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S. BERGSTEIN

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MACHINE AND METHOD FOR MAKING TUBULAR CONTAINERS

Filed Feb. 12, 1931

4 Sheets-Sheet 1

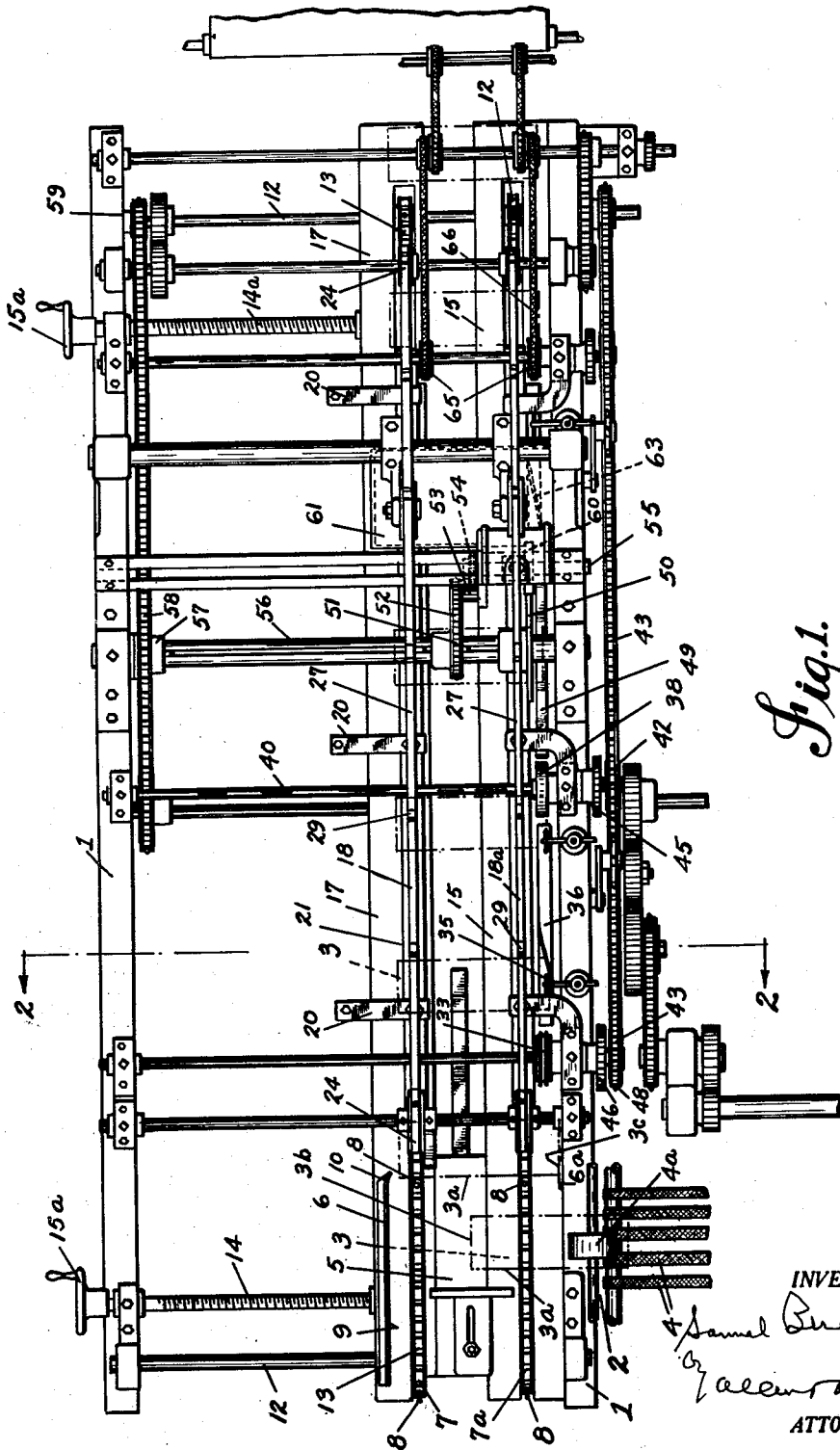


Fig. 1.

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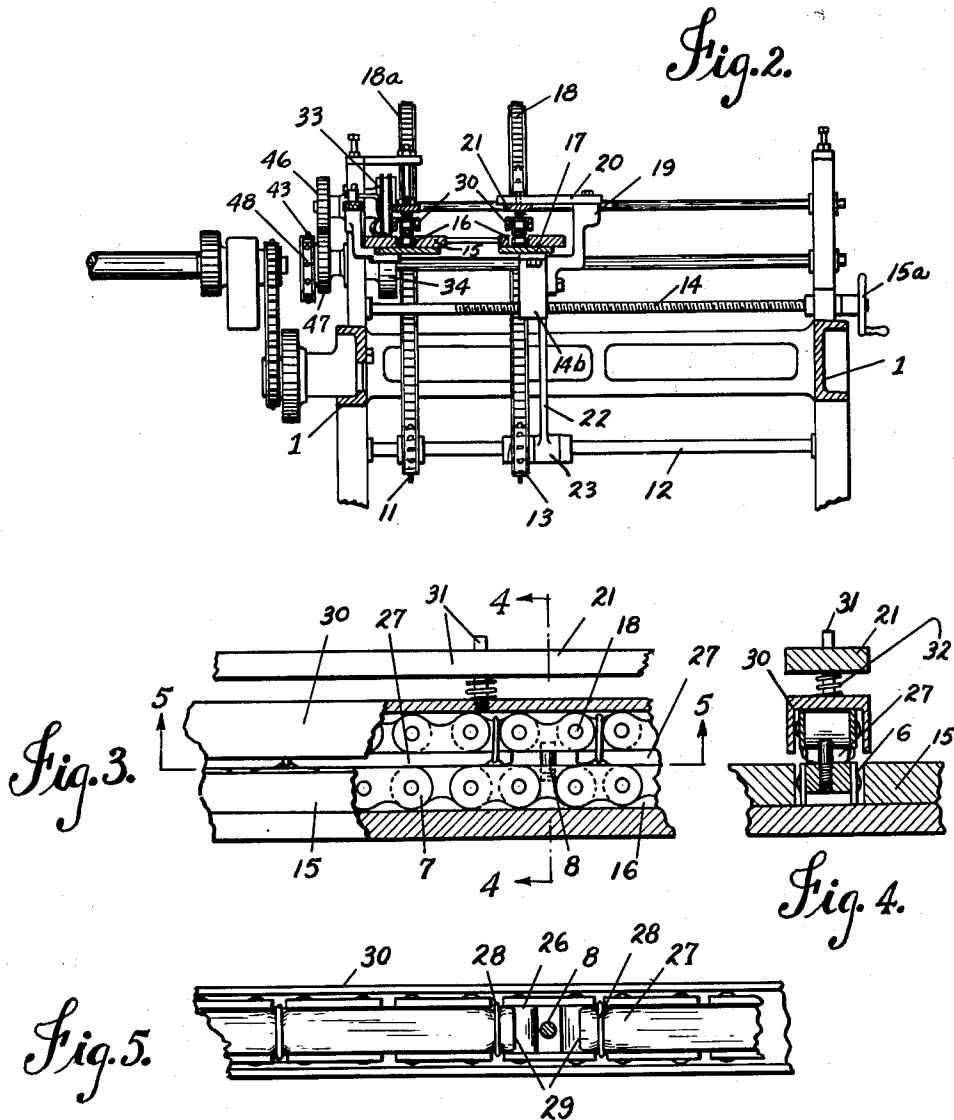
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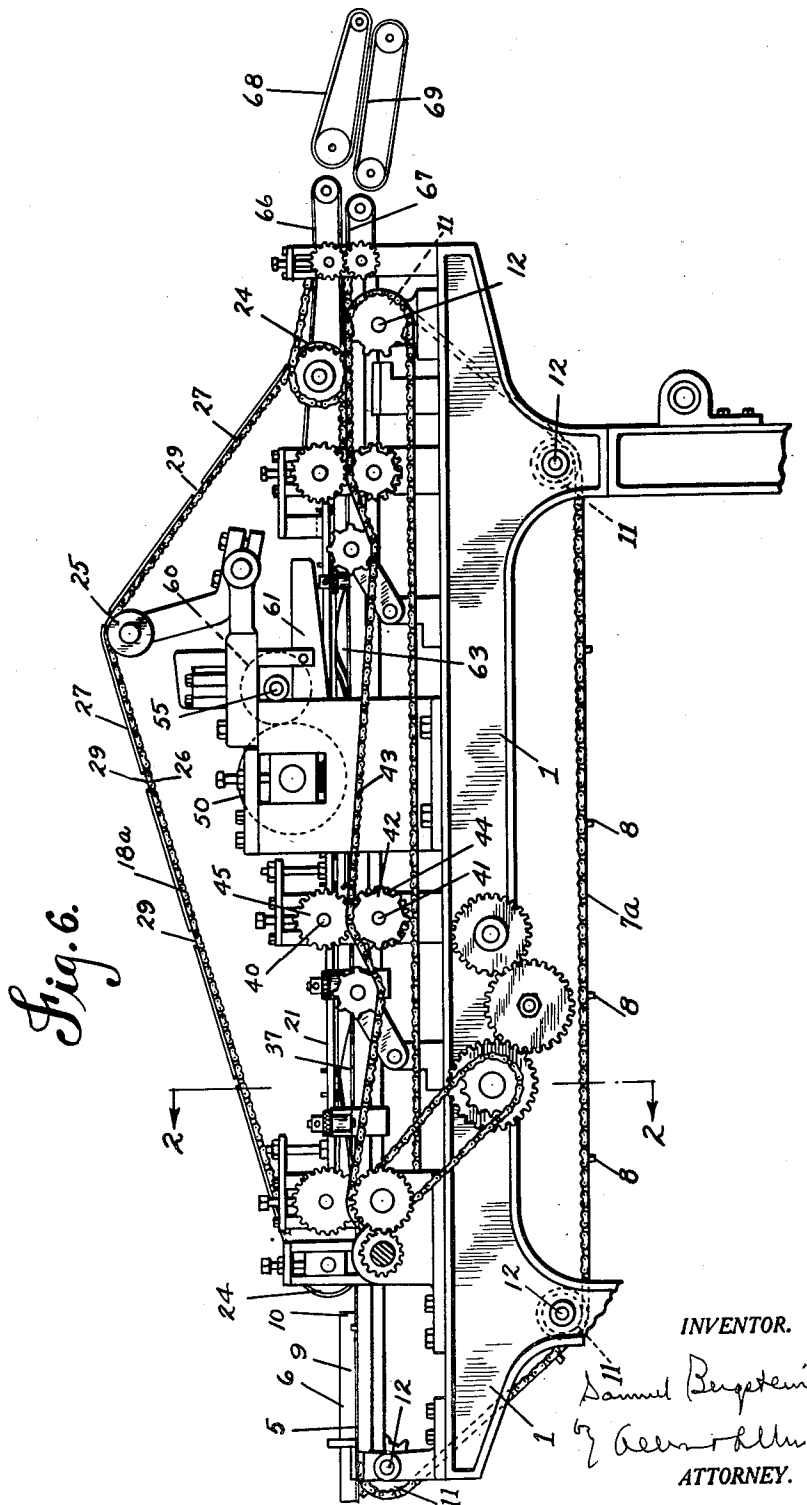
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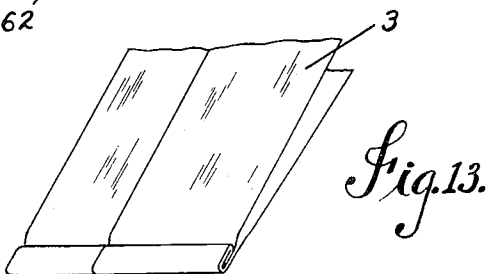
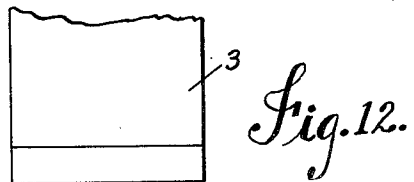
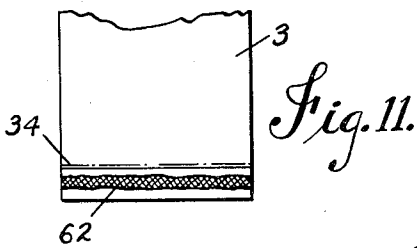
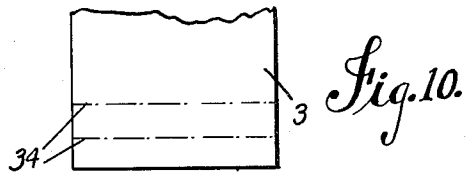
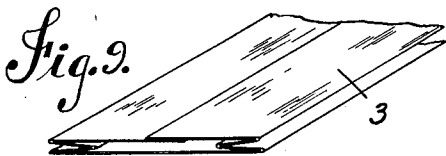
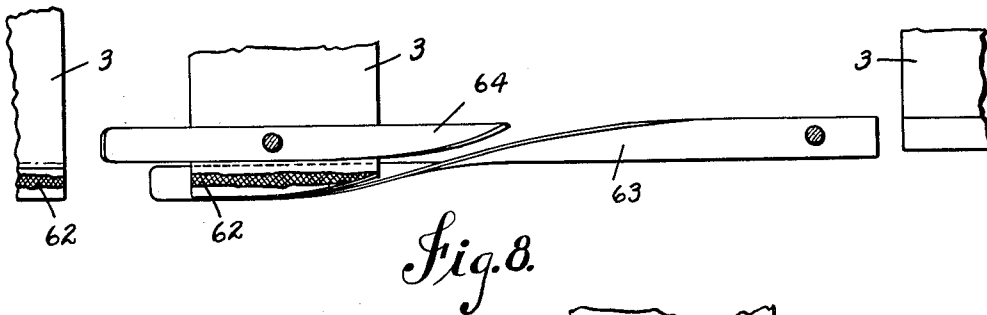
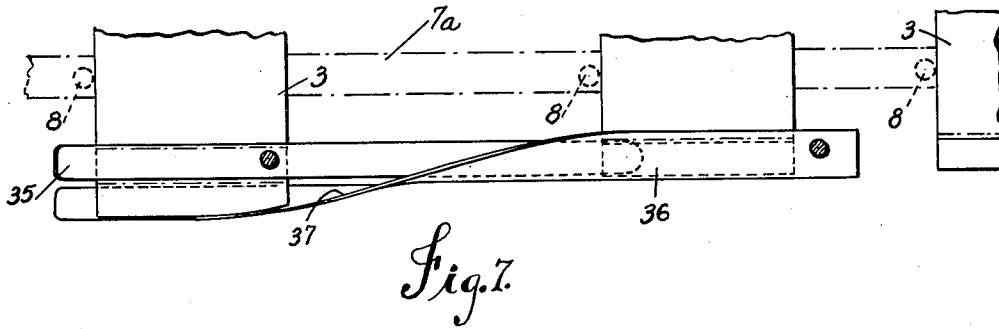
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UNITED STATES PATENT OFFICE

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MACHINE AND METHOD FOR MAKING
TUBULAR CONTAINERS

Samuel Bergstein, Cincinnati, Ohio

Application February 12, 1931, Serial No. 515,275

11 Claims. (Cl. 93—27)

This invention relates particularly to a method and mechanism for the manufacture of tubular containers of cellulose nitrate or other thin, transparent or readily flexible material into bags, of which one end is closed and preferably sealed, and the other is left open to receive materials to be retained within the said bags.

One of the objects of my invention is to provide a machine for feeding and closing the ends of formed collapsed tubular containers composed of such thin, readily flexible material that the ordinary bag machine will not handle them, and which, for example, may have one face of wax paper and the other of thin cellulose nitrate. It is my object to construct this machine so that it will double score an end of the tube, turn over the end edges on the outer score line, apply adhesive, and subsequently fold over again the folded edges on the other score line, and then apply pressure while the glue is drying to complete the sealing of one end of the tubular container.

Another object is to provide a machine for converting tubular containers into bags with one end closed, in which the tubular containers are spaced so that the succeeding operations will not interfere with each other, and in which the series of operations necessary to close the end are performed without stopping the tubes during the operations.

Another object is to provide an aligning means to enforce proper reception on a novel conveyor which engages the formed tubes and advances them to a secondary conveyor which frictionally drags the tubes during their passage through the scoring, folding, gluing and sealing operations, thereby insuring continuous uniform production of the bags.

A further object is to provide a machine, for converting tubular bodies into bags with one end open, that can be operated in synchronism with a tube-making machine.

Broadly, it is the object of my invention to provide a machine that will, in a continuous operation convert the tubes into bags with one closed and one open end. The machine comprises a series of mechanisms for receiving, aligning, conveying, scoring, turning over on one score line, applying adhesives, turning over on the other score line, applying pressure to the glued end, and discharging the finished bag at a convenient point to be packed, each of the operations mentioned being performed in sequence on tubes of exceedingly flimsy, flexible material

and while the bag is passing through the machine without pause.

These and other objects will be more specifically pointed out in the specifications and the drawings illustrating a preferred embodiment of my invention.

Referring to the drawings:—

Figure 1 is a plan view of the machine, including part of the delivery mechanism of the tube forming machine.

Figure 2 is a sectional view taken on the line 2—2 of Figures 1 and 6.

Figure 3 is an enlarged detail sectional view of the two conveyors showing the position of the pins while the conveyors are carrying a tube through the various operations.

Figure 4 is a section taken on the line 4—4 of Figure 3.

Figure 5 is a bottom plan view taken on the line 5—5 of Figure 3 and shows the method of attaching the frictional material to the upper clamping conveyor.

Figure 6 is a side elevation of the entire machine.

Figure 7 is a plan view showing the means used to make the first turn on the first score line.

Figure 8 is a plan view showing the means used to make the second turn on the second score line after applying the glue to the tube.

Figure 9 is a perspective view of an end of a tube as it comes from the tube forming machine.

Figure 10 shows the position of the score lines on the end of the tube shown in Fig. 9.

Figure 11 shows the glue applied after the first end fold on the first score line.

Figure 12 is a plan view of the end of the bag after the second fold.

Figure 13 is a perspective of the end of the finished bag as it comes from the machine.

The tube-feeding and end-folding part of the machine is supported by spaced side frame members 1, suitably secured in a solid frame by means of cross tie rods (not shown). The machine in this instance is positioned at right angles to the delivery end 2, shown in Fig. 1, of a tube making machine. The collapsed tubes 3 are carried on conveyor belts 4 until they engage a friction roller 4a, which discharges them with considerable velocity from the discharge belts of the tube machine.

The tubes are discharged with sufficient velocity so that they will pass completely across the space 5 and impinge against a vertical baffle 6. This baffle serves as a stop, and also as a means for aligning the tubes in proper position

for delivery to the conveyor on which the tubes are formed, without pause, into sealed end bags. As the tubes are delivered from the machine, they slide over the top of two endless chain conveyors 7 and 7a. The conveyors move in timed relation and have upwardly projecting pins 8 attached to the chains at definitely spaced intervals. The pins in each chain are so spaced as to be in line with the corresponding pin in the other chain and engage an edge 3a of the tube and carry it forward through the machine. The delivery from the tube forming machine is so timed that a tube is never discharged into endwise contact with the carrying pins. In case a tube should come from the tube forming machine and not lie at right angles to the conveyor chains, the edge 3b will slide along a surface 9, which will align the edge 3b of the tube with it and cause the tube to lie at right angles across the conveyor chains 7, and also insure contact with the pins 8. An end 10 of the baffle 6 is curved inwardly towards the conveyor chains and guides the tube back to a position with its end 3c against another end aligning plate 6a which insures proper registry of the tube on the conveyors which carry the tube through the end folding and sealing mechanism.

The conveyor chain 7a is operable in only one fixed vertical plane. It extends around sprockets 11, fixed on shafts 12, which are rotatably mounted in suitable bearings on the side frame of the machines. The other endless conveyor 7 has its sprockets 13 non-rotatable but slidably splined on the shafts 12 so that the space between the two conveyors may be varied according to the length of a tube to be converted into a bag.

The adjustment is accomplished by means of screws 14 and 14a, one at each end of a machine, which rotate in nuts 14b rigidly fastened to a plate 15 extending the full length of the machine. The screws are adjusted by means of hand wheels 15a. In order that the chains will present a flat surface for the tubes they are guided in grooves 16, provided in the plate 15 and another plate 17. These grooves guide the chain in a straight line, and also prevent any sagging of the chains while passing through the machine.

These grooves also offer resistance to the downward pressure of top frictionally dragging conveyors.

The top friction and pressure conveyor chains 18 and 18a are shorter than but in vertical alignment with the lower conveyor chains 7 and 7a, respectively. Chains 18 and 18a operate in timed relation to the lower conveyors and move at the same speed.

In order to provide for different lengths of tubes, the pairs of upper and lower chains have a connection which insures uniform lateral adjustment. The nut 14b carries a bracket 19, which is connected by means of a link 20 to a plate 21, which extends substantially the distance between the shafts supporting the sprockets for the upper conveyor. The nut 14b is directly connected with the plate 17, over which the upper portion of the lower chains 7 and 7a move. A bracket 22 extends down to a boss 23, which is secured to the journal for the sprocket 13 mounted on the idler shaft 12.

When it is desired to make a lateral adjustment the sprockets 24 and the idler sprockets 25 are loosened on their respective shafts, and the hand wheels 15a are turned, which carries the

nut 14b to a desired position of lateral adjustment. With the nut 14b moves the plate 21, the plate 17, and the boss 23. Since, as will hereinafter be described, the carrying pins 8 on the lower conveyor chain 7 register with openings in the upper conveyor chain 18, the upper conveyor chain 18 moves over at the same time the lower conveyor does, so all that is necessary after making an adjustment is to tighten up the sprockets 24 and 25 on their respective shafts and the lateral adjustment is completed.

In the handling of material such as thin, flimsy cellulose nitrate, or the like, while a conveyor such as I have provided in my lower conveyor would be suitable for moving sheet material having any substance body without the frictional dragging action of my upper conveyor, the thin flexible tubes would be crinkled up and could not be forced through the end folding and sealing mechanism.

The upper chains or pressure belts, as indicated in Figure 5, are formed with regular chain links 26 with strips of resilient material such as blocks of rubber 27, tied to the links as with wires 28. As indicated in Figure 5, it will be noted that at intervals spaces 29 are left between the blocks which provide clearance for the carrying pins 8, which fit in between the pins of certain links 26 of the chain in the respective spaces. The timing of the two chains of each pair being positively maintained, since they are sprocket chains, the pins 8 will always seat within the recesses between the resilient blocks of the upper chains. Also, the two pairs of chains keeping in synchronism, the tubes cannot become biased or twisted.

From the time when the tubes are received between the upper and lower chains, the pins on the lower chains guide the ends of the tube, and the resilient surfaces of the blocks of the upper chain press against the tube so as to prevent its dis-alignment.

In order to increase the resilient pressure of the upper chains or pressure belts, the lower portions of the upper chains pass along under channels 30, which are supported on pins 31 from the plates 21. Springs 32 press the channels 30 downwardly so that the lower surfaces of the engaging faces of the resilient blocks of the upper chains press resiliently down against the tubes, and thus cause their movement without crinkling through the folding and sealing operations.

The first operation in forming an end closure of the tube is a double scoring roller 33 which operates in peripheral contact with a supporting roller 34, seen in Fig. 2. As one end part of the tube passes between the scoring roller and the supporting roller, several spaced score lines 34a are formed close to the end of the tube. The position of the score lines 34a is indicated in Figure 10.

The next operation is the initial folding, which is accomplished by moving the scored ends of the tubes into engagement through fold plates 35, 36, the fold plate 35 lying just above the top surface of the tube, and the score plate 36 having the customary turned-over surface 37 which causes the first fold of the end of the tube to be made along the outer of the two score lines.

After the initial folding, the tube is conveyed so that the folded portion passes between an upper pressure roll 38 and a lower pressure roll 39. The pressure rollers 38 and 39 are fixedly mounted on shafts 40, 41. The shaft 41 has a sprocket 42 which is driven by a chain 43. The

shaft 41 has a gear 44 which engages a gear 45, which drives the shaft 40. In a similar manner the scoring rolls 33 and 34 are driven by gears 46, 47, which are actuated by means of a sprocket 48, also driven by the chain 43. As has been indicated, the timing of all the rotating parts of the mechanism is at the same peripheral speed, so that during the scoring operation and during the pressing of the initial fold, there is no tendency for the end of the tube to become crinkled.

After emerging from the pressure rolls 38, 39, the folded end of the tube passes underneath a hold down plate 49, and while being held down, has adhesive applied to it from the adhesive applying disc 50. The disc 50 is mounted on a shaft which carries the sprocket 51, which is driven by means of a chain 52 from a pinion 53. The pinion 53 meshes with a gear 54 on a shaft 55. The shaft 56, on which the sprocket 51 is mounted, has a sprocket 57 which is driven by a chain 58. The chain 58 passes over a driving sprocket 59 on the shaft 12, and thus through the proper sizing and arrangement of the gears and driving mechanism, the disc 50 is driven at the same peripheral speed as the speed at which the tube is moved through the machine.

The gear 54 is mounted on a shaft 55, and this shaft carries the pick-up glue wheel 60. The glue wheel 60 rotates in a glue pot 61, and through peripheral contact with the periphery of the adhesive disc 50, supplies it continuously with a coating of adhesive.

In the particular arrangement which I have described I find it preferable to apply an area of adhesive, such as is indicated at 62 in Figure 8, to the upper surface of the folded end of the tube.

After the application of glue or cement the tube is next conveyed to the final fold plate indicated at 63. Spaced from the fold plate is a hold down and guide plate 64 which insures a proper fold.

After the re-folding of the already folded end of the tube, the tube is conveyed to a further pair of pressure rollers 65, over which pass conveyor belts 66. The discharge from between the conveyor belts 18 and 7, and 18a and 7a, occurs just previously to the discharge in under the conveyor belts 66. Below the endless conveyor belts 66 there is another supporting conveyor belt 67. When the tube is delivered from between the conveyor belts 66 and 67, it passes to a series of dryer belts 68, 69, which are preferably of canvas or other flexible material, and which press firmly together and so insure a complete seal of the end of the tube at the time of its discharge.

Figures 9 to 13 illustrate the various operations in the forming of the end closure for the tubes. Figure 9 shows the tube as it is received from the tube forming part of the machine. Figure 10 indicates the application of the score lines 34a to the end of the tube. Figure 12 indicates the first folding along the outer of the two score lines. Figure 11 indicates the area to which adhesive 62 is applied and the outer surface of the folded end of the tube, and Figure 13 indicates the complete double fold and seal of the closed end of the tube.

The operation of the machine has been described in connection with the various devices which I have described for scoring, folding and sealing the end of the tube. The novel process so far described consists in conveying a preformed, collapsed tube, and while moving it along, folding over and sealing an end of the tube and dur-

ing this operation, so holding the tube that it will be prevented from crinkling up and jamming the machine and forming a deformed bag.

The portion of the machine described is completely adjustable for various lengths of tubing to be formed into bags, and the combination of the pushing lugs on the lower conveyor with the upper belt which presses down against the lower belt and moves with the same peripheral speed, insures that the tube will not become displaced during the folding operation, which as has been stated, constitutes an advance in the art of considerable merit as previously the material of which I form my tubes has not been successfully handled on any bag forming machine of which I am aware.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In combination, a bag forming machine comprising means in continuous operation to seal collapsed tubes by double folding each tube at one of its ends, said means consisting of conveying means, scoring means, preliminary folding and pressure means, adhesive applying means, secondary folding and pressure means, said folding and scoring means effective in sequence on each tube at its end while being conveyed through said machine.

2. In combination, a bag forming machine comprising means in continuous operation to seal collapsed tubes by double folding each tube at one of its ends, said means consisting of conveying means, scoring means, preliminary folding and pressure means, adhesive applying means, secondary folding and pressure means, said folding and scoring means effective in sequence on each tube at its end while being conveyed through said machine, and pressure applying means effective on said tubes during the sealing operation of said tubes.

3. The method of forming cellulosic bags which comprises feeding in sequence collapsed tubes of the material in a direction lengthwise of the tubes, then conveying the tubes in a direction widthwise of the tubes between moving pressure members, scoring and folding over an end of each tube, applying adhesive to said folded end, scoring and refolding the adhesive coated portion, and applying pressure to the folded end until the adhesive sets, as one continuous process.

4. In a bag forming machine, means in continuous operation to seal collapsed tubes by double folding each tube at one of its ends, said means comprising carrying means carrying said tubes with at least one end projected from a side of said carrying means, preliminary folding and pressure means, adhesive applying means, and secondary folding and pressure means, said folding means being effective in sequence on each tube at its projected end while being conveyed through said machine.

5. In a bag forming machine, means in continuous operation to seal collapsed tubes by double folding each tube at one of its ends, said means comprising carrying means carrying said tubes with at least one end projected from a side of said carrying means, preliminary folding and pressure means, adhesive applying means, and secondary folding and pressure means, said folding means being effective in sequence on each tube at its projected end while being conveyed through said machine, and pressure applying means effective on said tubes during the sealing operation of said tubes.

6. In a bag forming machine, means carrying tubular bag bodies in succession, each with an open end presented for action to close said end, preliminary folding means acting on said open end in the course of the travel of said bag body to fold said end, flatly against said bag body, secondary folding means acting on said folded end to additionally fold said folded end flatly against said bag body, in the course of the travel of said bag body, and means acting in the course of travel of said bag body to apply adhesive to lie between portions of the fold formed by one of said folding means.
7. In a bag forming machine, means carrying tubular bag bodies in succession, each with an open end presented for action to close said end, preliminary folding means acting on said open end in the course of the travel of said bag body to fold said end, flatly against said bag body, secondary folding means acting on said folded end to additionally fold said folded end flatly against said bag body, in the course of travel of said bag body, and means to apply adhesive to lie between the portions of the fold formed by the secondary folding means.
8. The method of forming a closure of an open end of a flattened tubular bag body, which comprises causing travel of said bag body with said end projected for folding, and successively acting on said projected end in the course of travel of said bag body, to form a preliminary fold of said projected end, and then to form an additional fold of said end around and enclosing the preliminary fold, said method including the step of applying adhesive at least intermediate the preliminary folding and the secondary folding operations, to a portion of the bag material which will present the adhesive inside the secondary fold, securing said end in its folded condition.
9. The method set forth in claim 8, in which the bag material is a thin cellulosic sheet.
10. In a bag making machine in combination with mechanism for delivering thereto flattened tubes of flexible material, means for forming successive folds in the same direction in an end of a tube, and means for adhesively uniting the folded portion to the tube body.
11. In a bag making machine in combination with mechanism for delivering thereto flattened tubes of flexible material, means for forming successive folds in the same direction in an end of a tube and means for uniting the folded portion to the tube body.

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