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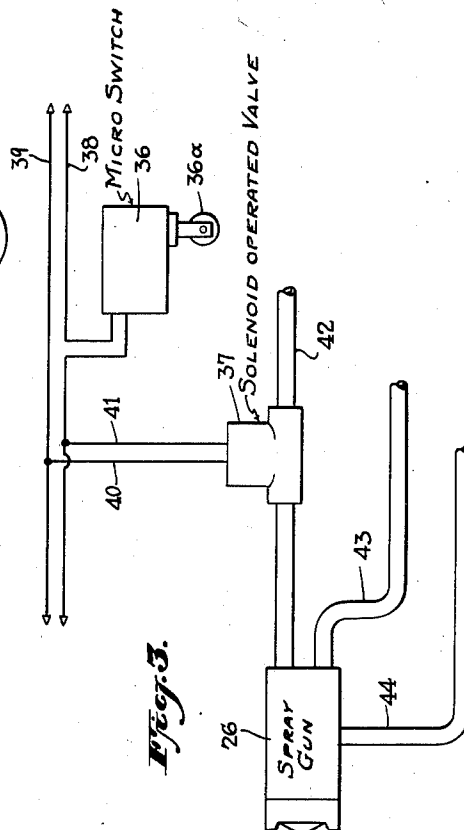
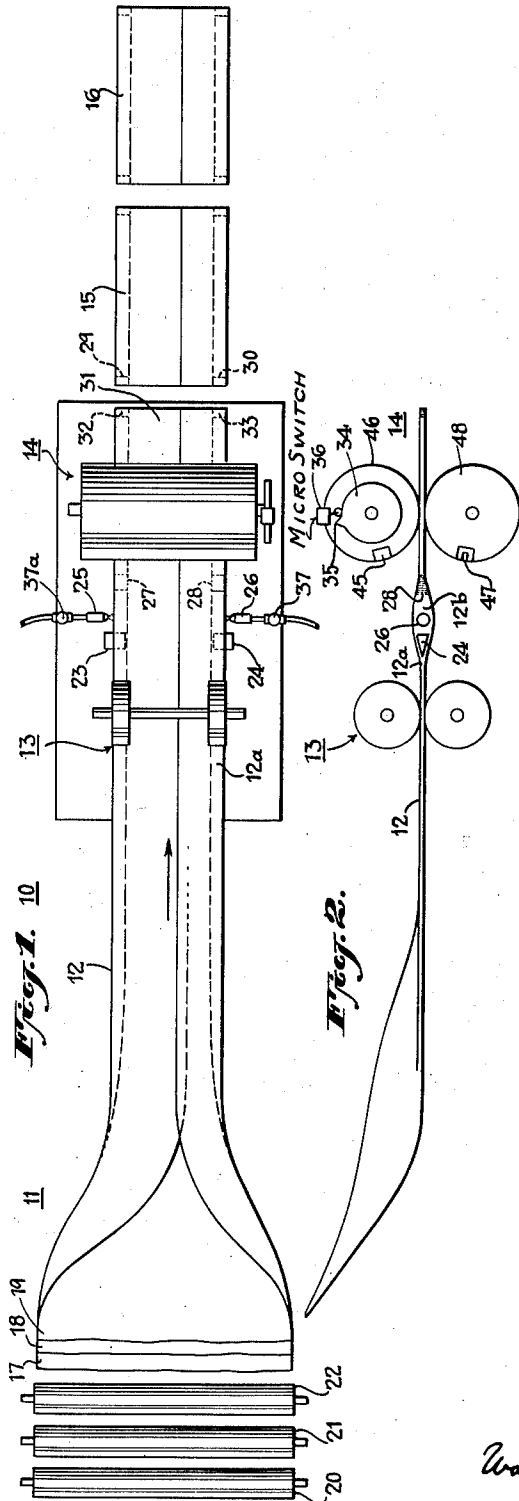
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METHOD AND APPARATUS FOR FORMING MOISTURE-PROOF GUSSETS

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2 Sheets-Sheet 1



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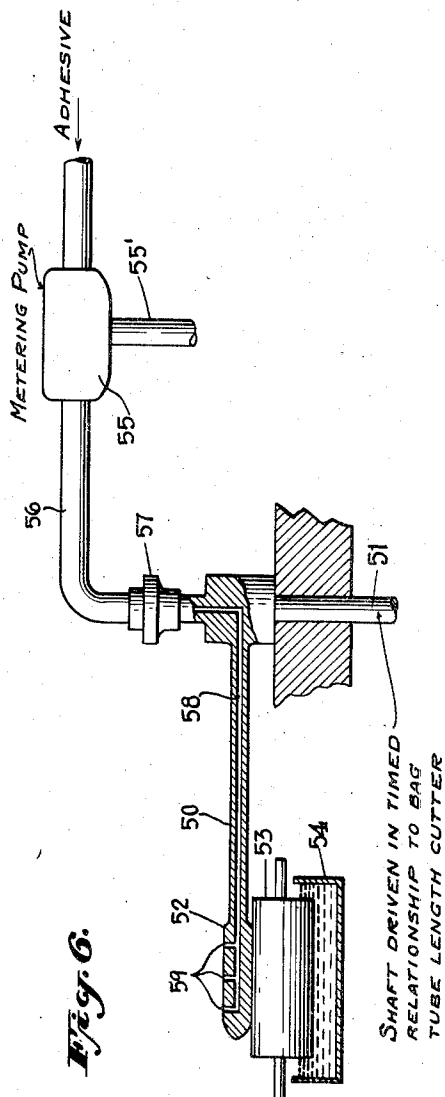
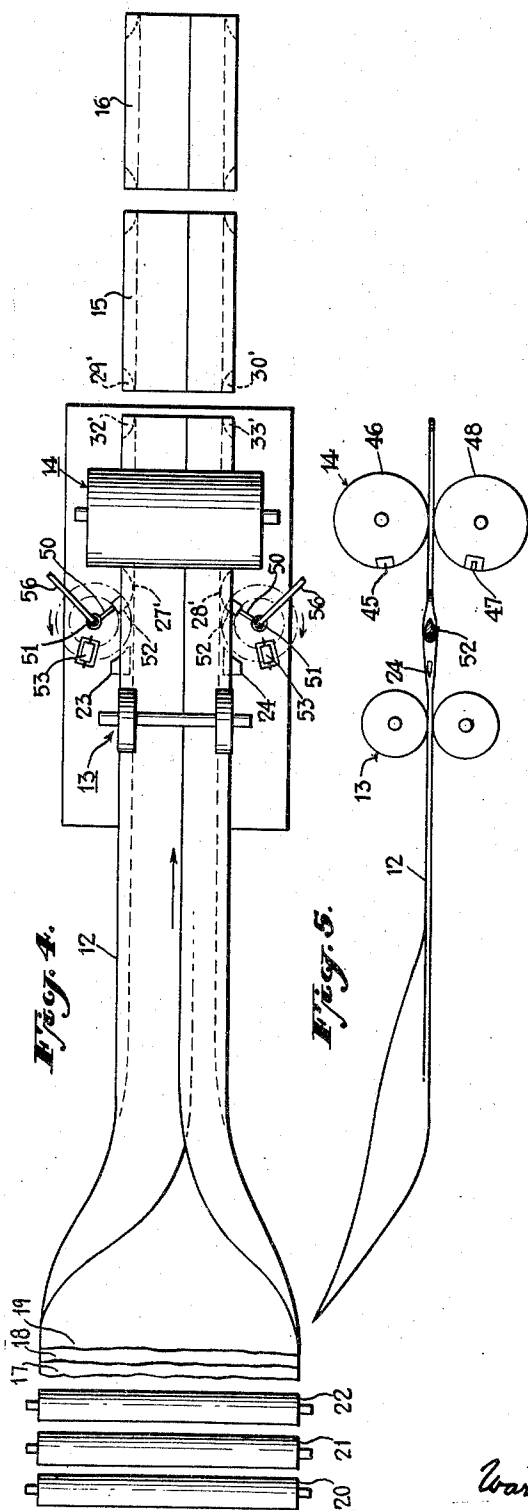


Fig. 6.

SHAFT DRIVEN IN TIMED
RELATIONSHIP TO BAG
TUBE LENGTH CUTTER

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METHOD AND APPARATUS FOR FORMING MOISTURE-PROOF GUSSETS

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12 Claims. (Cl. 93—19)

This invention relates to the closing of bags, and more particularly to method and apparatus for forming moisture-proof gussets for the end closures of gusseted bags which are intended to have closures of the sewn-end type.

The invention also relates to method and apparatus for providing moisture-proof gussets not only for the end closures of bags having sewn ends which are closed by a seam of thread, but also for the gusseted end closures of bags which are closed by means of plastic stitch-like means including plastic which extends through perforations formed along the end margin of the bag. It is understood that the term "sewn-end type" of closure as employed herein embraces not only the conventional type of sewn seam closure employing a continuous thread but also the aforementioned plastic stitch type of closure including the type wherein a ribbon of, for example, thermoplastic, extends along the end margin of the bag and has portions thereof which protrude through and adhere together within perforations formed along such end margins. It is understood, of course, that closure tape may be applied along and astride the end closure of the bags thereby to cover the sewn seam or plastic closure aforementioned.

The invention in one aspect thereof is constituted by the novel method for forming a moisture-proof sewn-type end closure for a gusseted bag which includes the steps of first forming a gusseted bag tube from a web supply which may be of the multi-ply or single ply type. This may be accomplished by advancing toward assembled superposed relationship a plurality of paper webs which are to form the bag tube. After the webs are brought together in contact they are continuously formed into either a single or multi-ply flattened tube with gussets along each side. While the tube is in such a flattened condition, including the gussets on opposite sides thereof, such flattened gussets are wedged open and while so wedged open adhesive in preselected amounts is applied at bag length intervals therein. Thereafter the bag tube is separated into bag tube lengths along transverse lines of partition which pass across the regions of the gusset which bear the aforementioned adhesive thereby forming a bag tube end, the end gusset portions of which have interposed therebetween on the inner facing surfaces thereof such adhesive material which is of moisture-resistant nature. Thereafter at least one end of each separated bag tube length is closed by the formation of a sewn-type end closure with or without a covering end closure tape bound thereover.

Various further and more specific features and advantages of the invention will clearly appear from the detailed description given below taken in connection with the accompanying drawings which form a part of this specification and illustrate, by way of example, preferred arrangements of apparatus for carrying out the invention. The invention consists in such novel methods and combinations of features and method steps as may be shown and described in connection with the equipment herein disclosed.

In the drawings:

Fig. 1 is a plan view, partly in section and with parts

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broken away, illustrating schematically one form of apparatus for carrying out the present invention;

Fig. 2 is a side elevation of parts shown in Fig. 1;

Fig. 3 is a schematic fragmentary view of an operative interconnection between an adhesive spray gun employed in the apparatus of Fig. 1 and its actuating means operatively connected to a cutter element of Fig. 1; and

Figs. 4 and 5 are views similar to Figs. 1 and 2, but illustrating an alternative embodiment of the invention;

Fig. 6 is an elevational view partly in section of portions of the apparatus of Fig. 4.

Referring to Figs. 1 and 2 in further detail, a multi-ply bag tubing machine 10 is employed, portions of which are here schematically indicated, and which may include a conventional type of tube former or shaping portion (not shown) but which is located at the region indicated at 11, for forming a flattened gusseted tube 12, the latter being continuously advanced through the machine after formation thereof by conventional draw roll means located at 13. A cutter element of conventional form located at 14 is provided and which separates the continuously formed bag tube 12 into bag tube lengths such as indicated at 15 and 16.

The draw rolls draw, for example, three webs 17, 18, 19 through the machine from three source rolls of paper 20, 21 and 22, which respectively feed to the bag tuber the webs for the formation of a three-ply bag tube. It is possible to carry out the invention with any suitable single or multi-ply web supply.

For the purpose of depositing an adhesive substance within the gussets of each bag tube length, and at the end regions of each gusset whereby the end closure of each bag tube length can be made substantially moisture-proof, novel means are provided situated intermediate the draw rolls and the cutter 14 for wedging open the gussets on opposite sides of the bag tube and spraying therein at bag length intervals a preselected amount of suitable moisture-resistant adhesive substance.

Such means, in the form shown in Figs. 1 and 2, comprises a pair of wedges 23 and 24 for respectively wedging open the opposite flattened gussets of the bag tube 12, such wedges 23 and 24 being, as aforementioned, situated intermediate the draw rolls and the cutter 14. Positioned intermediate the locations of the wedges 23, 24 and cutter 14 are spray guns 25 and 26 which are so located as to direct sprays of adhesive into the two gussets respectively.

The spray guns 25 and 26 are actuated at a frequency equal to the frequency of the operation of the cutter element whereby at bag length intervals preselected amounts of such moisture-resistant adhesive substance are sprayed into the gussets, for example, onto areas indicated at 27 and 28, which are sprayed respectively by the spray guns 25 and 26. The adhesive-bearing regions of the gussets are so positioned that the transverse separation lines at the cutter, that is, the knife lines of the cutter, pass about midway thereacross in such a way that each end of a bag tube has interposed at the end region and between the faces of the gussets thereof a suitable and selected area and amount of said moisture-resistant adhesive substance. For example, the bag tube length 15 at the left-hand end thereof (Fig. 1) is provided with adhesive-bearing gusset regions 29 and 30 and the next adjacent and oncoming portion of the bag tube, as at 31, is provided with adhesive-bearing gusset areas 32 and 33, it being apparent that prior to this separation of the bag tube 15 the adhesive-bearing portions 29 and 32 were joined together as were the adhesive-bearing portions 30 and 33.

Any suitable means can be employed for actuating the spray guns 25 and 26 at a frequency designed so

to spray the adhesive, as at 27 and 28, and in the areas shown. For example, there may be an operative inter-connection between the spray guns and the cutter, comprising a cam 34 which is coaxial with the cutter and which is provided with a raised portion 35 adapted for coacting with a microswitch 36 for the purpose of actuating solenoid valves 37 and 37a. Such valves in turn are operatively connected to the spray guns 26 and 25 respectively. Actuation of the solenoid valves 37 and 37a thus immediately actuates the spray guns 26 and 25 to spray the adhesive increments into the gussets at the desired points whereby they will be intersected by the transverse line of partition or cut line at the cutter 14.

As is further well shown in Fig. 3, the cam-operated microswitch 36 is provided with a cam following roller 36a which is positioned for coacting with the raised portion 35 of the cam 34 thereby to actuate the solenoid valves 37 and 37a. In the form shown, in Fig. 3, this is accomplished electrically by connecting the cam-operated microswitch 36 in series with a source of electrical current 38, 39, comprising the power lines across which the solenoid valves 37, 37a may be connected in parallel by means of leads 40 and 41. (For simplicity of illustration, only one of the solenoid valves 37 and one of the spray guns 26 is shown in Fig. 3, but it will be understood that the other valve 37a and the other gun 25 will be connected in the same manner.)

The solenoid valves 37, 37a control the flow of a so-called control air supply to the spray guns 25, 26, the control air supply being directed thereto by means of a conduit 42 in which is connected the solenoid valves 37, 37a. The supply of air for atomizing the adhesive is directed to the spray guns by means of conduits as at 43 and in turn the adhesive itself is directed to such spray gun by means of conduits as at 44. It is advantageous for the air lines between the solenoid valves 37 and 37a and the spray guns 26 and 25 to be as short as possible in order to insure prompt actuation of the spray guns in response to actuation of the solenoid valves.

Referring to Fig. 2, the wedge 24 is shown wedging apart the gusset 12a of the bag tube 12 thereby spreading same, as at 12b, whereby the spray gun 26 can spray the adhesive material, as at 28 easily into the spread gusset.

The cutter 14, in the form shown, includes a transversely extending knife 45 mounted upon the uppermost cutter roll 46. Such knife 45 coacts with a transversely extending groove 47 which is mounted in the lowermost of the cutter elements 48. It is, of course, possible to mount the transversely extending knife in any suitable means and to operatively interconnect the upper and lower cutter elements for operating in phase in a conventional way. The cam 34, in the form shown, is coaxial with the upper cutter element or cutter roll 46 and may be angularly adjustable with respect to the knife 45 whereby a desired phase relationship in the operation of the spray guns 25 and 26 and the cutter 14 can be accomplished. The latter is desirable in order that the transverse line of partition or cut line formed by the cutter be accurately positioned to effect the separation of the bag tube into bag tube lengths in the manner shown in Fig. 1 whereby each inner face along the end of the gusset of each bag tube length is provided with its preselected area of adhesive, as at 29, 30 and 32, 33. It is, of course, desirable for the adhesive-bearing region to be cut about in half so that approximately equal amounts are allowed to remain upon the end marginal inner faces of each of the gussets.

Examples of adhesive moisture-proof material suitable for use for this invention may include the following: polyvinyl acetate which has the advantages of being easily sprayed and subject to heat sealing by virtue of its thermosetting qualities. Thus also a thermosetting adhesive material having adequate moisture-proof qualities, such as polyvinyl acetate, is particularly desirable

when the end closure of the bag is to be of the type employing, for example, polyethylene coated paper tape, or any thermoplastic tape applied to the end margin of the end closure and over which an end closure tape is applied along and astride same. The heating means for heating such tape for securing it in place, is also capable of heat sealing the gussets having the heat-sealable plastic therebetween.

Other substances which have been found to be satisfactory adhesive materials, for example, are latex and certain types of wax, such as one commercially available under the name of "Proxmelt" wax. The latter contains: ethyl cellulose, carnauba wax, synthetic resin having a melt point for example of 300° F., and a plasticizer such as castor oil. Other suitable "hot melt coating" waxes can be employed.

There is thus provided a novel method and apparatus for forming moisture-proof gussets in a gusseted bag tube, the ends of the bag lengths of which are to be closed by sewn-end types of closures, the cost of the formation of such moisture-proof gussets being at a heretofore unattained low point by virtue of the novel and automatic aspects of the method and apparatus. The end closures resulting from the novel method and apparatus may be made wholly moisture-proof at an expense considerably less than heretofore possible of attainment.

In a separate form of the invention it is possible to apply to the web which is to be the outermost one after formation of the tube, the adhesive material prior to the formation of the tube and while the webs, such as 17, 18 and 19 are still in an unfolded condition, that is, prior to their reaching the tube former. The moisture-resistant adhesive material can be, for example, of the wax type if so employed and preferably may be heat-actuable whereby under the action of heat or pressure or both, the gusset portions bearing such material can be caused to adhere to one another.

In still another form of the invention, the moisture-proofing material can be applied to the desired web during the printing of a selected repeated image upon the web, such substance, of course, being applied in the areas which are to become the gusset areas and at bag length intervals in regions which are to be cut across by the cutter element. The moisture-proofing material in this embodiment of the invention preferably is of a non-tacky variety, for example, of a waxy nature, such as the above-mentioned "Proxmelt" wax which can be caused to adhere under the influence of heat or pressure.

Another possible embodiment of the invention is shown in Figs. 4-6 inclusive, wherein it will be noted many of the parts correspond to those shown in Figs. 1 and 2 and are identified by the same numerals. However, in Figs. 4-6, instead of applying the adhesive by spraying into the wedged-open gussets, rotatable adhesive applicator blades are so mounted as to accomplish the purpose.

One of such blades and the associated equipment therefore is shown at 50 in Fig. 6, mounted to rotate about a vertical shaft 51, the shaft being driven with the same frequency of rotation as that of the bag length cutter means 14. It will be understood that the drive for the cutter means and the shaft 51 may be mechanically interconnected in various suitable ways (not shown) to accomplish this result.

As shown in Fig. 4, one of the applicator blades 50 may be mounted in spaced relation from, and at the side of each of the gussets of the bag tube 12 and at locations between the wedges 23, 24 and the cutter means 14.

Each applicator blade 50 may terminate in a somewhat enlarged horizontally extending wedge-shaped portion 52 which appears in cross-section in Fig. 5. These blades are adapted to be rotated in the direction of the arrows indicated in Fig. 4 so that the forward narrow edges thereof will enter the gussets at points following the wedges 23, 24, whereupon the wider parts of the blade

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portions 52 which bear the adhesive will wipe over the internal surfaces of the gussets along arcuate paths. The rearmost and wider parts of the applicator portions 52 are preferably such as to tend to spread open the gussets at least slightly more than same are spread by the wedges 23, 24, in order to insure that the adhesive will be applied to the paper surfaces in the gussets with adequate pressure for uniform smooth application at the necessary predetermined areas.

Adhesive may be applied to the applicator portions 52 in either one or both of two ways. For example, as shown in Fig. 6, an adhesive applicator roll 53 may be so mounted on a horizontal axis that its lower portions will be immersed and rotatable in adhesive contained in an adhesive pot 54, while the upper surface portions of roll 53 engage with rolling contact the undersurface of the applicator portion 52 on each occasion when the latter rotates around to the location of this roll. By known glue roller arrangements, provision could also be made for similarly applying adhesive to the upper surface of applicator portion 52. However, with the particular construction shown in Fig. 6, a supply of adhesive may be furnished from a metering pump 55 interposed in an adhesive supply conduit 56, which conduit is connected by a swivel joint 57 to the upper end of the rotatable shaft structure 51. As indicated, the applicator 50 may be formed with an internal channel 58 for receiving such metered supply of adhesive and conducting same to outlet openings as at 59 on the surface of applicator portion 52.

Ordinarily it will be necessary only to apply adhesive to either one or the other of the wedged-apart paper surfaces within the gusset. That is, if the adhesive is applied either to the lower or the upper surface in the gusset, it will serve adequately to adhere the surfaces together when the gusset is again flattened. But to insure that no desired adhesive areas are skipped by the applicator, adhesive may be applied as above explained to both the upper and lower surfaces thereof and either by the use of glue applicator rolls or by the metering pump arrangement.

The above-described rotatable adhesive applicator means will apply predetermined arcuately shaped adhesive areas in the gussets as indicated at 27' and 28' in Fig. 4 and when the tube lengths are severed, the gussets in each corner will accordingly contain adhesive areas, each of which will extend over about one-quarter of a full circle. Yet at the ends of the bags, the adhesive will extend into the deepest portions of the gussets for insuring secure sealing of the gusset ends when the bag ends are closed as by sewn seams or other closure means.

After the bag lengths leave the bag tubing machine as indicated in Figs. 1 and 4, they may be taken or conveyed to any of the known forms of end closure applying equipment for bags of this type, for example sewing machines accompanied by means for applying closure tapes astride the bag ends and securing such tape in place either before or after the sewn seam is applied.

In the usual gusseted multiwall bag having a sewn seam closure or the like, the seam is spaced some little distance from the end edges of the bag tube, and accordingly in some cases it may not be essential or important that the adhesive areas in the gussets extend much closer to the end edges of the bag tube than the location of the sewn seam, in order still to insure that the area along the seam is securely sealed. Thus the above-described means and methods for applying adhesive in the gussets might be so arranged as to apply two adjacent adhesive areas, if desired, separated by a narrow gap, at which gap the bag tube lengths are severed apart. But for practical purposes, the use of two such slightly spaced areas of adhesive are to be considered the equivalent of the above-described single adhesive areas which are severed by the bag tube length cutter.

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What is claimed and desired to be secured by Letters Patent is:

1. In the manufacture of bag tubes, continuously advancing a web supply while continuously forming same into a flattened tube with gussets along each side, forcing open said gussets at transversely opposite positions along the opposite sides of said advancing flattened tube, introducing at bag length intervals into such opened gussets preselected quantities of moisture-resistant adhesive material, and separating the continuous tube at bag length intervals along transverse lines which pass across the areas in such gussets bearing such adhesive material.

2. In the manufacture of bag tubes, advancing a paper web supply while continuously forming same into a flattened tube with gussets along each side, opening the opposite gussets thereof at transversely opposite positions along the opposite sides of said flattened tube, spraying at bag length intervals into such opened gussets preselected quantities of moisture-resistant adhesive material, and thereafter closing such gussets thereby re flattening the tube.

3. In the manufacture of multi-ply bag tubes, advancing toward assembled superposed relationship a plurality of paper webs, continuously forming same into a multiply flattened tube with gussets along each side, opening such gussets at transversely opposite positions along the opposite sides of said flattened tube, applying areas of moisture-resistant adhesive material at bag length intervals in such gussets, and separating the continuous tube at bag length intervals along transverse lines which pass across the areas of such gussets bearing such adhesive material.

4. The method for forming moisture-resistant gusset ends in gusseted bags which includes the steps of: forming a gusseted bag tube from a web supply; separating said tube into bag tube lengths; prior to such separation applying moisture-resistant adhesive substance at bag length intervals into the opposite gussets of said tube at gusset regions which are to be severed in such separating step.

5. The method for forming moisture-resistant gusset ends in gusseted bags which includes the steps of: forming a gusseted bag tube from a plurality of webs of sheet material; after the formation of such gusseted bag tube spraying moisture-resistant adhesive at bag length intervals into the opposite gussets thereof; and separating said tube into bag tube lengths along lines transverse to such bag tube, such transverse lines passing across the regions of such gussets into which adhesive has been sprayed as aforementioned.

6. The method for forming moisture-proof gusset ends in gusseted bag tubes including the steps of: forming a gusseted bag tube from a plurality of paper webs; at a stationary adhesive application station on opposite sides of said formed gusseted bag tube, applying areas of moisture-proof adhesive into such opposite gussets and at bag length intervals; and thereafter separating said tube into bag tube lengths along transverse lines of partition which pass across the adhesive-bearing areas of such gussets.

7. A method for forming a moisture-proof sewn-type end closure for gusseted bags which includes the steps of: forming a gusseted bag tube from a web supply; at a stationary adhesive applicator station, wedging open the opposite gussets of said bag tube and applying in such gussets at bag length intervals areas of moisture-resistant adhesive material; thereafter separating said tube into bag tube lengths along transverse lines of partition, which lines pass across said adhesive-bearing areas of the gussets; and thereafter closing at least one end of each separated bag tube length.

8. In a method for forming multiwall tube lengths for sewn end bags from a continuous multi-ply gusseted tube and providing moisture-proof gusset ends, the combination of steps which comprises: applying areas of moisture-

resistant adhesive to the outer surface of the outer ply at regions which are to form the opposed wall surfaces in the gussets at the ends of the bag tube lengths, at a time prior to the severing of the continuous multi-ply tube into bag tube lengths; and after the continuous bag tube has been formed with gusseted sides containing such adhesive areas in the gussets, severing the continuous tube into bag lengths along transverse lines which divide each such adhesive area in a gusset into two portions, whereby each gusset end of each bag tube will contain portions of such adhesive areas therein for sealing the severed gusset ends when the bag ends are closed by a sewn seam.

9. In the manufacture of bag tubes, the combination of method steps which comprises: continuously advancing a web supply while continuously forming same into a tube with generally flattened gussets along each side; forcing open said gussets at transversely opposite positions along the opposite sides of the advancing tube; introducing rotary adhesive-bearing means at bag length intervals into such open gussets; and thereafter separating the continuous tube at bag length intervals along transverse lines which pass across the areas in such gussets bearing adhesive applied by said adhesive-bearing means.

10. Apparatus for applying moisture-resistant material at the end regions of the gussets of bag tubes including in combination: a tubing machine having means for pulling a plurality of paper webs from a plurality of paper rolls and also having a folder for forming same into a generally flattened tube with gussets along opposite sides of such tube; means for severing the formed bag tube into bag tube lengths; means interposed between said pulling means and said separating means for wedging open the opposite gussets of said bag tube; a pair of adhesive applying means situated intermediate said wedging means and said severing means for applying adhesive into the opened opposite gussets of said bag tube; and means for actuating said applying means at bag length

intervals and at the same frequency of operation as that of said severing means, the latter being adjusted in phase relation with respect to said applying means whereby the severing means acts upon said bag tubes at areas which bear the said adhesive.

11. In apparatus of the class described, a multi-ply paper bag tubing machine having means for pulling a plurality of paper webs from a plurality of paper rolls and forming same into a tube, such bag tubing machine including gusset-forming means for forming a flattened gusseted bag tube, such pulling means aforementioned including bag tube draw rolls; a cutter for separating the formed bag tube into bag tube lengths; wedge means situated between said draw rolls and said cutter for wedging open the opposite gussets of said bag tube; a pair of spray guns situated intermediate said wedge means and said cutter and positioned for directing a spray of adhesive into the respective opened gussets of said bag tube; and means for actuating said spray guns at the same frequency as the frequency of operation of said cutter.

12. Apparatus for applying moisture-resistant material in the end regions of the gussets of bag tubes including in combination: a tubing machine having means for pulling a plurality of paper webs from a plurality of paper rolls and also having a folder for forming same into a generally flattened tube with gussets along opposite sides of such tube; means for severing the formed tube into bag tube lengths; means interposed between said pulling means and said severing means for wedging open the opposite gussets of said bag tube; a pair of rotary adhesive-applying means situated intermediate said wedging means and said severing means for applying adhesive in the opened gusset areas of said bag tube; and means for rotating said adhesive applying means with the same frequency as that of said severing means and in predetermined phase relation thereto, whereby said applying means will apply the adhesive at bag length intervals and at regions across which the tube is to be severed.

No references cited.