July 28, 1931. T. E. COTY ET AL 1,816,361

TUBER FOR MULTIWALL BAGS

Filed Nov. 30, 1929 3 Sheets-Sheet 1

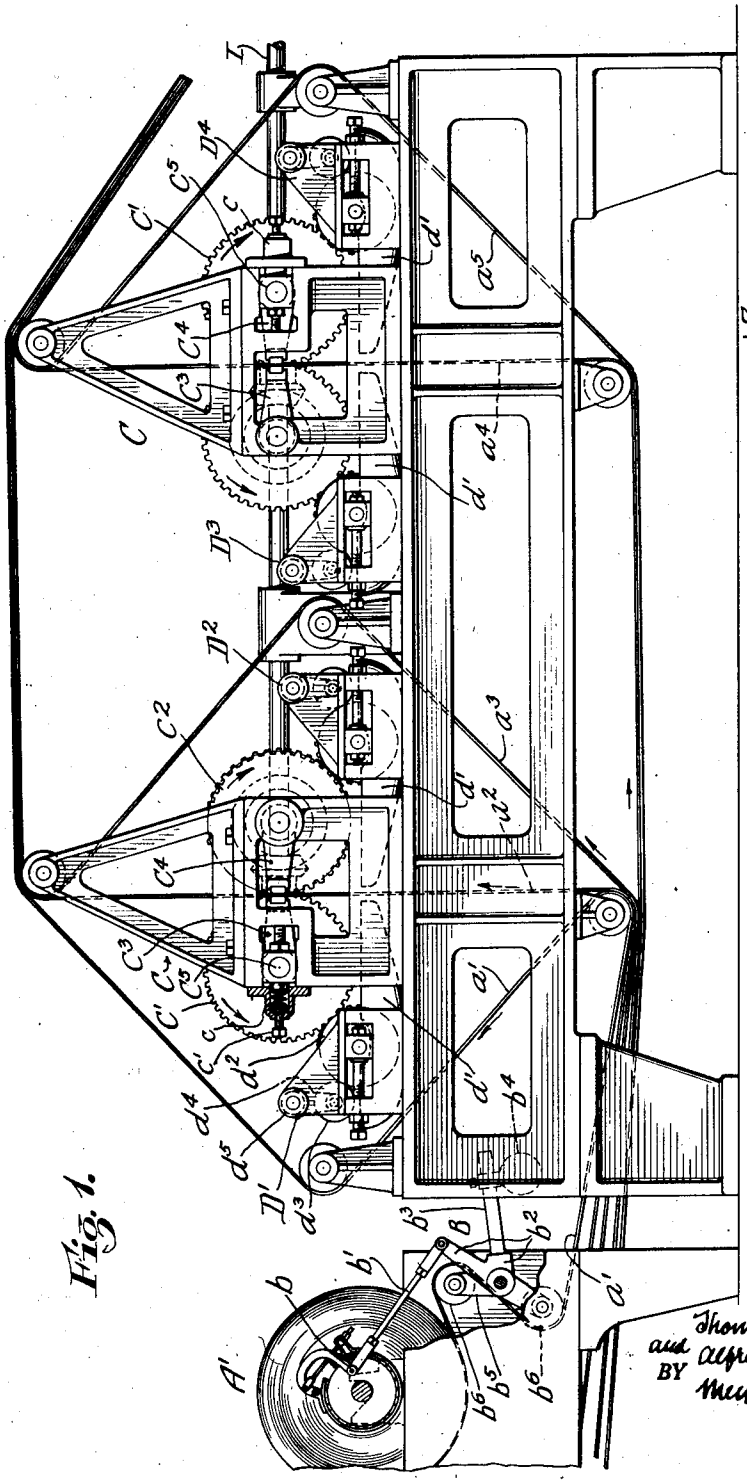


Fig. 1.

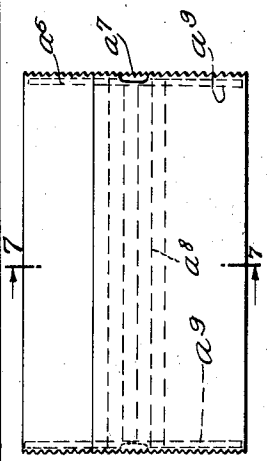


Fig. 8.



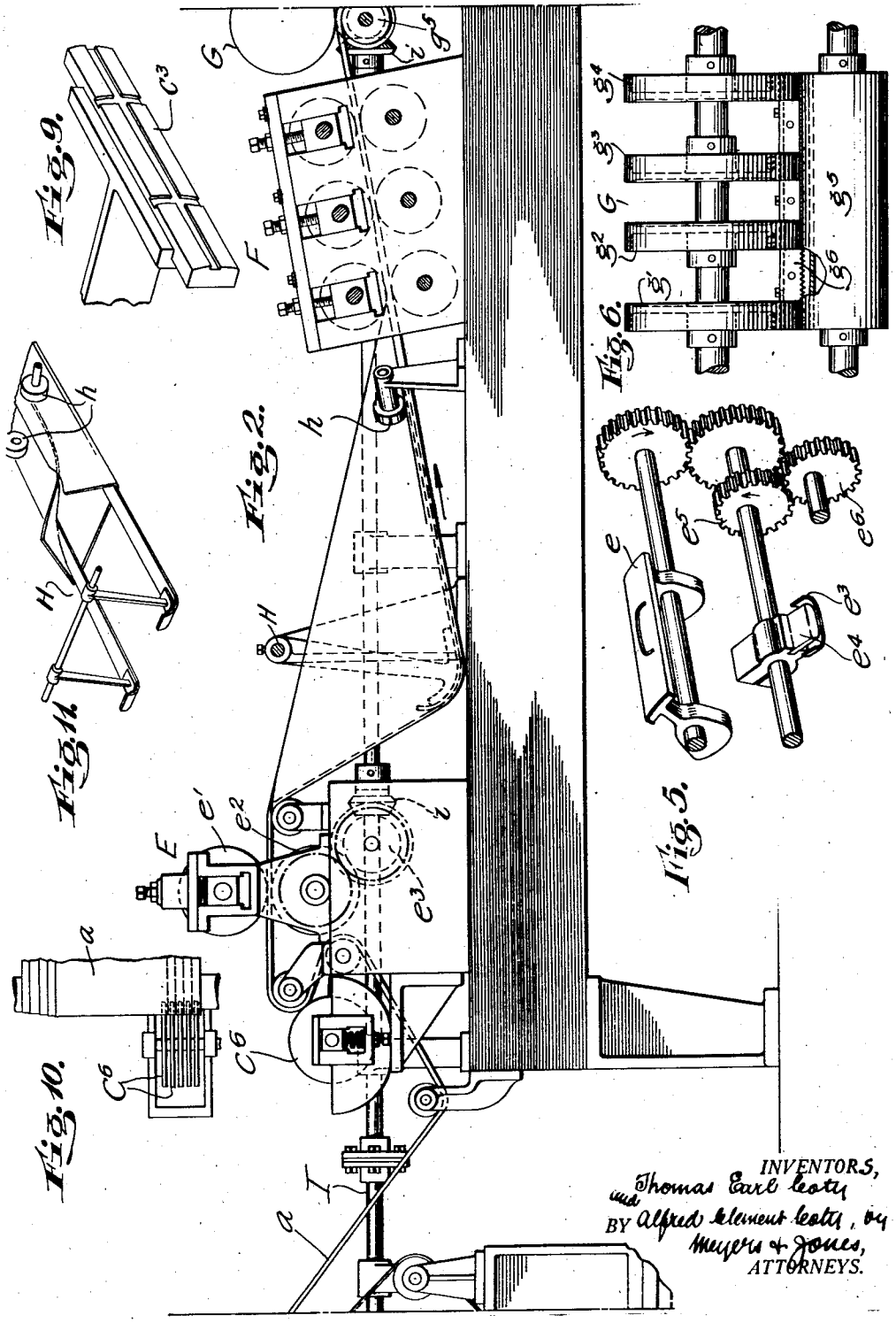
Fig. 7.

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Filed Nov. 30, 1929 3 Sheets-Sheet 2



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TUBER FOR MULTIWALL BAGS

Filed Nov. 30, 1929 3 Sheets-Sheet 3

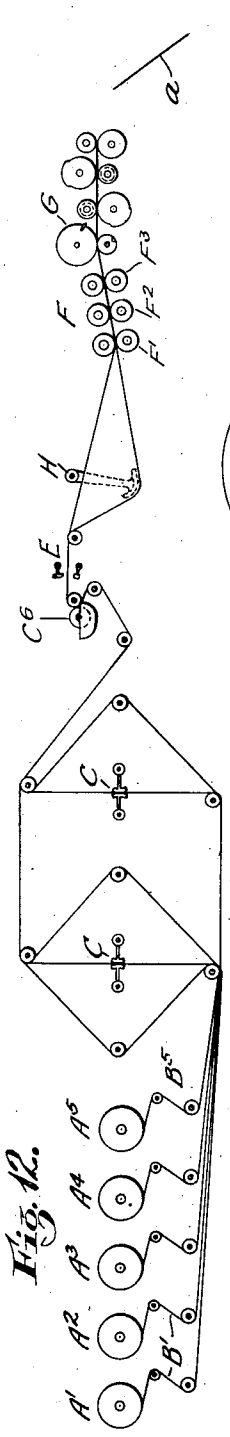


Fig. 12.

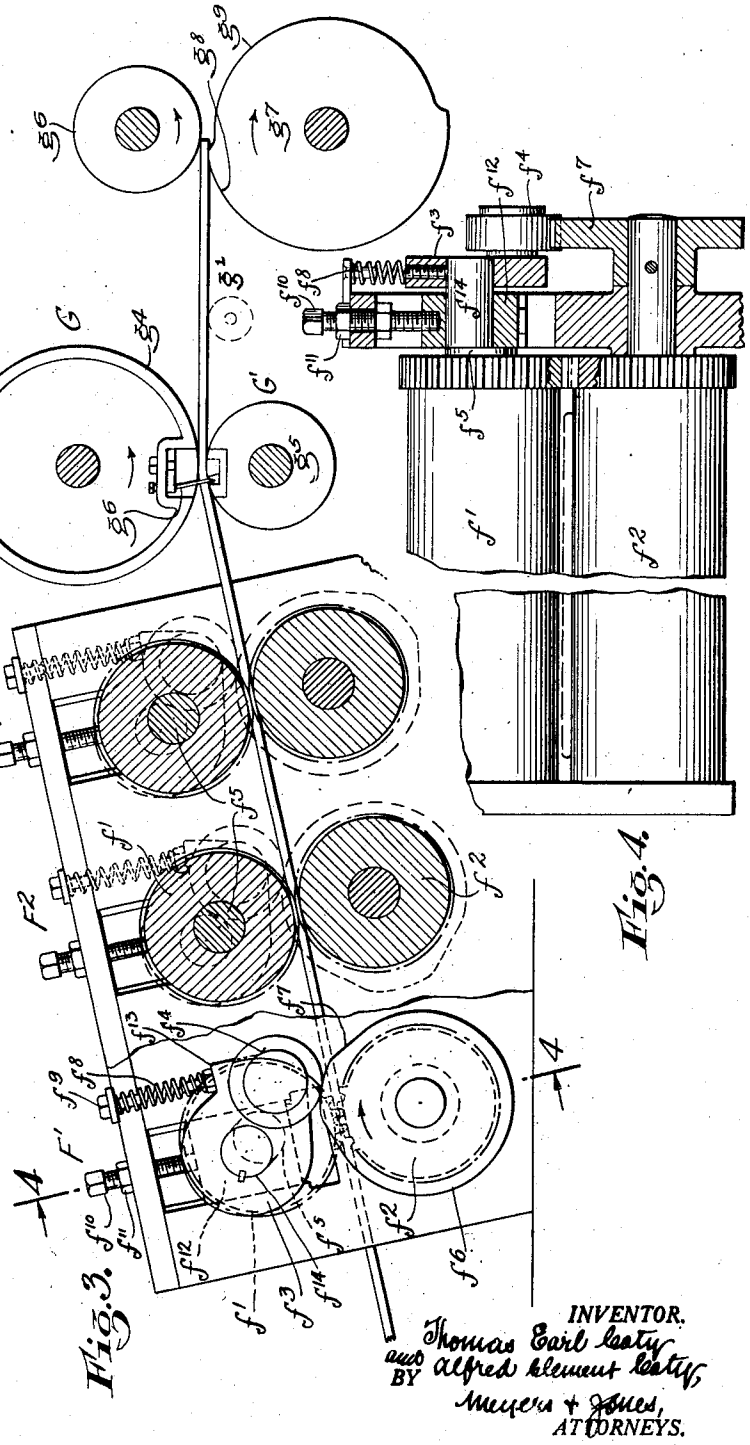


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE

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TUBER FOR MULTIWALL BAGS

Application filed November 30, 1929. Serial No. 410,804.

Our present invention relates to "tubers" or machines for making "multi-wall" bags, particularly paper bags, such as are now used for packing cement and other heavy materials, generally in powder form. These bags are usually made of a number of layers of very heavy paper, and trouble arises in handling the bags from the slipping of the various layers one upon another, so that the ends are not uniform, sometimes one or more layers projecting beyond the others and causing trouble in forming the bottoms or the other closures. One form of these bags is a so-called "valve" bag, in which one end of the bag is closed tight, and the other is formed and closed except at one side of the bag into which a spout is to be inserted, through which material is blown into the bag pneumatically, the weight of the material itself closing the opening in that end of the bag. When a bag of this character is made of several layers of material, the layers must register accurately in order to fit the bags for use on the bottoming machine.

Our improved machine deals with these bags particularly, and is designed to form the tube from which the bag is made with its several layers pasted together so that they cannot slip, after which the tube is cut into sections forming blanks which are subsequently fed to a bag-machine for forming the bottom and top closures.

We apply the paste to the inner layers only of the material by separating the layers so that the outer ends pass on one side of the pasting mechanisms, of which in the machine shown there are two; while two of the inner layers have the paste applied to both sides, so that all of the layers adhere when the several sheets are subsequently assembled in a web to pass on to the tubing device.

In applying the paste we have found it important to prevent its being ironed flat in the subsequent operation of the machine, which prevents or weakens adhesion and eventually causes the paste to be smeared on the draw-rollers feeding the web, thus getting it on the outer layers of the blanks, making them stick together in the magazine and impairing the feed to the bottomer. Also, when it hardens on the rolls it cuts the web or weakens it. We therefore arrange a multiplicity of sets of draw-rollers, with means timed for lifting each upper roll in turn as the paste-strips pass, so that some are always acting when others lift. This requires careful coordination of the various pasting and drawing mechanisms.

We have also devised a new pasting mechanism consisting of two different sets of bars, applying paste to both sides of the inner layers of material, and geared in synchronism. Adjusting means thus is necessary on only one of the sets, one being moved to position while the other is free, and the second being then brought into registry and secured. This greatly facilitates changes to make different sizes of bags.

Also we have applied an automatic tension device to the web, which in this industry has heretofore been generally regulated by hand, a fixed tension subject to adjustment by the operator being employed. For this we substitute a tension having automatic compensating means, so that an increase or decrease in web tension is nullified immediately, thus increasing the speed of manufacture.

The accompanying drawings show an embodiment of the invention, for which others may be substituted.

Figure 1 is a side elevation of a part of the machine, showing the way in which the layers of material are secured together.

Figure 2 shows the tubing device in which the web is formed into a tube, and the longitudinal seams pasted together.

Figure 3 shows the feeding rolls of the machine of peculiar construction more fully to be described hereafter, together with the cut-off knife for separating the tube into blanks.

Figure 4 is an end elevation partly in section on the line 4—4 of Figure 3, of the parts shown in that figure.

Figure 5 shows the construction of the thumb-knife.

Figure 6 shows the construction of the cut-off knife.

Figure 7 shows an end elevation of one of the blanks after it has been cut off from the tube; and

Figure 8 is a plan of a blank.

Figure 9 is a perspective of one of the paste-applying mechanisms shown in Figure 1.

Figure 10 is a plan of the paste-rolls shown in Figure 2.

Figure 11 is a perspective of the folder arm around which the tube is formed.

Figure 12 is a diagram showing the way in which the work progresses throughout the machine.

Referring first to Figure 12, we show rolls A^1 to A^5, from which the material for the walls of the bag is supplied. As already stated, this is usually heavy paper, but we do not exclude other materials. B^1 to B^5 are tension devices presently to be more fully described. C illustrates diagrammatically the means for applying the paste to the inner layers of the bag-wall, keeping the outside layers free from paste. E indicates the location of the thumb-knife. F shows the feeding rolls, which draw the bag strip through the machine. G shows the cut-off knife, and the feeding device which removes the bag from the machine.

Turning now to Figure 1, A1 shows one of the rolls, and reference character B indicates in general the tension or friction device which puts a tension on the paper or other material a^1. This tension device is shown arranged so as to maintain substantially uniform tension upon the paper, irrespective of the size of the roll as that changes in operation, and also of its irregularity in form, which increases or diminishes the leverage, due to the change in radius of the roll, either from removal of the paper or the irregularity referred to; b indicates a band-brake with one arm b^2 of a bell-crank lever, the other arm b^3 supporting a weight b^4. Connected to the bell-crank lever are arms b^5 of a lever; carrying rolls b^6, around which the paper passes. Throughout the machine there are various rolls of the same general type around which the paper passes, to which we have not deemed it necessary to apply reference characters, nor to describe them. The operation of this part of the device is as follows:—

When the tension on the bag paper marked a^1 in Figure 1 increases, it tends to pull the arms b^5 counter-clock-wise, and thus tends to lift the weight b^4 and slack the band-brake b. Of course if the tension decreases the opposite effect occurs, the tendency of the two being to reach a neutral position, giving the amount of tension on the paper designed by the builder.

Passing from the roll the sheet a^1 passes to the left, and a^3 to the right, while a^2 passes up through the center of a diamond-shaped figure formed by the other two sheets with the aid of the guide-rollers. The sheet a^2 passes to the paste-applying mechanism C. Of these there are two, one on the left and one on the right of Figure 1, and as they are counterparts, the description of the one on the left is sufficient. In that the gear wheels C^1, C^2, rotate paste-applying arms C^3, C^4, one of which is shown in perspective in Figure 9. The gear wheels C^1 have a spring-bearing c with the regulating tension screw c^1, of well-known construction, while the gear C^2 rotates in a solid bearing. As the two rotate the arms C^3, C^4, on opposite sides of the sheets a^2, apply a cross-wise dab or streak of paste, such as shown in dotted lines at a^9 in Figure 8. D^1, to D^4 are paste-pots, the description of D^1 being sufficient for all of them. In these the usual pan d^1 holds the paste, a roll d^2 rotating therein; a dressing roll d^3 removes the surplus paste from d^2, the dressing roll being carried upon a link d^4. At each rotation of the gears C^1, C^2, the paste-pads make contact with the rolls d^2.

It will be observed that no paste is applied to the outside sheets a^1, a^3, it being sufficient to apply it to the sheets a^2, a^4, the latter operation being effected upon the right of the drawing, Figure 1.

The result of this operation is that at regular intervals the sheets a^2, a^4 have streaks of paste applied to them upon both sides and as the material progresses through the machine, the sheets a^3, a^1 are cemented to the sheets a^2, and sheets a^3, a^5 are cemented to the sheet a^4, while the outsides of the sheets a^1, a^5 have no paste applied thereto.

The paper then passes on from Figure 1 and to the mechanism shown in Figure 2. The reference character a here indicates the web of assembled sheets as they leave the part of the machine shown in Figure 1; it passes over the paste roll C^6, which is indicated somewhat diagrammatically in Figure 10. This consists of several disks rotating in the paste pot. The usual appliances to prevent excessive pasting may be employed, but are not illustrated. The collected sheets then pass into the rolls e^1, e^2 of the thumb-knife construction E. The construction of the thumb-knife is shown in Figure 5. It consists of a slot bar e operated by the roll e^1. The knife is indicated at e^3, and of course is shaped to fit the slot in the slot-bar e.

A presser e^4 is provided, which holds the paper firmly against the thrust of the knife, the presser being forced down against the paper and holding it against the slot-bar e while the knife enters the slot. In order to render this knife more effective I have connected it to the driving bar by elliptical gears e^5, e^6, as shown, so that when the knife is about to enter the slot it is speeded up,

being correspondingly retarded during the rest of the stroke.

The tube-folding mechanism consists of the bar H, which is adjustably mounted upon the stud and bracket in the usual way. A perspective of the bar is shown in Figure 11. This acts as indicated in Figure 2, to press down the paper to the width of the bag, while the edges of it are drawn up over and overlap in a way common and well understood in this art. After the tube is thus formed, it passes through the feeding device F.

Referring to Figures 3 and 4 the feeding device just referred to is illustrated. It consists of three sets of rollers, only the first of which will be described, as the three sets are alike. A greater or less number may be employed. They are so timed that the cross-streaks of paste are not subjected to the feeding pressure, as will now be explained. On the left of Figure 3 it will be seen that the upper one of the rolls F^1, F^2, is carried in a link pivoted on the stud shaft f^{14}. The outer end of the link carries a cam-roller f^4, and on the horizontal surface f^{13} a spring f^8 keeps the cam-roller on the link in engagement with its cam f^6, the cam having a high part f^7. The link f^3 carries the roll f^1 by its shaft f^5 in a bearing f^{12} adjusted to position by a set-screw and lock-nut f^{10}, f^{11}. A similar link carries the other end of the shaft.

The operation of these parts is as follows: The rolls act to draw the sheet through the machine, but as each paste streak approaches the rolls the high part f^7 of the cam lifts the cam-roller f^4 against the spring f^8, moving the link around the shaft f^{14} and elevating the roll f^1 sufficiently to prevent the paste being pressed out. When the paste-streak has passed through this pair of rolls, the high part of the cam has dropped the roll f^4 so that the rolls F^1, F^2, again engage the sheet; the action is progressive through the three sets of rolls, each upper roll lifting in turn to allow the paste streaks to go by.

Leaving the feed rolls of Figure 3 the sheet passes on to the cut-off device G, consisting of an upper roll g^4 carrying the knife g^6 with the rolls g^5 carrying the cut-off bar. The construction of this is substantially like the cut-off knives already in use and need not be further described.

After the bag-blank is cut off it passes to the feed rolls g^7, g^6, the lower one of which has a cut-away portion g^9, while the high part g^8 engages with the roll g^6. The bag blank being fairly stiff from its construction, the distance is easily bridged; but a supporting roller g^1 (shown in dotted lines) may be employed, if desired.

The various mechanisms described are all so co-ordinated in speed and timed relation that they co-operate to assemble and paste together the layers of the web automatically without ironing out the paste, keeping the several layers at substantially the same tension definitely regulated in amount; to form the assembled web into a tube by folding over and pasting the edges, and to cut off from the tube blanks of desired length entirely free from paste spattering, so that they do not stick together in the magazine of the bottomer. The speed of manufacture and quality of the goods is thus benefitted.

What is claimed is:

1. In an apparatus for preparing blanks for multiwall bags, means for applying paste to the inner layers of material at desired points; means for assembling the inner and outer layers in a web; means for drawing the web through the apparatus, and means for relieving the pressure upon the material when the pasted points pass through the drawing means.

2. In a machine for preparing blanks for multiwall bags, means for applying paste to the inner layers, means for assembling the inner and outer layers in a web, means for forming the assembled web into a tube, and means for drawing the web through the apparatus, means for relieving the pressure as the pasted points pass the drawing means, and means for cutting from the tube blanks of a desired length.

3. In a machine for preparing blanks for multiwall bags, means for separating the outer layers of the wall from the inner layers, means for applying paste to the inner layers at desired points, means for assembling the layers into a web, means for forming the web into a tube, means for drawing the web through the machine, means for preventing the drawing means from pressing out the paste by which the layers of the web are secured together, and means for cutting off blanks from the tube.

4. In a machine for preparing bag blanks for multiwall bags, means for supporting a number of rolls of material means for automatically regulating the tension upon each roll to substantial uniformity, means for separating the inner and outer layers of material, paste-applying mechanism between each outer layer and the inner layers, means for assembling the several layers into a web, means for forming the web into a tube and cementing the edges thereof together, means for drawing the web through the machine, and means for preventing the pressure of the drawing means from spreading the paste between the layers.

5. In a paper bag apparatus, means for pasting a number of layers of material and assembling them into a web, feeding means for the material comprising a number of sets of rolls between which the assembled

web passes in succession; and means for lifting successively the top rolls of each set at desired times so that the paste-seams between the several layers are relieved from pressure, at least one set of rolls being active at all times to maintain tension upon the web.

6. In a paper-bag apparatus, means for supplying several layers of material, means for applying paste between the layers, means for assembling the several layers into a web, and means for drawing the web through the apparatus; the said means comprising a number of sets of drawing rolls through which the web passes successively, and means timed to separate the rolls of each set in succession as the paste-streaks between the layers of material pass through; thus preventing the "ironing out" of the paste between the layers while maintaining tension upon the material.

7. In a paper-bag apparatus, means for supplying several layers of material, means for applying paste between the layers, and means for assembling the several layers into a web, means for drawing the web through the apparatus; the said means comprising a number of sets of drawing rolls through which the web passes successively, one of the rolls of each set being carried in movable bearings; and cams and levers operated thereby for separating the rolls of each set successively as the paste-streaks between the layers pass through the rolls.

8. In a tuber for multiwall bags, supports for a number of rolls of material, automatic tension regulating means for each roll, pasting means acting to apply paste to the inner sheets, means for forming a tube from the web, means for cutting off blanks from the web, and drawing rolls keeping the sheets under tension; with means for separating the rolls as the pasted points pass through while maintaining tension upon the sheets.

9. Feed mechanism for a tuber operating upon a web composed of several sheets of material secured together at intervals by transverse pasted portions, comprising several sets of rolls and means for separating the rolls of each set as the pasted portions pass therethrough.

10. Feed mechanism for a tuber operating upon a web composed of several sheets of material secured together at intervals by transverse pasted portions, comprising a number of sets of rolls and means for separating the rolls of each set successively as the pasted portions pass therethrough, one or more of the sets remaining active as each set is separated, maintaining tension upon the web.

11. Feed mechanism for a tuber operating upon a web composed of several sheets of material secured together at intervals by transverse pasted portions, comprising a number of sets of rolls, and cams and levers arranged to lift the top roll of each set as the pasted portions pass.

12. Feed mechanism for a tuber operating upon a web composed of several sheets of material secured together at intervals by transverse pasted portions, comprising a number of sets of rolls, and cams and levers arranged to lift the top roll of each set as the pasted portions pass, the movable roll being mounted in links forming the levers and carrying cam-rollers at their outer ends.

Signed at Watertown, in the county of Jefferson and State of New York this 13th day of November, A. D. 1929.

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ALFRED CLEMENT COTY.