Aug. 31, 1965 S. T. ADAMS ETAL 3,203,323

PROCESS FOR MANUFACTURING BAGS

Filed Dec. 7, 1962 3 Sheets-Sheet 1

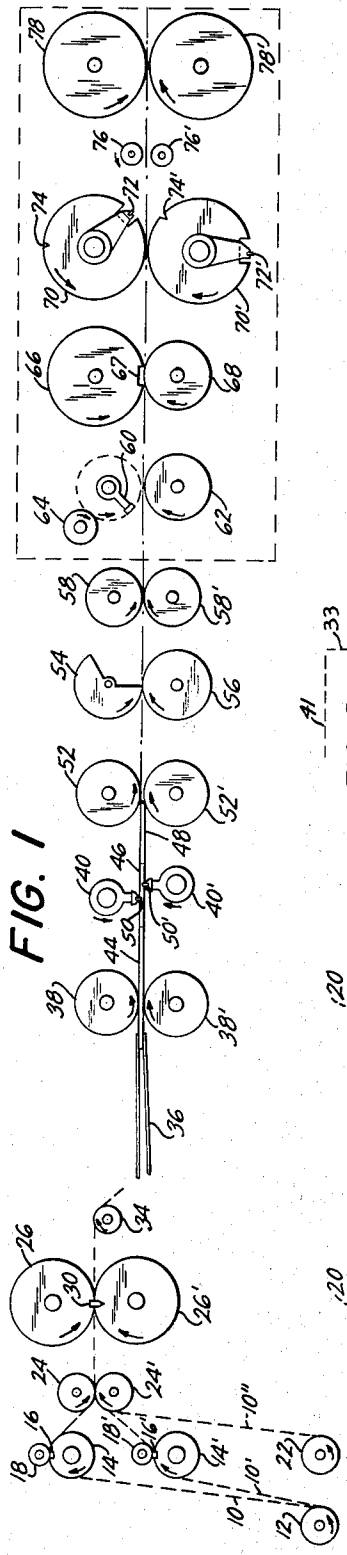


FIG. 1

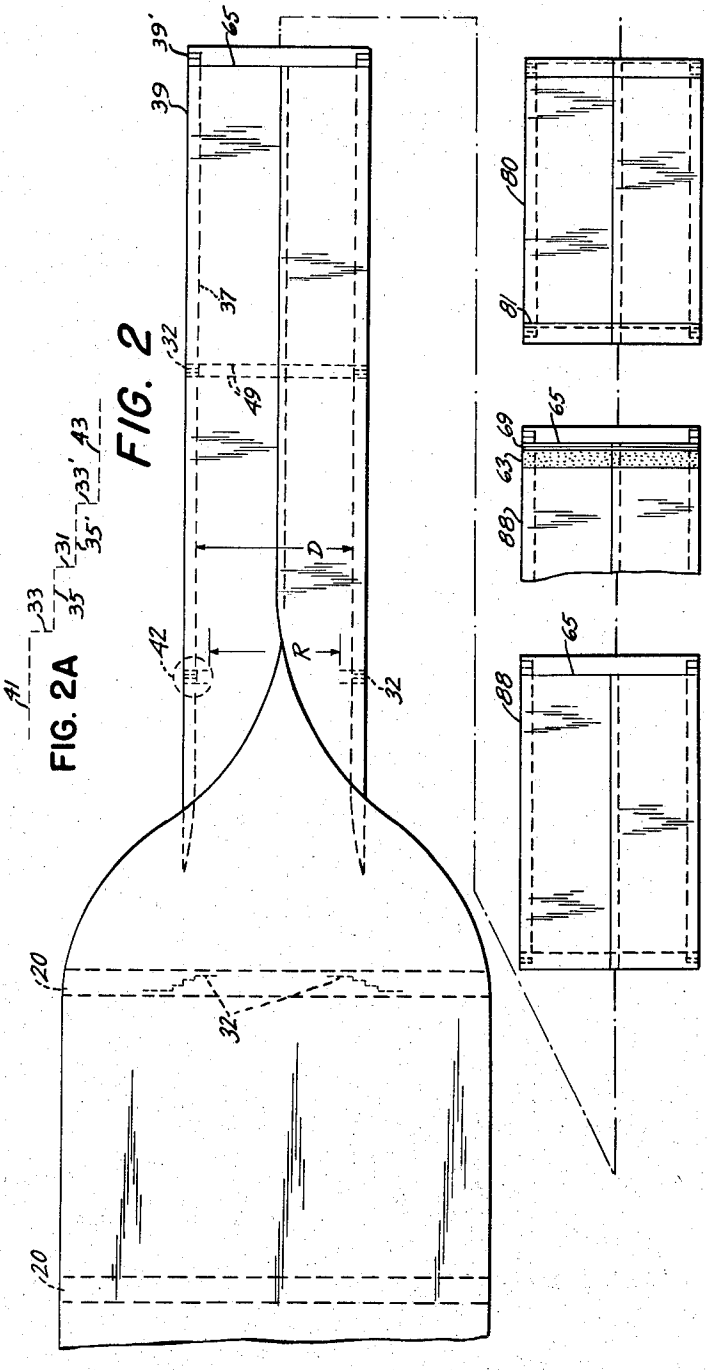


FIG. 2

FIG. 2A

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FIG. 6

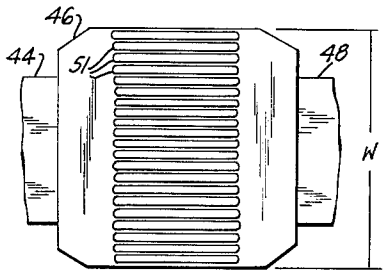


FIG. 3

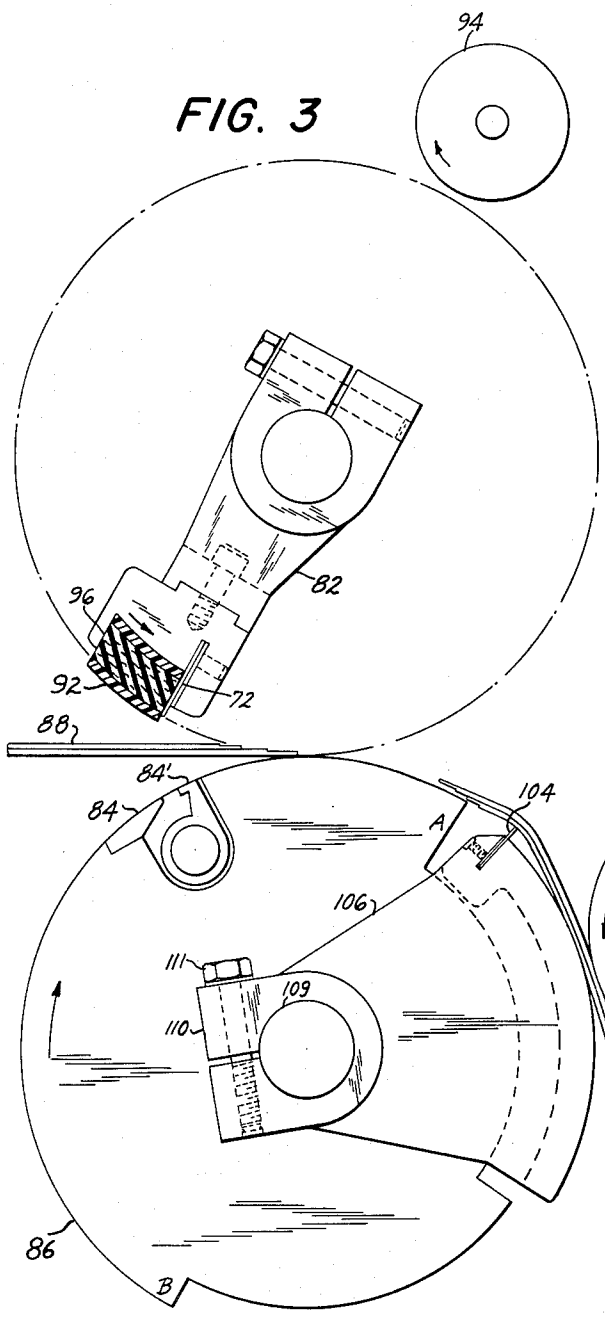
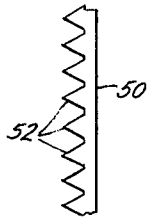


FIG. 7



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FIG. 4

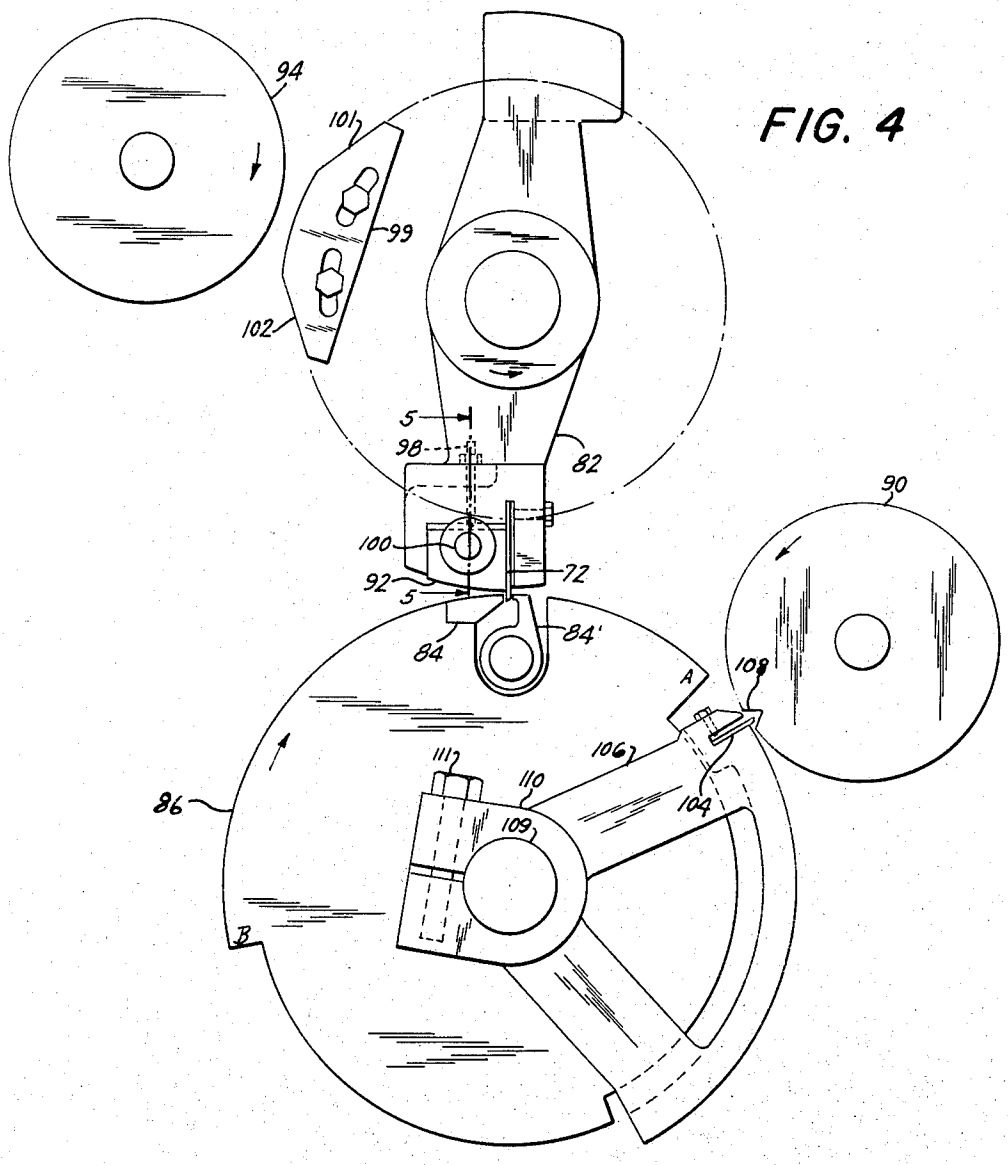
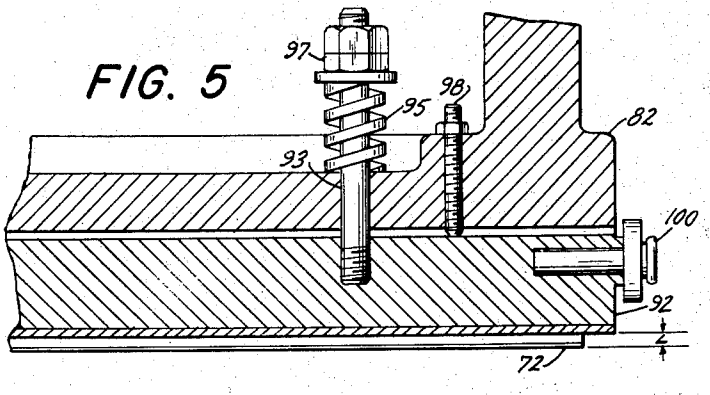


FIG. 5



United States Patent Office 3,203,323 Patented Aug. 31, 1965

3,203,323

PROCESS FOR MANUFACTURING BAGS

Samuel T. Adams, New Orleans, La., and Ben P. Zober, Charleston, S.C., assignors to West Virginia Pulp and Paper Company, New York, N.Y., a corporation of Delaware

Filed Dec. 7, 1962, Ser. No. 243,034
3 Claims. (Cl. 93—35)

This invention relates to a process for manufacturing paper bags and to the machinery for conducting this process. More particularly, this invention relates to a process and to machinery for producing so called "gusseted pinch bottom" bags. These gusseted pinch bottom bags are of the so called "open mouth" type, i.e., during manufacture only one end is sealed, the other end being left open for filling and sealing by the user. These bags may be prepared from either single or multiple plies of paper although the present invention is primarily directed toward multiply bags.

The primary object of this invention is to provide a process and the machinery for conducting this process which will produce gusseted pinch bottom bags at high rates of speed. Other objects will be evident from the following disclosure.

In order to achieve applicants' object of providing high speed production of bags, applicants have devised a process wherein essentially no reciprocating or oscillating parts are involved and wherein the paper web or tube is pulled through the machinery until after the tube has been formed and all necessary cuts have been made for forming of the bag. As a result of these factors, very high speed operation can be achieved.

This invention may be best understood by referring to the drawings, wherein:

FIGURE 1 is a side elevation of a bag machine of this invention.

FIGURE 2 is a top view of the paper web as it is converted from a flat sheet to a finished bag.

FIGURE 2A is an enlarged view of the initial perforations shown in FIGURE 2.

FIGURE 3 is a side elevation of a combined paste applier, folder and sealer which may be employed in the bag machine of FIGURE 1.

FIGURE 4 is a side elevation of another, preferred, form of a paste applier, folder and sealer for use in the bag machine of FIGURE 1.

FIGURE 5 is a cross-sectional view of the paste applicator head taken at section line 5 of FIGURE 4.

FIGURE 6 is a top view of the perforation bed employed in this invention.

FIGURE 7 is a side view of a section of the perforation blade employed in this invention.

Referring to these drawings, three paper webs **10**, **10'** and **10''** are fed from separate mill storage rolls (not shown) under guide roll **12** which helps to align the webs as they enter the machine. After passing guide roll **12**, the webs are separated with webs **10** and **10''** passing over paste applicator rolls **14** and **14'** respectively. The paste applicator rolls **14** and **14'** are equipped with paste heads **16** and **16'** which apply paste within area **20** across the width of the web at intervals corresponding to the length of the bag being made. Back-up rolls **18** and **18'** are provided to ensure firm contact of webs **10** and **10'** with paste heads **16** and **16'**. The purpose of the paste applied at this point is to secure the separate plies of the bag together in the area near the ends of the bag. Consequently, it is not necessary that a continuous strip of paste be applied, and, in fact, it is desirable from a cost standpoint that the paste be applied in area **20** in the form of a series of discontinuous spots.

Web **10''** is passed beneath idler roll **22**, and the three webs are mated while passing between pressure rolls **24**, **24'**. The pressure rolls **24**, **24'** exert enough pressure on the three webs to set the adhesive applied to webs **10**, **10''**, thus combining all three webs into essentially a single assembly of the webs which are joined together at bag length intervals.

It will readily be observed that in securing the webs together that paste need only be applied to the plies employed which are in excess of one. Consequently a greater or lesser number of paste applicators than that shown in the drawings will be required dependent upon the number of plies employed in making the bag. As will become evident from the disclosure hereinafter, this change in the number of paste applicators employed is the only change to the machinery necessary when changing the number of plies used in making the bags.

After the webs have been thus secured together at bag length intervals, they pass through perforator rolls **26**, **26'** where the webs in flattened condition are perforated in the pasted area **20** by two perforator blades **30** acting in conjunction with corresponding recesses in perforator roll **26'**. The two perforations **32** are stepped and extend across only a minor portion of the web width. The two transversely spaced and aligned stepped perforations **32** are made in the general area of the web which will become the gusset when the webs are formed into the gusseted tube. The stepped perforations **32** each preferably have three sections **31**, **33**, and **33'** made in the longitudinal direction of web travel. These longitudinal sections **31**, **33** and **33'** are so made that they will coincide with the three folds **37**, **39**, and **39'** respectively made in the formation of the gusseted tube. In addition, each perforation **32** has four transverse sections **35**, **35'**, **41** and **43** connecting with the three longitudinal sections **31**, **33** and **33'**. The innermost and outermost transverse sections **41** and **43** of each perforation **32** are made of a significantly greater length than the depth of the gusset to be formed and when the tube is formed will each lie in a different wall of the tube, while the two transverse sections **35**, **35'** which abut the longitudinal sections **31**, **33** and **33'** on both ends are made of the same length as the depth of the gusset and will each lie in a different side of the gusset. These stepped perforations **32** can be made in other forms than that shown. For example, the three longitudinal sections **31**, **33** and **33'** and the two transverse sections **35**, **35'** which abut these longitudinal sections on either end may be replaced by a single diagonal section extending from transverse section **41** to **43**. Other modifications to the design of the stepped perforations may obviously be made so long as the transverse sections **41**, **43** are made longer than the depth of the gussets to be formed, are spaced apart from one another in a longitudinal direction, and are connected together by a continuous perforated section which when the tube is formed will extend across the gusset.

It is extremely important in the practice of this invention that the web be perforated and not completely severed in the preceding operation. If the web is completely severed, the edges produced will snag on the former in the succeeding step, thereby tearing the web and jamming the machinery. This is particularly the case at the high rate of speed at which this invention can be employed. In general, it has been found that severing of from 50 to 90% of the web during perforation is satisfactory, depending principally upon the tensile strength of the web and the number of plies employed. Each individual cut should, of course, be relatively short—on the order of ½ inch or less—to prevent any possibility of snagging the web on the former. A very workable perforation is one where the cut portions are ⅜ inch long and are separated by an uncut web portion of about ⅛ inch.

After perforation, the webs are passed over tension roll 34 and through a standard gusset former 36. Draw rolls 38, 38' pull the web through the former 36 and press the formed tube to set the adhesive applied in the former to adhere the longitudinal edges of the webs together. After the tube has been formed, the perforations should appear as indicated at 42 in FIGURE 2. It will be noted at 42 that the transverse portions 41, 43 of the perforations 32 extend from the edge of the bag inwardly well beyond the depth of the gusset and that transverse portion 41 lies in the bottom wall of the tube and transverse section 43 lies in the upper wall of the tube.

The tube, as it passes between draw rolls 38, 38', completely envelopes plate 44 which extends from the end of former 36. Supported at the end of plate 44 is a perforator plate 46 shown in top view detail in FIGURE 6. The width W of perforator plate 46 is slightly less than the distance D, shown in FIGURE 2, between the inward projections of the gussets and somewhat greater than the distance R, shown in FIGURE 2, between the ends of the perforations 32. Perforator plate 46 is constructed with a series of longitudinal slots 51 which extend all the way through the depth of the plate. These slots are designed to coact with perforator blades 50, 50' mounted in rotating perforator heads 40, 40'. The blades 50, 50' have a series of teeth 54, shown in FIGURE 7, which are designed to pass during rotation of perforator heads 40, 40' into the slots 51 of perforator plates 46, thereby perforating the paper as it passes over the perforator plate 46. By so constructing the length of teeth 54 and the thickness of perforator plate 46 so that the teeth do not project all the way through the plate during cutting, both walls of the tube or either wall alone may be perforated as desired without disturbing the opposite wall. By this arrangement, perforations 49 are made in the top and bottom walls of the gusseted tube connecting with the ends of transverse sections 41, 43 of perforations 32 previously made in the gusseted portion of the web. This is easily accomplished by offsetting perforator roll 40 from perforator roll 40' by the same distance as the cumulative longitudinal stepping of perforation 32 between transverse sections 41 and 43. By thus perforating the tube, perforations 32 and 49 complete a circle of perforations around the tube in which the perforations in the two walls are offset from one another.

It may be observed that, due to the manner in which this circle of perforations are made, extremely accurate registry of perforations 49 with perforations 32 is not absolutely necessary. It is, in fact, possible to mis-register the two sets of perforations by ¼ inch or so without causing any serious difficulty although it is preferable from the standpoint of finished bag appearance that good registry between the two sets of perforations be maintained.

In operation the tube of paper which encircles perforator plate 46 will hold this plate in a horizontal plane. However, when the machine is stopped, perforator plate 46 will sag downward since the only support is provided by the pressure of draw rolls 38, 38' on plate 44. To alleviate this, a plate 48 may be provided as an extension on perforator plate 46. This plate 48 should be long enough to rest on draw roll 52' when the machine is not in operation.

Proper tensioning of the tube as it passes over perforator plate 46 is provided by draw rolls 52, 52'. These rolls also feed the perforated tube to segmented roll 54 and support roll 56 which are located slightly over a bag length away from draw rolls 52, 52', and have a higher surface speed than the preceding section of the machine. Due to this difference in peripheral speed the tube is snapped apart at the perforations into bag length sections 88. These bag length sections 88, as shown in FIGURE 2, have one wall at each end extending longitudinally beyond the opposite wall. Normally the opposite walls will be extended at the opposite ends of the tube section, e.g., as shown, at the forward end of the tube the lower

wall extend at both ends, however this requires a dual end of the tube section the upper wall extends beyond the lower wall. It is possible, however, to have the same wall extend at both ends, however this requires a dual set of perforator blades on perforator roll 26 having oppositely arranged stepping and a complicated perforating arrangement at perforators 40, 40'.

The individual bag sections are passed to draw rolls 58, 58', pulled therethrough, and passed to paste applicator 60 and back up roll 62. The paste applicator 60 applies a transverse line of paste across the bag a short distance from the edge of the upper wall of the bag as is indicated by paste area 63 in FIGURE 2. A fresh supply of paste is supplied to paste applicator 60 each time it rotates by contact with paste roll 64.

After application of the paste the bag section is drawn forward by draw rolls 66, 68 and passed to creasing rolls 70, 70'. Draw roll 66 is provided with a notched section 67 so as to avoid contact of the surface of the roll with the paste which has previously been applied.

Each of the creasing rolls 60, 70' is equipped with a scoring blade 72, 72' which extends beyond the surface of the roll and with a recess 74, 74' corresponding with the scoring blade on the opposite roll. As the bag section passes between creasing rolls 70, 70', it is first struck by scoring blade 72 along a transverse line 69 between the line of paste 63 and the edge 65 of the upper wall, thus forcing the tube into recess 74' and scoring the end of the tube upward along transverse line 69. As the end of the tube passes between butt rolls 76, 76', it is folded back upon the body of the bag along score line 69 into contact with the pasted area 63. Passage immediately thereafter of the thus-folded bag through pressure rolls 78, 78' sets the paste, producing the finished open-mouth bag 80.

In order to facilitate later closing of the open end of the bag, a score may also be formed near the open end of the bag. The operation here is similar to that of scoring the closed end of the bag and is accomplished by the action of the scoring blade 72' on roll 70' forcing the bag along line 81 into recess 74 of roll 70.

As will be noticed from the foregoing description of the machine shown in FIGURE 1, all components act in a rotary manner and no reciprocating or oscillating parts are required. Due to this wholly rotary movement of the cooperating components of the machine, very high production speeds can be obtained.

The portion of the machine in FIGURE 1 within the dotted lines, which is involved in the closing and sealing of the bag, may if desired be replaced with the more compact units shown in FIGURES 3 and 4. These units accomplish the same results as the components within the indicated area although they consist of only one set of rolls. These more compact units consequently offer considerable advantage as far as space requirements and cost are concerned.

Both of these units of FIGURES 3 and 4 have a tucker blade 72 rigidly mounted in a rotating frame member 82. This tucker blade coacts with a set of cam operated jaws 84, 84' mounted in roll 86. The cams on these jaws are so arranged that the jaws close and grasp the paper tube 88 as the tucker blade 72 during its rotation presses the tube between the jaws. The jaws remain in a closed position until they have carried the tube 88 between roll 86 and press roll 90. After passage through the nip the jaws are cammed open releasing the tube and remain in that position until they have again been rotated around to a position where the tucker blade 72 inserts another tube length when they close, repeating the cycle.

Located immediately behind the tucker blade 72 on rotating frame member 82 is a paste head 92 which applies the line of paste 63, shown in FIGURE 2, to the tube simultaneously with the creasing of the tube by tucker blade 72 along crease line 69. The difference between the units shown in FIGURES 3 and 4 principally resides in the operation of the paste heads 92. It will be obvious

that a fresh supply of paste must be applied to the paste heads **92** on each revolution. This may be easily accomplished by having the paste heads contact paste roll **94** in each unit. However, in order for the paste heads **92** to contact paste roll **94** during rotation of frame member **82** they must extend beyond the tucker blades **72**. During contact with the bag during creasing, however, the tucker blades **72** must extend beyond the surface of paste heads **92** in order to insert the tube **88** between jaws **84**, **84'**. The solution to this problem in FIGURE 3 is obtained by employing a relatively soft, compressible, resilient material **96**, such as sponge rubber, behind the surface of paste head **92**. In the normal noncompressed state, the surface of the paste head **92** extends beyond the tucker blade and contacts paste roll **94** on each revolution of frame member **82**. Upon contact with the tube, however, the resilient material **96** readily compresses below the edge of the tucker blade **72**.

In contrast, the device of FIGURE 4 employs a cam arrangement to accomplish this same purpose. It, however, provides an advantage over the mechanism of FIGURE 3 in that very accurate control of the quantity of paste applied to the tube can be obtained. The paste head **92** is slideably attached for generally radial movement to the frame member **82** by bolts **93**, as shown in FIGURE 5, upon which are mounted springs **95** held by nuts **97** which inwardly bias the paste head **92**. An accurate regulation of the amount of radial projection of the edge of tucker blade **72** beyond the surface of paste head **92** is obtained by set screws **98**. In a normal position the tucker blade **72** extends beyond the surface of the paste head **92** by the distance L as shown in FIGURE 5. A cam **99**, rigidly mounted on the machine frame (not shown) is provided upon which cam follower wheel **100** rides once with each revolution. As rotating frame member **82** revolves, the wheel **100** will contact and ride upon the outwardly sloped forward surface **101** of cam **99**, extending paste head **92** radially outwardly against the pull of spring **95**. This outward extension of the paste head **92** moves the surface of paste head **92** beyond the edge of the tucker blade **72** and into contact with paste roll **94**. As the wheel **100** passes over the inwardly sloped rearward surface **102** of the cam **99**, the spring **95** pulls the paste head **92** inward of the edge of the tucker blade **72**, in normal position for the application of paste to and creasing of the tube **88**.

The scoring of the tube **88** at the open end, if desired, may be accomplished in the units of FIGURES 3 and 4 by tucker blade **104** mounted on arm **106** which rotates with roll **86**. The tucker blade **104** operates in conjunction with recess **108** of press roll **90** in the usual manner. An easy method for providing for different bag lengths is by movably mounting arm **106** on the shaft **109** of roll **86** through the split ring **110** and bolt **111**. By this arrangement arm **106** may be adjusted and fixed in any set position within an arc of about 90° between A and B. The distance between the forward crease **69** at the closed end of the bag and rearward crease **81** at the open end of the bag will be equal to the counterclockwise distance on the circumference of roll **86** from jaws **84**, **84'** to tucker blade **104**. By moving the position of the tucker blade **104** in relation to the jaws **84**, **84'**, a very quick method is provided for adapting the machine for a change in bag lengths.

While the present invention has been described in connection with certain specific embodiments, it will be obvious that many variations may be made within the scope of this invention.

We claim:

1. The method of making open mouth gusseted pinch bottom bags from a continuous paper web comprising:

(a) forming the web into a gusseted tube having opposite walls and opposite gusseted sides,

(b) prior to said forming while the web is in a flattened condition making a pair of transversely separated and aligned stepped perforations through the web, said perforations extending across only a minor portion of the web width and being separated from the edges of said web by a substantial transverse portion of non-perforated web, each of said pair of perforations comprising two longitudinally displaced transverse sections longer than the depth of the gusset which will extend when the gusset tube is formed inward in opposite walls of the tube from the gusseted side of the tube and a section connecting the ends of the transverse sections through the portion of the web which will form the gussets,

(c) after formation of the tube transversely perforating each of the opposite walls of the tube along a transverse line connecting the inner ends of the transverse sections of the stepped perforations,

(d) separating the gusseted tube into bag length sections along the lines of perforation, and

(e) folding over and sealing an end portion of the bag length tube upon one wall of the tube.

2. The method of claim **1** wherein the sections connecting the transverse sections of the stepped perforations consists of three longitudinal sections which when the tube is formed coincide with the three folds made in the formation of the gussets and two generally transverse sections connecting the three longitudinal sections.

3. The method of continuously making open mouth gusseted pinch bottom bags from a plurality of continuous paper webs which comprises:

(a) pasting said plurality of webs together at bag length intervals to form a unitary web structure,

(b) making two stepped, transversely separated, and aligned perforations simultaneously through all the paper webs while said webs are in a flattened condition said perforations extending across only a minor portion of the web width; each of said perforations comprising:

(1) two longitudinally displaced transverse sections, said sections being separated from the edges of said web by a substantial transverse portion of non-perforated web and being so formed that when the webs are formed into a gusseted tube having opposite walls that each section lying in an opposite wall of the tube will extend from the gusset edge inward of the depth of the gusset, and

(2) a continuous line of perforations, connecting said transverse sections, which when the gusseted tube is formed will extend across the gusseted area,

(c) forming the web into a gusseted tube having opposite walls,

(d) making two transverse perforations, one in each wall of the tube connecting the inward ends of the transverse sections of the two stepped perforations,

(e) separating the gusseted tube into bag length sections at the perforations, said sections having one wall at each end thereof longitudinally extending beyond the opposite wall, and

(f) folding the longitudinally extended wall over the opposite wall and sealing it thereto.

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FRANK E. BAILEY, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,203,323 August 31, 1965

Samuel T. Adams et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 1, strike out "wall extend at both ends, however this requires a dual" and insert instead -- wall extends beyond the upper wall and at the rearward --; line 21, for "rolls 60, 70'" read -- rolls 70, 70' --; column 6, line 23, for "consists" read -- consist --.

Signed and sealed this 12th day of April 1966.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents