease line which, in the empty bag, lies between the main sections of the bag, is forced outwardly into a form wherein the previously reentrant faces become the convex outer surface at the lateral edge of the bag. Thus the fibers at the outer surface of the bag, for example, are bent through an angle considerably in excess of 180°. In the case of a flat bag, however, only a single crease line is formed along each edge, and the fibers at this crease line, even when the bag is full, have been bent through considerably less than 180°. Hence the material at the creases of a flat bag are not subjected to the reversed stresses which arise when a gusset bag is opened and filled.

Furthermore, a flat bag formed from tubular material and having a stapled or stitched seam along the meeting edges at the bottom of the blank, as distinguished from a bag wherein a satchel bottom is formed by folding and pasting the bottom of the blank, can not only be formed economically and expeditiously with the same type of closure that is provided for the top end, but it has many other advantages, particularly when employing multi-ply material or designed to carry relatively heavy weights (as in the case of bags for carrying 94 pounds of cement, for example), in the strength and permanency of the closure.

With bags designed to carry a considerable weight of material, the flat multi-ply bag also possesses the advantage that a bag of sufficient wall strength can be formed of a plurality of plies, and stored and transported in a substantially flat condition, whereas a single thickness of material of equal strength could not be formed into a flat bag without injuring the fibers at the creases. The advantages of a valved bag, as distinguished from an open-mouthed bag, are well appreciated by those skilled in the art.

As indicated in Figs. 6 and 7, as well as diagrammatically suggested in some of the sections, the bag shown on the drawings is formed of a plurality of plies of any suitable material, preferably a good grade of paper such as has heretofore been used in the packaging of cement, flour or other suitable powdered or pulverulent materials. Any suitable number of plies may be used; for example, in the case of bags designed to hold 94 pounds of cement, the bag may have five plies.

To prevent confusion in illustrating a plurality of plies formed into a plurality of folds, however, the structure at the corners and folds has been illustrated on the drawings as if the several plies had been integrated into a single thickness, i. e. as if the bag had been formed from a single thickness of relatively thick material.

The blank from which the bag is formed may be made in any suitable way, the present invention enabling the forming of the blanks from tubular material as it comes from any suitable tube-forming machine. The tubular blank as cut is rectangular in outline, involving no wastage of bag material. One corner of the blank is indicated fragmentarily at 10 in Fig. 6.

The first step in forming the bag is to provide, at a suitable distance from each corner and in opposite faces of the tubular blank, a cut 11 extending generally lengthwise of the tubular blank and for a distance that is equal to the width of the material that is to be formed into a reentrant reversely folded seam as hereinafter explained. Each cut may be parallel to the axis of the blank or it may be appropriately inclined toward or away from the lateral edge of the blank, depending upon the amount of the intucked corner that is to be received and secured between the folds of the closure seam as hereinafter explained—the inclination of the cut 11 determining the extent to which the intucked corner overlaps the portions at the end of the bag which are to be formed into the reversely folded reentrant folds of the closure seam.

As respects certain features of this invention, the corners may then be formed by folding each corner up to the cut 11 inwardly along the lines designated 12 in Fig. 6, so as to provide a simple intuck or infold which would thus be V-shaped in cross section. I prefer, however, in order to obtain a bag having all of the characteristics hereinafter described, to so intuck the corners as to provide an interfold as illustrated. To this end each corner is not only folded inwardly along the lines 12 heretofore referred to but also outwardly along the lines designated 13 in Fig. 6, so as to provide an accordion pleat or reentrant interfold, as illustrated in perspective in Fig. 7, comprising inwardly extending sections 14 folded on the lines 12 and outwardly extending sections folded on the lines 15 and joined at the fold line 16.

The same general procedure for forming the folds is followed at each of the four corners of the bag, although intucked corners can be provided at only one end of the bag if desired. Where a valve is provided at one corner of the bag, however, the shape at the valve corner is preferably somewhat modified by changing the size or direction, or both, of the folds so as to readily distinguish the valve corner from the other three corners. The direction of the folds is also somewhat changed at the valve corner so that the interfold shall not be caught between the plies of the closure seam at the end of the tubular blank, as next to be described.

As shown more particularly in Fig. 7, the inwardly extending sections 14 of the interfold have their corners 17 extending into overlapped relation with those portions of the ends of the tubular blank between the cuts which are to be folded into the closure seam in completing the closure of the bag. Hence these corners 17 will be folded into the closure seam when formed, and will receive therethrough the means which secure together the folds of the closure seam, whether

staples, eyelets, sewing, etc. The areas to be folded into the closure seam are indicated at 18 in Fig. 7.

In the case of the three corners exclusive of the valve corner, it is also desirable that the interfold 15 have its corner 19 also overlap the portions 18 which are to form the closure seam, so that these corners, like the corners 17, will be folded into the closure seam and receive there-through the securing means. In the case of the valve corner, however, the interfold 15 should be free so as not to prevent the insertion of a spout into the bag through the space between the lateral portions 14 and 15, and hence the direction of the interfold at the valve corner, as illustrated in Fig. 7, is such that the extremity 19 of the interfold is inside of the area which goes to make up the closure seam.

In the case of the three corners exclusive of the valve corner, although the corners 17 and 19 are thus caught between the folds of the closure seam, the inner edges of the four sections 14 and 15 are unsecured for a part of their length, as shown, for example, at 20 in Fig. 1. In other words, there is an opening into the bag between each section 14 and the adjacent section 15 for a portion of the length of the inner edges of said sections. Therefore, at each of the three corners exclusive of the valve corner, there are two small openings at each corner through which air can escape from the bag. If preferred, however, the folds may be so directed at the bottom corners as to reduce or eliminate these openings.

The four corners having been intucked as heretofore described, the ends of the bag between the corners are provided with any suitable closure seam, preferably a reversely-folded, reentrant four-ply closure fold 21 as shown in the sections of Figs. 3 and 5. Thus the sections 18 may first be folded midway of their width along the line 23 indicated in Fig. 6, and then the folded sections may be folded back, or in the opposite direction, onto each other along the lines 24 indicated in Fig. 6, so as to provide a reentrant reverse four-ply closure fold. Thereafter, the plies of this reentrant reverse fold may be secured together in any suitable way, preferably by a row or line of staples 26 as shown, although in some cases the closure seam may be completed by other suitable securing means.

When a bag so formed is to be filled, a spout is introduced through the valve opening as indicated at 27 in Fig. 8. The interfold 15 at the valve, being free of the closure seam, can be depressed or pressed to one side so as to permit the ready insertion of the spout. It is sometimes desirable to render the interfold at the valve corner more resilient than is represented by the inherent resiliency of the material, and thereby assure that the interfold will spring back to initial position after the spout has been withdrawn. To this end one or more staples may be passed through the two sections of the interfold 15 as shown at 28 in Fig. 7 and indicated by staple holes 29 in Fig. 2. If such a staple or staples are used they must be so located as not to interfere with the proper introduction of the spout and yet give to the interfold a resistance to deformation that will assure its springing back to initial position once the deforming pressure is removed.

The material being admitted through the spout 27, or forced therethrough under pressure, will accumulate within the bag from the bottom upwardly, swelling the bag outwardly, while at the same time displacing the air upwardly. The

weight of the material at the two lower corners will squeeze the edges of the interfold together and seal any openings at these corners, but the corner opposite the valve at the top of the bag is subjected interiorly to the pressure created by the material forcing the air upwardly, and this air pressure will slightly open the heretofore described apertures 20 at the free edges of the interfold sufficiently to permit the air to escape, but without permitting any substantial escape of material being introduced into the bag. The bag being filled, the top corners are also closed under the pressure of the confined material, and leakage prevented.

When the bag is provided with intucked corners, whether infolded or interfolded, there are no sharp, right-angular portions at the four corners of the bag, and therefore the difficulty heretofore experienced with sharp corners causing abrasion or puncture of other bags, under the jar of transportation or when dropped or thrown against each other, is eliminated. Additionally, the intucked corner, particularly when provided with an interfold, provides a construction which acts as a cushion for the bag whenever dropped or thrown so as to bring the corner into contact with an object. Not only is some air trapped between the folds of the corner so as to act as an air cushion, but the presence of the plurality of sections of bag material at each corner constitutes a reinforcement which materially stiffens and strengthens the bag thereat, while the intuck adds resiliency at these corners. Additionally, the intucked corners provide substantial areas on which the concentration of pressure is less than in the case of a sharp corner, while the corner, each time the bag is dropped thereon, changes in shape, so that the areas which receive the stresses at successive impacts are likely to be different. Hence a bag of this construction can be repeatedly dropped on a corner without bursting the corner.

If the bag material were folded instead of being cut along the lines 11 there would be additional corners of the material, represented by the areas embraced between the lines 12 projected to the edge of the bag and said edges, which would also have to be folded into the closure seam. This would involve the inclusion of many additional plies of bag material at each corner, which would make more difficult the folding of the material into a closure seam and the passing of staples or other securing means therethrough. Humps would also be formed at each of the corners which would be points of weakness in the bag structure. By cutting the blank as heretofore disclosed, however, the number of plies included in the closure seam is reduced by 33⅓%, and therefore an objectionable hump is avoided and the number of plies folded is not so great as to interfere with the proper introduction of securing means or the forming of a tight, secure closure.

A bag constructed in the foregoing manner also has the advantage that it is substantially symmetrical in outline, although sufficiently differentiated at its valved corner, and therefore the two ends of the bag for folding and stapling for example, are of substantially the same length. This becomes of importance where the stapling is to be done by a multiple stapler, as the same number of staples can be used at both ends without change in the spacing of the staples, and therefore both ends of the bag can be closed by the same or like banks of staplers. The reen-

trant four-ply fold also provides a stiff corner 30 at each extremity for the ready engagement of feeding means to pass the bag through the stapling mechanism.

In order to facilitate the finding of the center or interior of the bag, which would otherwise be difficult because of the plurality of plies at each side of the bag, one side of the bag is preferably provided at each end thereof with at least one thumb hole 31. While only one thumb hole may be provided, it is preferred to provide a pair of thumb holes, preferably one adjacent each corner. Hence it is easy to find the center of the bag as a preliminary to intucking the corners. These thumb holes can be cut by punching one or more apertures in the tube at the line of severance between successive blanks so that half of each aperture is left in the adjacent ends of the severed blanks.

Experience has demonstrated that with bags of the character heretofore described the first place at which the bag tends to burst is along the lateral edges 33 (Fig. 8), the intermediate portions of the faces of the bag being stronger than the edge portions. I have found that one or more of the plies of the bag material can be safely omitted in the intermediate portions of the bag provided the edge portions have the proper strength. A further feature of the present invention is the substitution of one or more reenforcing strips 34 along the lateral edges of the bag in place of one or more complete plies. Thus in the case of a cement bag to hold 94 pounds of cement reenforcing strips 8' in width, so as to lie 4' on each side of the lateral edges, will sufficiently reinforce the edges to permit the saving of the remainder of the ply. The ply omitted and replaced by a reenforcing strip can be an outer or an intermediate ply, but is preferably the latter. Thus in the case of a five-ply bag, two plies can sometimes be omitted, and in such case, the second and fourth plies, counting from the inside out, can be replaced by reenforcing strips along the lateral edges as indicated in Fig. 8, with a saving of bag material without substantially reducing the strength of the bag. The reenforcing strips can be pasted or otherwise secured to the complete plies, but are preferably left free.

It will, therefore, be perceived that a multi-ply bag of the flat, valved type has been provided which possesses numerous important advantages over prior bags. The difficulties heretofore experienced by the presence of sharp corners to cause abrasion or puncture of contiguous bags has been eliminated by the provision of means which materially add to the strength and resiliency of the bag at the corners, because the intucked corners not only act as cushions and distribute stresses thereat over a larger area than in the case of prior bags, but the presence of the plurality of folds, arising from the intuck, reinforces the corners and at the same time adds resiliency to the corners not only because of the form of the corners but also because of the inherent resiliency in the increased number of layers of material. If preferred for any reason, however, corners formed in accordance with the present invention may be provided at only one end of the bag.

Furthermore, the provision of the intucked corners is accompanied by the further advantage that suitable air escape openings may be provided, so that less porous paper than heretofore used can be employed to obtain such advantages as are inherent in these other characters of paper. However, it is to be expressly understood that by

suitably arranging the direction of the folds, particularly in the case of the interfold intuck, the magnitude of these openings can be considerably modified, or if preferred, these openings can be entirely omitted, without interfering with the other advantages heretofore pointed out as arising from the use of the intucked corners.

At the same time, a strong multi-ply bag of the type that is closed by seams at opposite ends and provided with a valve at one corner is formed while avoiding the weakening of the fibers at the creases which arises in filling the gusset type bag. It is to be expressly understood however that some of the features of the present invention, such as the improved valve, the intucked corners, etc., can be used with the gusset type bag. Hence a bag and method of making the same have been provided which are productive of increased durability in the bags.

The foregoing method of manufacture and form of construction of the bag also facilitates the use of the reversely-folded, reentrant, closure seam which experience has demonstrated to be so advantageous in the forming of closure seams for bags, particularly relatively large bags for carrying relatively heavy weights, finely powdered material, etc. It is to be expressly understood, however, that while the reversely-folded closure seam is preferred, any other suitable form of closure seam may be used in conjunction with the interfolded valve or the intucked corners or both to obtain many advantages of the present invention.

The heretofore described method of making a bag eliminates wastage of bag material in cutting the blank, while material that has heretofore been thrown away at one end of the bag blank is utilized to reinforce and strengthen the closure seam. Also a valve has been provided which possesses marked advantages over valve structures heretofore in use, among which may be noted the increased resiliency at the valve by reason of the interfold construction, and the subdividing of the valve opening with the resultant diminution of leakage after the bag is filled, without interfering with the ready filling of the bag.

The present invention also enables the saving of bag material by eliminating portions of some of the plies in a multi-ply bag and as respects this feature of the invention, it is apparent that it may be used without regard to the type, character or construction of the bag, and without regard to the character of corner, closure seam, presence or absence of valve, etc.

While the valved bag provided with diagonal corners as illustrated has the advantages heretofore described, the valved corner is readily distinguishable from the remaining corners, and these remaining corners may be given different directions and extent of folds or intucks without varying the manner in which the corner is formed. The bag blank can be readily cut from tubular stock as it comes from the tube machine, and when one or more thumb holes are provided, no difficulty is experienced in locating the center of the bag. Also the bag is substantially symmetrical so as to introduce no difficulties with respect to the number or spacing of the staples or other fold securing means.

While it is preferred to complete each closure seam by inserting a line of properly spaced staples through the folds of the seam, so as to obtain the full advantage in strength of a seam so constructed, other manners of securing or complet-

ing the seam as well as other forms of seams than that formed as a reversely folded reentrant fold can be used to obtain some of the advantages of my invention. Thus the improved corner construction or the improved valve is available whether the bag be of the flat or gusset type and whether the seam be completed by stapling, sewing or pasting.

While the illustrated embodiment of the invention has been described with considerable particularity and the preferred procedure has been described with considerable detail, it is to be expressly understood that the invention is not restricted to the illustrated and described embodiment, as the invention is capable of receiving a variety of expressions and of being carried out in a variety of ways. As heretofore pointed out, some of the features can be used without other features, and it will be apparent to those skilled in the art that this is also true as to additional features and combinations of features not heretofore discussed. Changes may also be made in the character of the material used, the number of plies employed, the construction of the valve, the form of the closure seams, the number and size of reinforcements, etc., as well as various other details of construction, arrangement, proportion and size, without departing from the spirit of this invention. Reference is, therefore, to be had to the appended claims for a definition of the invention.

What is claimed is:

1. A valved bag having a valve and one or more corners each provided with two reversely directed reentrant interfolds.
2. A valved bag provided with a valve, a closure seam, and one or more reentrantly and reversely interfolded corners with the corners of the interfold caught and secured in said seam.
3. A valved bag provided with a valve, one or more corners provided with infolds of V-shape, and a folded closure seam into the fold of which are caught and secured portions of the infold.
4. A bag provided with one or more corners each provided with two reversely directed reentrant interfolds.
5. A valved bag having a valve and one or more corners provided with infolds of V-shape cross section with the sides of said infold secured in closely folded relationship.
6. A valved bag having a closure seam across the end of the bag, and a valve and one or more corners both formed by infolding to V-shape cross section the corners of the bag, the infolded corners exclusive of the valve being caught and secured in a seam.
7. A valved bag having a seam across the end thereof, and a valve and one or more corners both formed by reentrantly interfolding the corners of the bag, the corners of the interfolds exclusive of the valve being caught and secured in a seam.
8. A bag provided with a closure seam, and one or more infolded corners of V-shape cross section having sections of the infold caught and secured in said seam and retaining said infold when the bag is filled.
9. A bag provided with a closure seam, and one or more reentrantly interfolded corners having at least the corner of the interfold caught and secured in said seam and retaining said interfold when the bag is filled.
10. A valved bag provided with closure seams across both extremities of the bag, a valve at one corner of the bag, and infolded corners of V-

shape cross section at the three remaining corners of the bag with the plies of said infold secured in closely folded relationship so as to retain said relationship when the bag is filled.

11. A valved bag provided with closure seams across both extremities of the bag, a valve at one corner of the bag, and reentrantly interfolded corners at the three remaining corners of the bag with the plies of said interfold secured in closely folded relationship so as to retain said relationship when the bag is filled.

12. A valved bag provided with a valve formed by a reentrant inwardly directed fold and an intermediate reentrant outwardly directed fold.

13. A valved bag provided with a reentrantly interfolded valve and an element cooperating with the plies of said interfold to increase the resiliency of the interfold.

14. A valved bag provided with a valve and an infolded corner of V-shape cross section at the corner opposite the valve, said infolded corner forming an aperture between the plies of said fold through which air may escape from the bag as it is being filled.

15. A valved bag provided with a valve and an interfolded corner at the corner opposite the valve, said interfolded corner forming two apertures through which air may escape as the bag is being filled.

16. A valved bag provided with a valve, an interfolded corner and a seam closing the end of the bag, said seam fixedly securing the apex of said interfold so as to form two normally closed apertures through which air may escape from the bag as it is being filled.

17. A bag having closure seams at its opposite extremities and having infolded corners of V-shape cross section with the folds thereof secured together to retain said relationship when the bag is filled and thereby provide cushions at its corners.

18. A bag having closure seams at its opposite extremities and provided at its corners with interfolds secured in closely folded relationship and retaining said relationship when the bag is filled to reinforce the same.

19. A multi-ply tubular bag having a plurality of plies and one or more reinforcing strips separate from said plies at each of its lateral edges, each of said reinforcing strips being of band-like formation and extending the full length of the lateral edge of the bag with overlapping portions at both faces of the bag for a substantial distance.

20. A multi-ply bag having one or more reinforcing strips disposed along the lateral edges of the bag between the plies.

21. A flat multi-ply bag having a valve at one corner, reversely folded closure seams at one or both ends of the bag, and infolds of V-shape cross section at one or more of the remaining corners with the infolds caught and secured in said seams.

22. A flat multi-ply bag having a valve at one corner, reversely folded closure seams at one or both extremities of the bag, and reentrant interfolds at one or more of the remaining corners with the corners of said interfolds caught and secured in said seams.

23. A flat bag provided with a valve at one corner, and intucked fold provided with an interfold at another corner, a reversely folded reentrant closure seam at the end of the bag, and staples securing the folds of said seam together, the extremities of said interfold being caught in said seam and secured by one or more of said staples.

24. A flat bag having a valve at one corner, an intucked fold at another corner, a reversely folded reentrant seam at the end of the bag, and staples securing the folds of the seam together, the extremity of the intucked fold being caught and secured in said seam by one or more of said staples.

25. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof and provided at said corners with reversely directed reentrant interfolds.

26. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof and provided with infolds, and a folded seam between said cuts with overlapped portions of said infolds interfolded therewith.

27. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof and provided with reversely directed reentrant interfolds, and a folded seam between said cuts with overlapped portions of said interfolds interfolded therewith.

28. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof, one of said corners being infolded to form a valve and an infold at the opposite corner, and a seam having portions of the infold of the last named corner interfolded therewith.

29. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof, one of said corners being reversely interfolded to form a valve and a reversely folded interfold at the op-

posite corner, and a closure seam with the corner of said last named interfold interfolded therewith.

30. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof and provided with infolds at each corner with an inwardly directed infold, and a seam between said cuts holding said infolds in closely folded relationship.

31. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof, and each corner being provided with two reentrant and reversely directed interfolds secured together.

32. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof, an infolded valve at one corner, an infold at the opposite corner, a reversely folded seam between said cuts having a portion of the infold of said last named corner interfolded therewith, and staples holding said folds together with one or more staples passing through said last named portion.

33. A flat bag of tubular stock which has its end cut adjacent opposite corners thereof, a reversely interfolded valve in one corner, a reversely interfolded intuck at the opposite corner, a reversely folded seam between said cuts having a portion of the interfold of said last named corner interfolded therewith, and staples holding said folds together with one or more staples passing through said last named corner.

ISAAC W. LITCHFIELD.

110

115

120

125

130

135

140

145

150