

June 13, 1950

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2,511,031

METHOD AND APPARATUS FOR FORMING PAPER BAGS

Filed Aug. 9, 1946

3 Sheets-Sheet 1

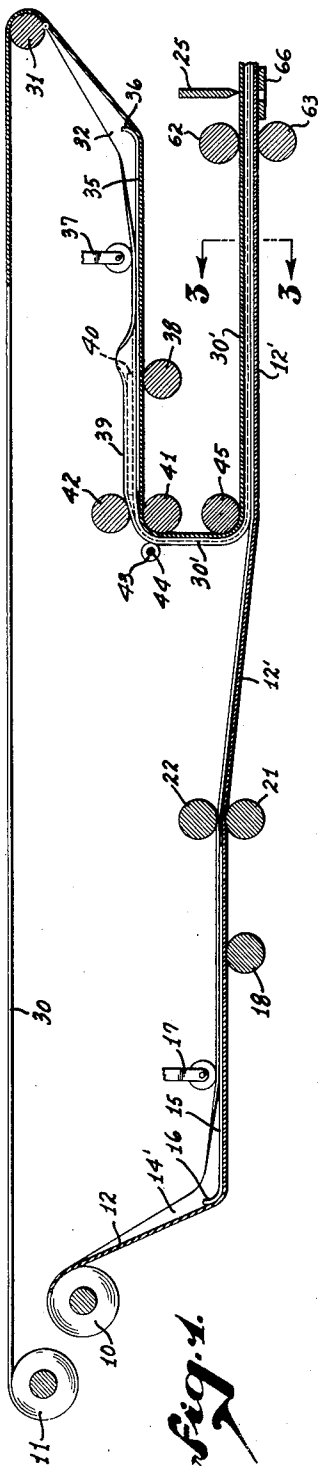


Fig. 1.

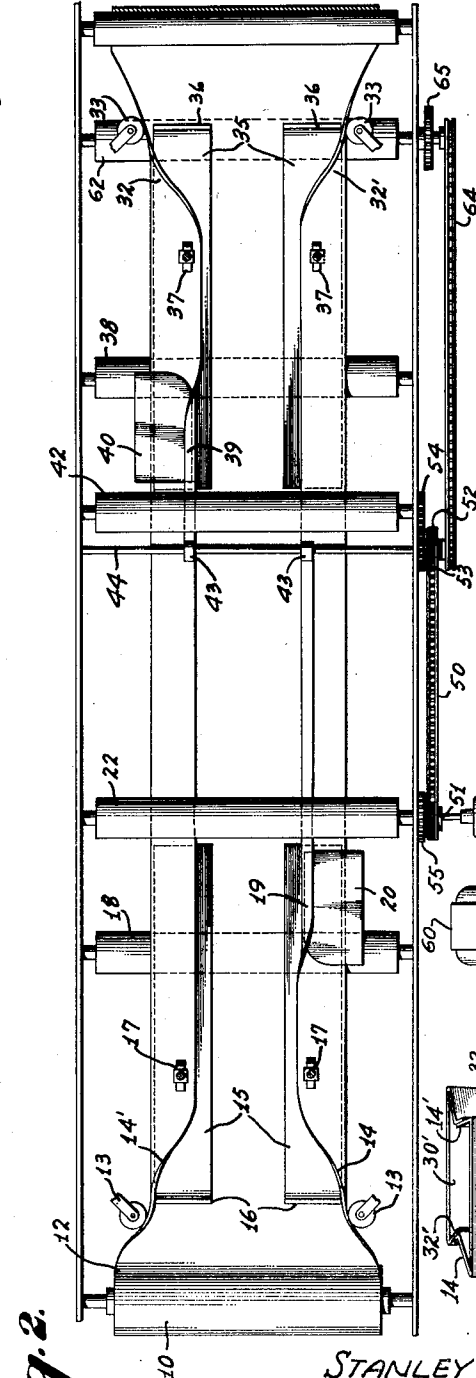


Fig. 2.

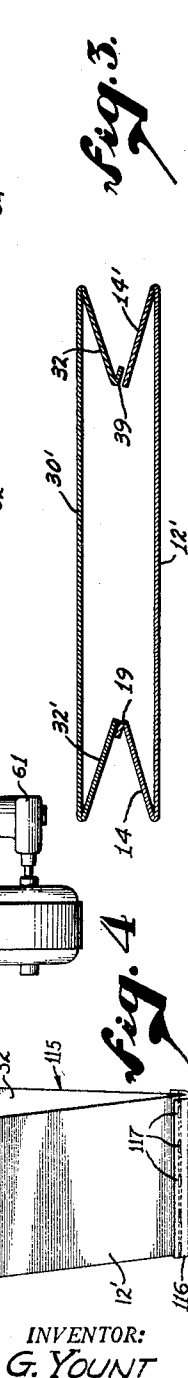


Fig. 3.

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Fig. 5.

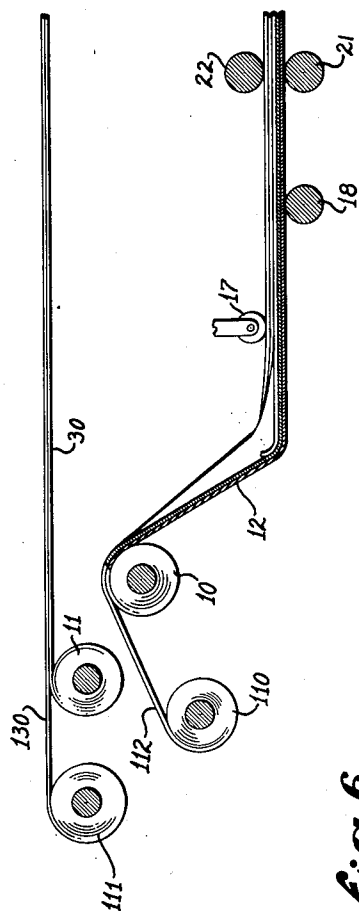
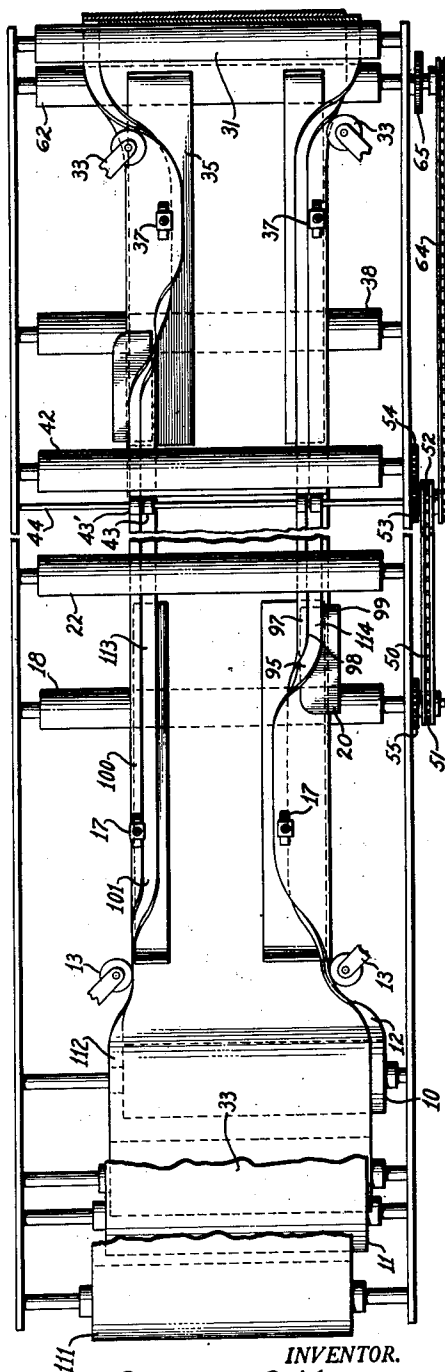


Fig. 6.



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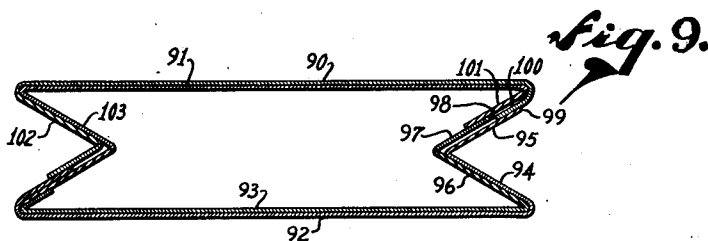
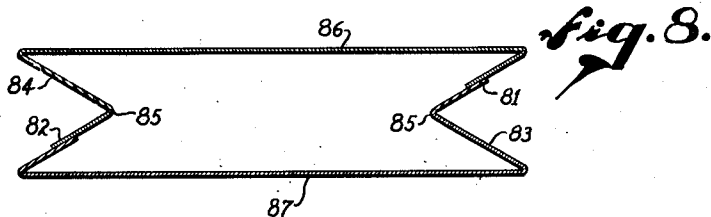
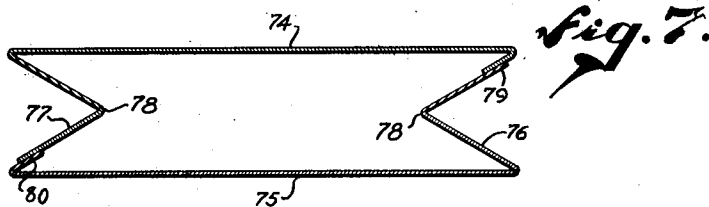
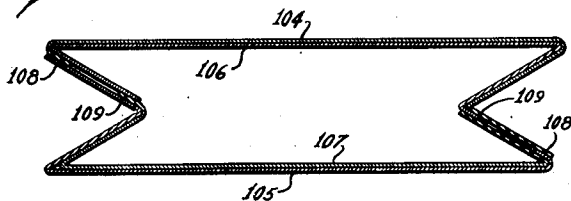


fig. 10.



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UNITED STATES PATENT OFFICE

2,511,031

METHOD AND APPARATUS FOR FORMING
PAPER BAGS

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Application August 9, 1946, Serial No. 689,565

3 Claims. (Cl. 93—35)

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This invention relates to the art of manufacturing paper bags and is particularly adaptable to the production of large circumference, heavy bags suitable for covering items such as divans, mattresses, and arm-chairs, also for lining boxes, cartons, etc. The invention is also applicable to the fabrication of bags of other sizes and is adaptable to the fabrication of either single-walled or multi-walled bags.

A very large gusset type bag best exemplifies the invention as there is a substantial need for such bags, particularly of a construction which can be employed in covering divans, arm-chairs and other similar articles of furniture for shipping and storing, bags for this purpose having been previously made by hand and embodying a different construction than that which characterizes the present invention.

The bags previously made by hand for the purpose of covering divans, chairs and the like have more or less conformed to the general outline of such articles of furniture, being inverted over the same, and are satisfactory except from the standpoint of manufacture, being necessarily made by hand and involving a relatively costly method.

The objects and purposes of the invention will become more apparent when it is considered that the jumbo roll is the largest unit of paper commercially employed for automatic or continuous processing. It has been found by experience to be the largest and heaviest paper roll unit which can be satisfactorily handled by standard equipment. Considering further that the conventional method of fabricating bags is to fold paper longitudinally as it comes from a roll, which reduces the circumference of the bag tube to something less than the width of the paper, depending upon the bag construction, it has never been possible to manufacture the largest bags of the character described above from a single roll for the simple reason that it is not practical to handle such a wide jumbo roll even if it could be produced under known manufacturing methods.

The present application is a continuation in part of co-pending application, Serial No. 535,642, filed May 15, 1944, now matured into Patent No. 2,474,770 dated June 28, 1949.

Among the objects of the invention is to provide a new and improved method and means adapted to the making of paper bags from separate rolls of paper for each wall of the bag which is simple, efficient, rapid in execution and economical.

Another object of the invention is to provide a

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new and improved method and means adapted to the making of paper bags from one or more separate rolls of paper for each wall of the bag which is capable of utilizing machine parts of a type already available for the construction of an apparatus suited to the folding and sealing of tubes for making paper bags.

Still another object is to provide a new and improved method and means adapted to the making of paper bags of exceptional circumference by utilizing substantially the full width of one or more separate rolls of paper of maximum practicable width for each side of the bag.

A further object is to provide a new and improved method and means for mechanically forming a continuous tube of paper having substantially as great a circumference in tube form as twice the width of a roll of stock of the maximum width from which paper bags ordinarily can be formed.

Still further among the objects of the invention is to provide a new and improved means for forming a paper tube made from sheets of paper from separate rolls, the strips of paper being adapted to be folded in complementary fashion so that the process of attaching them together is simple and can be accomplished by making a minimum number of folds at the side edges. For a single walled bag two rolls of paper are used. For multi-walled bags a plurality of paper rolls are employed divided into two groups, each group containing as many rolls as there are to be plies in the bag.

With these and other objects in view, the invention consists in the novel method hereinafter described, together with the construction, arrangement and combination of the various parts of an apparatus by means of which the method may be practiced, whereby the objects contemplated are attained as hereinafter are more fully set forth, pointed out in the claims, and illustrated in part in the accompanying drawings in which:

Figure 1 is a side sectional view showing a schematic representation of parts of an apparatus comprising a part of the subject matter of the invention and illustrative of an apparatus upon which the novel method may be practiced.

Figure 2 is a top view of the apparatus shown in Figure 1 with the upper strip of paper partially removed.

Figure 3 is a cross-sectional view of the tube of paper made by the machine taken on the line 3—3 of Figure 1.

Figure 4 illustrates a bag which may be formed from a gusset tube made by the process.

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Figure 5 is a diagrammatic, elevational view of the feed end of a machine set up for making bags of two-ply wall thickness.

Figure 6 is a foreshortened plan view of the machine showing an arrangement utilizing off-set rolls for making a tube having a two-ply construction.

Figure 7 is a cross-sectional view of a bag tube made according to my invention in which the seams instead of being along the center fold of the gusset are located along diametrically opposite edge folds.

Figure 8 is a cross-sectional view of another modified bag tube produced by my invention in which the seams are midway between the center fold of the gusset and the edge fold.

Figure 9 is a cross-sectional view of a multi-walled bag tube produced by my invention.

Figure 10 is a view similar to Figure 9 in which the seams of a double walled bag are distributed at different locations.

One of the chief difficulties in making paper bags of exceptional circumference is to be able to handle rolls of paper stock which have sufficient width from which to form the bag. There are occasions where paper bags of exceptional circumference are greatly in demand. The manual operations previously referred to for making such paper bags are slow, costly and inefficient and cannot be counted upon to produce a consistently good product under all circumstances. Consequently, if large paper bags are to be provided at a cost which will permit them to be used extensively, some means must be provided whereby they can be made economically. Whatever means is selected must further take into consideration the fact that large bags must usually be made of heavy stock and for many purposes must be adapted to utilize two or three plies or walls so that the resulting product will have sufficient strength. This requires that the process must be a simple one involving relatively few folds and few operations.

To illustrate the method an apparatus has been devised which is capable of performing the method by the use of relatively few rolls and without the use of numerous special features which have been incident to processes of a similar kind in the past. In one form of the invention shown in the drawings there is illustrated diagrammatically the location of two rolls 10 and 11 of paper stock. Although for convenience in illustration two rolls only are shown, it will readily be appreciated that for multiple ply tubes the paper for each half of the tube may be taken from separate rolls and brought together in the machine prior to folding, the different rolls being offset the required distance to provide the necessary staggering of the seams, as will be subsequently described.

Generally stated, the method of this invention contemplates continuously advancing two strips of paper of equal width, one strip from each of two rolls, continuously infolding a longitudinally extending section of uniform width adjacent one edge of each strip, continuously infolding a longitudinally extending section of greater width adjacent the opposite edge of each strip, outfolding panels along the inner edges of the infolded sections of greater width of each strip of paper (the outfolded panel of one strip being disposed adjacent the infolded section of uniform width of the other strip), then superimposing the two advancing strips of paper with their outfolded panels facing the infolded sections of uniform width to

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bring the outfolded panel of each strip into pressure contact with the opposed infolded section of uniform width and bonding the two strips together at such lines of pressure contact with an adhesive, thereby forming a pleated tube which is later cut into open-ended tube portions of desired length.

In the example chosen for illustration paper is drawn continuously from the roll 10 in the form of a sheet 12 which is directed downwardly, as shown in Figure 1, and during its downward course is deflected inwardly by a deflecting roll 13, frequently designated as a tucker roll, on each side, the deflecting rolls being mounted upon a vertical axis and being shown diagrammatically only in Figure 2. The deflecting rolls are adapted to form infolded sections 14 and 14' along the longitudinal edges of the sheet.

In order to properly locate and crease the folded over margin portion, there are provided folding guides 15 on each side which are suitably supported by convenient means inside the actual margins of the sheet or strip of paper. Curved ends 16 guide the paper into a proper position for completing the fold.

As the paper passes over the folding guides it is rolled or ironed down by means of rollers or tucker rolls 17, one located on each side. A supporting roll 18 holds the paper upwardly against the bottom of the folding guides.

The infolded sections 14 and 14' overlie the top surface of the strip of paper 12. It will be noted that one of the infolded sections such as 14 is of slightly greater width than the other infolded section 14' of uniform width, but the inner edges of the infolded sections do not contact or overlap. The extra width of infolded section 14 is to provide for a turned-back or outfolded continuous panel adjacent the inner edge of the infolded section indicated at 19. It will be noted that the outfolded panel 19 constitutes less than half of the infolded section 14. For turning back the edge there is provided a turn-back guide 20 on one side only of the apparatus, namely, the near side as viewed in Figure 2.

As the folded sheet or strip of paper comes off the guides the folds are pressed firmly together by suitably driven ironing rolls 21 and 22. The folded sheet designated by the reference character 12' then passes under the remaining portion of the machine to a cutter 25. By drawing the turned-back edge 19 between the rolls 21 and 22 a sufficient deflection is made possible to stretch the edge satisfactorily against the turn-back guide 20.

At the same time as the sheet 12, 12' is being formed a sheet or strip of paper 30 is being continuously led from the roll 11 across the top of the machine to an idler roll 31, reversed in direction by the idler roll and passed downwardly at an angle where infolds 32 and 32' are formed at the margins by folding rolls 33 similar in relative location and function to the rolls 13 previously described. Folding guides 35 perform a function similar to the guides 15 and are similarly provided with curved ends 36.

After the folds 32 have been made, they are pressed downwardly by the rollers 37, one located on each side. A supporting roll 38 similar to the roll 18 is also provided.

In this instance infold 32 is slightly wider than the fold 32' so as to provide enough material for a turned-over portion or outfold 39. It should be noted particularly, however, that the turned-over portion 39 is located upon the opposite side

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of the machine from the turned-over portion 19. A turn-back guide 40 is utilized for this portion of the operation. Ironing rolls 41 and 42 press the folds of the sheet together after it passes from the turn guides completing the formation of a sheet 30' provided with continuous infolded sections, one of them having the outfold panel 39.

Immediately following passage of the sheet 30' of folded paper from the ironing rolls adhesive applicators 43, which may be in the form of rolls mounted upon a shaft 44, are located so as to apply adhesive in one case to the outer face of the turned-over portion 39 and in the other case to the inside edge of the fold 32'.

The sheet 30, 30' then passes downwardly around an idler roll 45 which directs it into contact with the folded sheet 12'. The arrangement of rolls may be such that the folded sheets 30' and 12' are pressed against each other so that the adhesive applied to the folds of one of them is made to stick to complementary folds of the other. The relationship of the two sheets following the adhesive or gluing operation is illustrated graphically in Figure 3. Figure 3, however, shows the sheets distended one from the other for the purpose of illustrating the location and character of the folds rather than being pressed tight against each other as would actually be the case immediately after passage of the sheets over the roll 45.

By way of example, a motor 50 is illustrated as having a drive connection 51 to the shaft of the roll 22. Rolls 22 and 21 may, if desired, be geared together by a gear chain 55. A sprocket 51 is shown on the shaft of roll 22 around which is a chain 50 passing also around a sprocket 52 on the shaft 44. A gear chain 53, 54 may interconnect, respectively, shaft 44, the roll 41 and the roll 42, so that each of the respective shafts rotate in the proper direction relative to movement of the paper. Final pull rolls 62 and 63 may be connected to the shaft 44 by a chain 64, the rolls being inter-connected by a set of gears 65. Paper then is pushed over a table 65 whereon it is sheared off to size by the cutter 25.

An examination of Figure 3 will reveal the folded sheet 30' as being located above the folded sheet 12'. The infold 14 is shown with the outfolded panel 19 adapted to be pressed against the infold 32' of folded sheet 30'. Conversely, the infold 14' of the folded strip or sheet 12' is shown in contact with the outfolded panel 39 of the fold 32. Contact in each case is a face to face contact which makes it possible to apply the adhesive directly to the exposed portions of the folds on one of the sheets and then to press the respective folds of the opposite sheets face to face by a simple pressing operation. By this means a continuous paper tube of substantially maximum width emerges from the operation or process and can be cut by the cutter 25 to produce longer or shorter lengths of tubes for bags of any preselected length.

Although the illustration of the method above described contemplates the formation of pleats with the outfolded panels joined to the opposite portion of the tube at approximately the center of the pleat, occasions may arise where it would be undesirable to have this line of junction, frequently called a seam, at the center.

An arrangement of the apparatus making possible the formation of tubes wherein the seams are located elsewhere than at the center fold of the gusset is illustrated in Figures 5 and 6. These tubes in addition illustrate the formation of tubes

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of multi-ply walls. The offsetting of the rolls of paper in Figures 5 and 6 is purely by way of example as it will be understood that offsetting to a different extent of the various rolls may be utilized in order to form tubes wherein the seams are located at various positions along the gusset.

Figure 5 shows the left end portion only of an apparatus similar to that described in connection with Figure 1 wherein two sets of rolls provide paper for the wall of each side of the bag. In Figure 5 a supporting roll 18 is located in the same manner as described in connection with Figure 1 as are also the ironing rolls 21 and 22. The roll of paper 10 in the example of Figure 5 is augmented by the presence of a second roll of paper 110 spaced a short distance from the roll 10. A sheet 112 of paper from the roll 110 passes around the roll 10 joining the sheet 12, and both sheets together are folded by the tucker rolls 13 and 17.

In this instance, however, the rolls 10 and 110 must be offset with respect to each other as best illustrated in Figure 6. This is necessary in order to provide an exposed portion 113 of the sheet 112 and a corresponding exposed portion 114 of the sheet 12. The folds illustrated in Figure 6 may be readily compared with corresponding folds and edges illustrated and identified in Figure 9.

In order to form the opposite side of the bag, the roll 11 of paper must be augmented by the addition of another roll 111. A sheet 130 of paper from the roll 111 joins the sheet 30 of paper from the roll 11 as the sheets pass over the top of the machine to the opposite end where they are folded by the use of the tucker rolls 33 and 37 in conjunction with the folding guides 35 and turn-back guide 40 as was described in connection with Figures 1 and 2.

In the last instance rolls 11 and 111 must be offset with respect to each other by substantially the same amount as the rolls 10 and 110 are offset with respect to each other. In addition to offsetting the rolls of each set, namely, the set consisting of rolls 11 and 111 and the set consisting of rolls 10 and 110, one set must be offset with respect to the other set as is likewise aptly illustrated in Figure 6. The offsetting of the sets of rolls is required in order to provide a wide gusset fold on one side for the rolls of one set and on the other side for the rolls of the other set, the necessity for this being illustrated particularly well in Figure 9.

In the case where a tube is formed of double wall thickness adhesive applicators 43' and 43'' must be installed on both sides of the machine mounted upon the shaft 44 so that a strip of adhesive is applied to each ply for causing it to adhere to a corresponding portion of the ply forming the opposite side of the bag. In other respects the machine illustrated in Figures 5 and 6 contains the same essential features as the machine described in Figures 1 and 2. Conventional means of a well-known sort may be used to adjust the rolls to their proper offset position, these means being omitted for the sake of clarity.

By way of example, in Figure 7 there is illustrated a tube comprising single walls 74 and 75 having gussets 76 and 77 wherein the seam is located at a position remote from center folds 78 of the gussets. The gusset 76 has a seam 79 located near the top; whereas, a seam 80 for the gusset 77 is located near the bottom. By forming the gussets in the manner shown in Figure 7, the gussets may be printed upon easily and conveniently in a manner which would not be pos-

sible if the gussets were provided with seams near the center fold.

In order, however, to make a tube of the type shown in Figure 7, the roll of paper forming the wall 74 would have to be offset with respect to the roll of paper forming the wall 75 by an amount approaching the full length of the gussets.

Another variation is shown in Figure 8 wherein seams 81 and 82 in respective gussets 83 and 84 are located intermediate center folds 85 and the adjacent corners of walls 86 and 87 respectively.

Figure 9 illustrates a tube similar to the tube of Figure 7 but shows a tube having a double wall thickness or in other words a two-ply bag. As shown, the tube for forming a two-ply bag has outer and inner walls 90 and 91, respectively, forming one side of the bag and outer and inner walls 92 and 93, respectively, forming the other side of the bag. The wall or ply 92 has a gusset 94, a portion 95 of which is folded back upon itself for a width almost equal to the initial fold. The wall or ply 93 has a similar gusset 96 likewise with a portion 97 folded back upon itself but terminating along an edge 98 spaced inwardly from an edge 99 of the back folded portion 95. This leaves an exposed margin of the back folded portion 95 to which glue may be applied.

The wall or ply 90 has one short fold 100 which is adapted to contact the back folded portion 95 and be joined thereto, making a seam near the edge of the gusset fold. The wall or ply 91 has a longer fold 101, long enough to reach over the back folded portion 97 and to be attached thereto.

On the opposite side of the tube the outer and inner walls form outer and inner gussets 102 and 103 but with the overlapping of the folds arranged in slightly different order as is made necessary by the requisite staggering of the rolls of paper which form the bag in order to maintain a gusset uninterrupted by a seam as is illustrated on the right-hand side of the tube.

Figure 10 shows still another form of two-ply tube having outer walls 104, 105, inner walls 106, 107, and seams 108 and 109 on each side, the outer seam 108 being near a corner and the inner seam near the gusset fold.

It will be further appreciated that the location of seams can be modified by using rolls of paper of different width should occasion demand. Also, tubes may be made with gusset folds of unequal depth in order to make odd shaped bags by resorting to a similar expedient of using rolls of paper of unequal width. A tube having perfectly smooth gusset folds uninterrupted by seams may be made following the pattern of Figure 10, if desired, so that the gusset fold on both sides of the bag may be properly printed upon.

After the tube has been formed conforming to any one of the cross-sections shown in Figures 3, 7, 8, 9 and 10, a bag 115 may be formed by closing one of the ends using a reinforcing strip 116 attached thereto by a line 117 of stitching. Other styles of attachment may, of course, be substituted for the stitching and reinforcing strip as occasion may suggest. The bag of Figure 4 presumes to use a tube of the cross-section shown in Figure 3.

The virtues of the process and apparatus lie in the simplicity of their arrangement making it possible by simple, rugged means to handle rolls of paper of exceptional width and exceptional weight. Although paper rolls of exceptional weight and width have been emphasized as important in the practice of the invention, it is to

be appreciated that occasions may arise where the process and apparatus may be equally well suited to light weight papers or rolls of lesser width.

Although the invention has been herein shown and described in what is considered to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent methods, processes and apparatus.

The invention having been herein described, what is claimed and sought to be secured by Letters Patent is:

1. A method of forming pleated tubes for paper bags of large size from two continuous rolls of paper of substantially equal width, comprising: continuously advancing a strip of paper from one roll; continuously infolding a longitudinally extending section of uniform width adjacent one edge of the strip; continuously infolding, adjacent the opposite edge of the strip, a longitudinally extending section of greater width than the first mentioned infolded section; continuously outfolding the inner margin of the wider infolded section to form a longitudinally extending panel; simultaneously and continuously advancing a second strip of paper from a second roll above the first strip of paper in substantially parallel relationship; continuously infolding a longitudinally extending section of uniform width on the second strip adjacent the edge above the outfolded panel of the first strip; continuously infolding adjacent the opposite edge of the second strip a longitudinally extending section of greater width than the infolded section formed along its other edge; continuously outfolding the inner margin of the wider infolded section of the second strip to form a longitudinally extending panel above the inner edge portions of the infolded section of uniform width on the first strip; applying adhesive to the outer faces of an outfolded panel and of an inner margin of the infolded section of uniform width of one of said strips while said strip is advancing; continuously superimposing the two advancing strips of paper with their infolded sections and outfolded panels in collapsed position overlying their respective strips for bringing the outfolded panel of each strip into pressure contact with the infolded section of uniform width of the other strip to bond the two strips together into a pleated tube; and cutting all sections of the pleated tube thus formed simultaneously and transversely of the tube into open-ended tube portions of desired length.

2. A method of forming pleated tubes for paper bags of large size from two continuous rolls of paper of substantially equal width, comprising: continuously advancing a strip of paper from one roll; continuously infolding a longitudinally extending section of uniform width adjacent one edge of the strip; continuously infolding, adjacent the opposite edge of the strip, a longitudinally extending section of greater width than the first mentioned infolded section; continuously outfolding the inner margin of the wider infolded section to form a longitudinally extending panel; simultaneously and continuously advancing a second strip of paper from a second roll above the first strip of paper in substantially parallel relationship and in a direction opposite to the advancement of the first strip; continuously in-

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folding a longitudinally extending section of uniform width on the second strip adjacent the edge above the outfolded panel of the first strip; continuously infolding adjacent the opposite edge of the second strip a longitudinally extending section of greater width than the infolded section formed along its other edge; continuously outfolding the inner margin of the wider infolded section of the second strip to form a longitudinally extending panel above the inner edge portions of the infolded section of uniform width on the first strip; applying adhesive to the outer faces of an outfolded panel and of an inner margin of the infolded section of uniform width of one of said strips while said strip is advancing; reversing the direction of travel of the second strip for advancement in the same direction as the first strip; continuously superimposing the two advancing strips of paper with their infolded sections and outfolded panels in collapsed position overlying their respective strips for bringing the outfolded panel of each strip into pressure contact with the infolded section of uniform width of the other strip to bond the two strips together into a pleated tube; and cutting all sections of the pleated tube thus formed simultaneously and transversely of the tube into open-ended tube portions of desired length.

3. In a machine for forming a continuous pleated tube from separate strips of paper of virtually equal width for making paper bags of large size, the combination of: a frame; means on the frame for mounting a plurality of rolls of paper of equal width; a guide for infolding a longitudinally extending section of uniform width adjacent one edge of a strip of paper from one roll; an oppositely disposed guide positioned for infolding a longitudinally extending section of greater width than the first mentioned infolded section; a turnback guide for outfolding an inner margin of the infolded section of greater width to provide a panel; a pair of driving rolls positioned on the frame for advancing said strip and for pressing the infolded sections and the outfolded panel into overlying relationship with the strip; a reversing roll for a second strip from

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a second roll of paper carried by the frame adjacent its other end for reversing the direction of travel of the second strip in a plane parallel to and above the first strip of paper; a guide for infolding a longitudinally extending section of uniform width adjacent the edge of the second strip which overlies the outfolded panel of the first strip; an oppositely disposed guide for infolding a longitudinally extending section of greater width adjacent the other edge of the second strip which overlies the infolded section of uniform width of the first strip; a turnback guide for forming an outfolded panel from the inner margin of the infolded section of greater width of the second strip; a pair of driving rolls for advancing the second strip and for pressing the infolded sections and outfolded panel of the second strip into overlying relationship with the second strip; adhesive applicator means for applying adhesive to the outer faces of an outfolded panel and of an inner margin of the infolded section of uniform width of one of said strips while said strip is advancing; reversing roll means for changing the path of travel of the second strip for advancement in the same direction as the first strip and in close superimposed relationship thereto; a pair of pressing rolls for bringing the outfolded panel of each strip into pressure contact with the infolded section of uniform width of the other strip to bond the two strips together into a pleated tube; and transverse cutting means for cutting said pleated tube into open-ended tube portions of desired length.

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