

Dec. 16, 1958

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2,864,213

METHOD AND APPARATUS FOR FORMING AND FILLING BAGS

Filed July 15, 1955

3 Sheets-Sheet 1

Fig. 1.

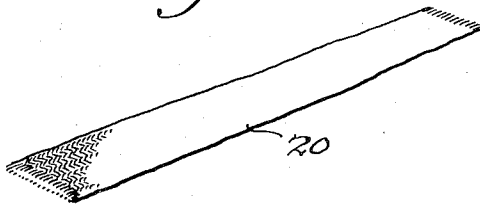


Fig. 2.

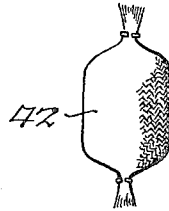


Fig. 3.

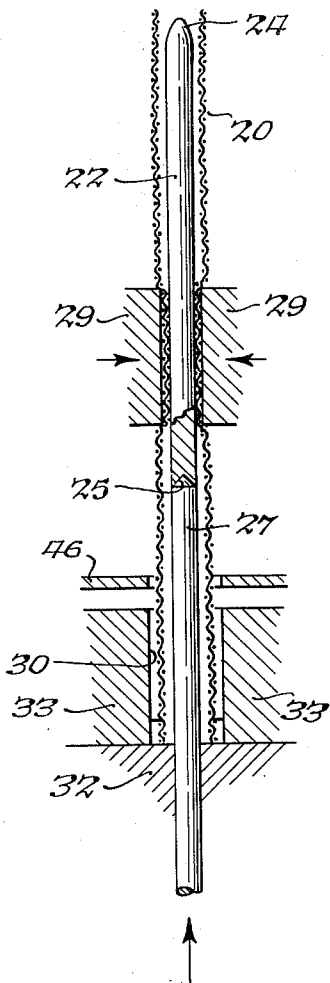


Fig. 4.

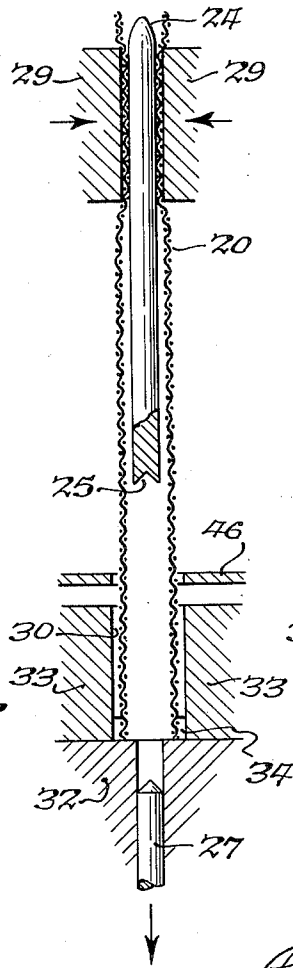
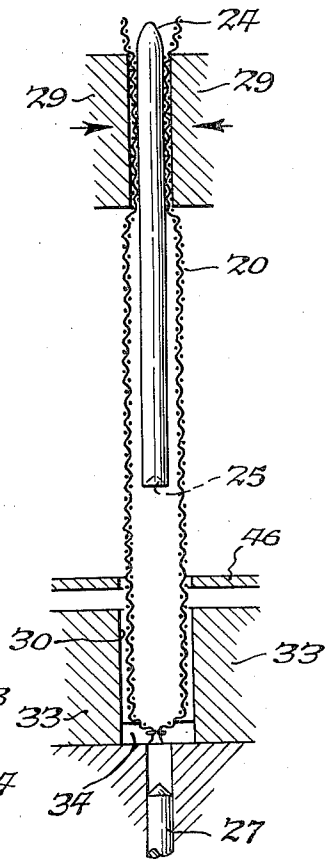


Fig. 5.



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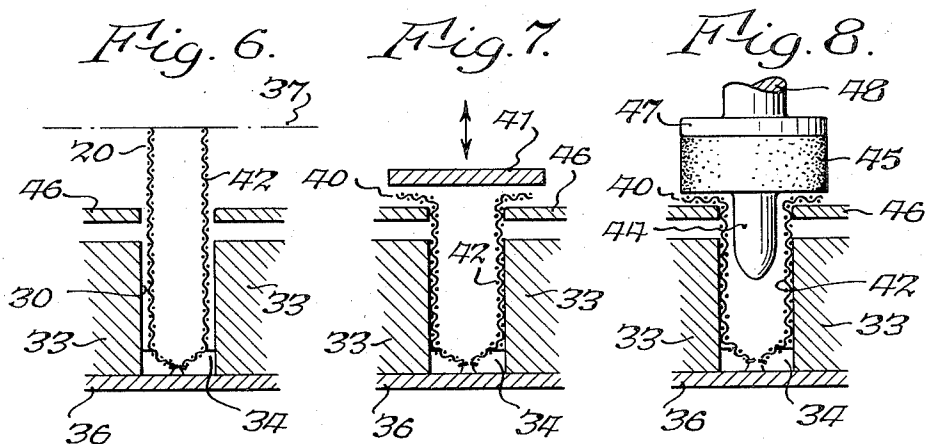
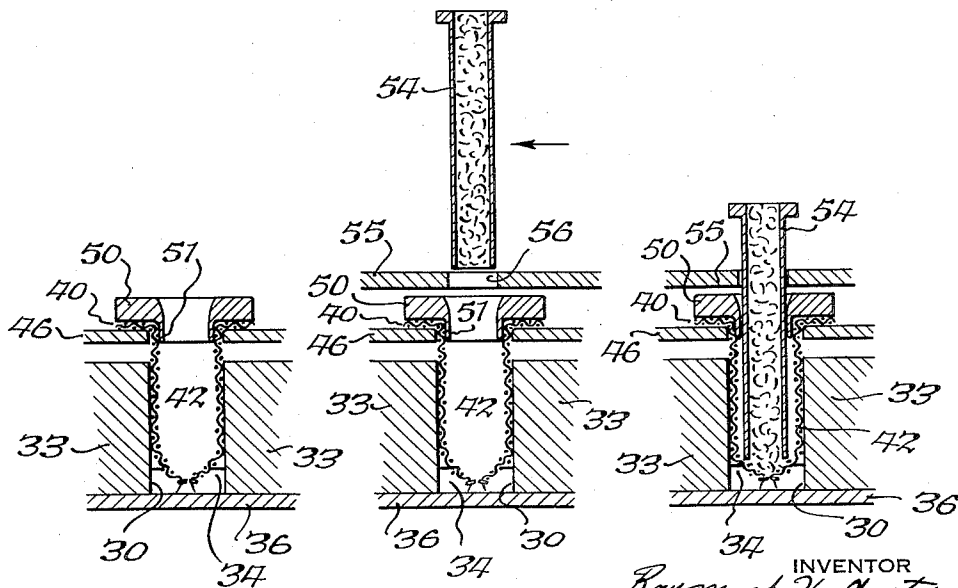


Fig. 9. Fig. 10. Fig. 11.



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Fig. 12.

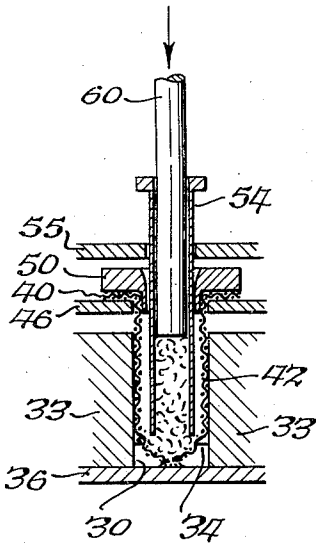


Fig. 13.

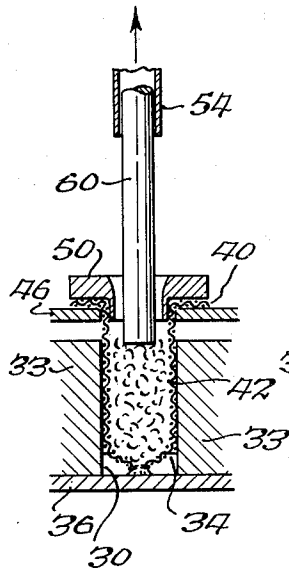


Fig. 14.

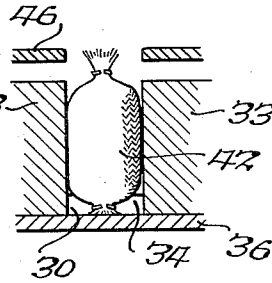


Fig. 16.

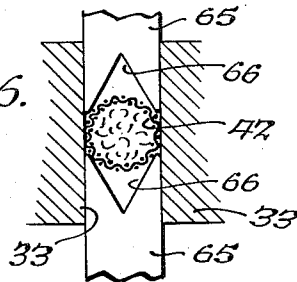


Fig. 15.

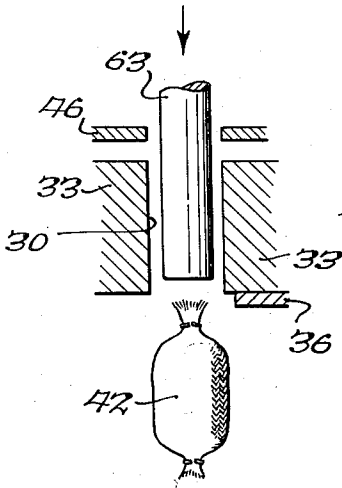
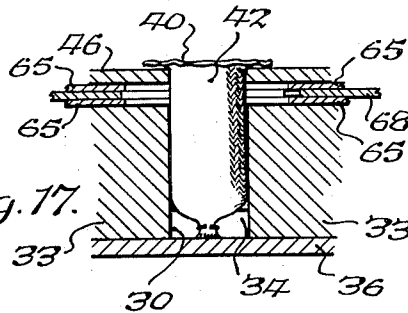


Fig. 17.



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METHOD AND APPARATUS FOR FORMING AND FILLING BAGS

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Application July 15, 1955, Serial No. 522,222

9 Claims. (Cl. 53—29)

This invention relates to a method and apparatus for producing small bags of a woven material filled with a product such for example as tobacco.

For pipe smoking there are definite advantages in smoking tobacco packed in bags made of non-combustible woven material which can be placed into the bowl of a pipe. Such bags may, for example, be made of woven glass fabric within which the tobacco readily burns. When the smoking is completed, these bags together with the ash may be bodily removed from the pipe bowl and discarded together with some of the gums, tars or other materials from the tobacco smoke which have condensed on the glass fibers. It has, however, been difficult in the past to produce in quantities small bags filled with tobacco and of such size that the bags will conveniently fit into a pipe bowl. While my invention is particularly applicable for use in connection with smoking tobacco, it will be obvious that it may equally well be used in connection with tea or other substances.

One of the objects of this invention is to provide an improved method by means of which bags of a woven fibrous material can be readily and quickly made and filled with a predetermined amount of a substance, and then closed so that the substance will remain in the bags. It is also an object of this invention to make bags of this kind from woven tubing. Another object is to provide an improved method of forming the collapsed tubing into approximately cylindrical form and feed the same to enable pieces of the desired length to be cut therefrom. A further object is to provide an improved means for opening an end of a bag to permit the deposit of tobacco or other substance into the same. A further object is to provide an improved method of filling bags of this type with tobacco or other substances.

Other objects and advantages will be apparent from the following description of one embodiment of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a perspective view of a length of tubular, woven fabric such as may be used for forming the bags.

Fig. 2 is an elevation showing a bag which has been formed, filled and closed and is ready for use.

Fig. 3 is a central, sectional elevation of mechanism for shaping the substantially flat, tubular fabric as shown in Fig. 1 into approximately cylindrical form, and for feeding the same into position to be cut to the desired length to be operated upon.

Fig. 4 is a similar view showing the next step in the feeding of the tubular material.

Fig. 5 is a view similar to Figs. 3 and 4 showing the bottom of the bag stapled or otherwise closed.

Fig. 6 is a view of the bag as shown in Fig. 3 after it has been cut from the length of tubular material.

Fig. 7 is a view similar to Fig. 6 showing the upper end of the bag spread outwardly and flattened into substantially circular form.

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Fig. 8 is a similar view showing the step of shaping the upper portion thereof to receive a holding device for holding the bag while being filled.

Fig. 9 is a similar view with the holding device in operative position to the upper end of the bag.

Fig. 10 is a similar view showing a filling tube containing the substance to be inserted into the bag in position to enter the bag.

Fig. 11 is a similar view showing the filling tube in the bag.

Fig. 12 is a similar sectional view showing the next step in the process in which a plunger enters the filler tube to hold the material in the bag while the filler tube is raised.

Fig. 13 is a similar view showing the filler tube raised and the bag filled.

Fig. 14 is a similar view showing the bag after the upper end thereof has been closed.

Fig. 15 is a similar view showing the filled bag being discharged from the apparatus.

Fig. 16 is a face view of a pair of fingers for gathering the material of the bag together for stapling or otherwise closing an end thereof.

Fig. 17 is a fragmentary, sectional elevation of the apparatus.

Any suitable non-combustible, fibrous material may be used for making small bags filled with tobacco for use in the bowl of a pipe or with other substances for other purposes. Woven material made of glass fiber has been found very satisfactory for the reason that it is not only non-combustible, but also is odorless, tasteless and non-toxic. Woven glass material in tubular form also lends itself to the manufacture and filling of small bags, but other woven materials may be used if desired. Such material as shown in Fig. 1, after being woven, is generally formed into large coils in which the tubular material is folded flat.

Fig. 2 shows the final product produced by my improved process and apparatus and consists of a bag formed of the material shown in Fig. 1 and closed at opposite ends. This closing may be effected in any suitable manner, also by means of non-combustible materials so that the bag will remain intact during and after the burning of the tobacco. In the construction shown by way of example, the opposite ends of the bag are closed by means of metal staples but other means for closing the opposite ends of the bags may of course be employed.

In the operation of my process, the woven material in long lengths may be fed from a reel or other holder in any suitable manner to the apparatus by means of which my process is carried out, and the process is started by manually inserting a mandrel or pin 22 into the adjacent end of the tubular fabric 20. This mandrel or pin need not be of any particular diameter or length, but is preferably large enough in diameter to form the material into tubular shape. The mandrel is provided at the upper end with a blunt point 24 which enables the same to readily enter into the flat tube 20 and to move lengthwise in the interior of the tube. The other end of the mandrel or pin may be provided with a substantially conical recess 25 into which the upper end of a second pin 27 fits, which reciprocates to move the mandrel 22 step by step through the tubular material 20.

In carrying out my process the pin or mandrel 22 with the fabric surrounding the same is positioned between a pair of movable clamps or jaws 29. These jaws are movable toward the mandrel to grip the same and the fabric extending about the same, and from each other to release the mandrel when the same is supported by the reciprocatory pin 27. The jaws when gripping the mandrel are also movable downwardly to feed the fabric to the appara-

tus. The parts of the jaws which engage the fabric are preferably made of rubber or similar material. When these jaws are tightened against the fabric 20 and the mandrel, the mandrel and the fabric may be fed into one of a number of recesses 30 formed in a movable member 33, which may be a part of a turntable or a part of an endless chain. This movable member may be supported on a stationary table 32, which at one station of the movable bag carrying member 33 has an aperture in which the pin 27 is movable toward and from the mandrel 22.

When these jaws move downwardly to their lowest position, as shown in Fig. 3, the fabric is fed downwardly into one of the holes or recesses 30 of the bag carrier 33 and at the same time the pin 27 moves upwardly in the hole 31 in the base 32 and through the recess 30 in the table 33 into engagement with the conical recess 25 in the lower end of the pin or mandrel 22 as shown in Fig. 3. During this downward movement of the jaws, the end of the tubular fabric is fed down into the recess 30 of the carrier 33.

When the pin 27 supports the mandrel, the jaws 29 release the fabric and mandrel and move upwardly into a position shown in Fig. 4, in which the mandrel 22 is again gripped by the jaws and held in readiness for the next operation, as shown in Fig. 4. During the upward movement of the jaws 29 the fabric will remain in the same position as shown in Fig. 3 with the end portion thereof arranged in the hole or recess 30 in the table or bag carrier 33, and the supporting pin 27 is withdrawn into its lower position as shown in Fig. 4.

The next step in the process is the closing of the lower end of that portion of the fabric 20 which extends into the hole or recess 30, and for this purpose, the table or chain including the carrier 33 remains in the same station. This may be done in any suitable manner, preferably by means of suitable fabric gathering and stapling devices formed to enter through a passage 34 in the bag carrier 33 in registration with the hole or recess 30 in the table. These fabric gathering and stapling devices may be of any well known construction and are not herein shown or described in detail, but may be as shown in Figs. 16 and 17 and will be hereinafter described. These devices have suitable means for gathering together the lower end of the fabric before the same is stapled.

In another step of the process, which may be done before, after or simultaneously with the closing of the lower end of the bag, and while the bag is in the same station as shown in Figs. 4 and 5, the fabric 20 is cut to form a single bag, at the desired distance above the bottom of the recess 30, for example, at the level shown by the broken line 37 in Fig. 6. This cutting may be effected in any suitable or desired manner, for example, by means of shears or scissors which may be actuated automatically or manually to provide the required amount of woven material to form a bag. Since the woven glass tubular material has a certain amount of stiffness, this material for forming the bag will remain standing in a substantially upright position after it has been cut, as shown in Fig. 6. This is particularly true of the type of weave in which the threads extend spirally in opposite directions around the tube, which is generally known as basket or maypole weave.

After a cut-off length of the tubular fabric has been positioned in a recess 30 of the movable support 33, the table or chain is advanced to its next station and another recess is positioned under the feeding jaws. The holding pin 27 then again moves upwardly to hold the mandrel 22, as shown in Fig. 3, while the movable jaws 29 move downwardly. During this downward movement, the tubular fabric is slid downwardly along the mandrel into the position shown in Fig. 3. This sliding of the fabric results because of the greater friction between the rubber faces of the jaws and the fabric than between the fabric and the mandrel.

The tubing of this weave has the peculiarity that when

slight pressure is applied to the upper end as shown in Fig. 7, the tubing tends to increase in diameter as it decreases in length. Thus the tubing or fabric will be forced into contact with the surface of the hole or recess 30 and the upper part of the fabric, which is not confined against lateral expansion, will increase in diameter to such an extent that the upper end of the fabric will expand into a substantially flat circular shape, as shown at 40 in Fig. 7. In this figure, a flat member 41 has moved downwardly against the upper end of the bag fabric 42 as shown in Fig. 7.

When the upper end of the bag 42 has been flared outwardly, as shown in Fig. 7, the movable bag carrier 33 is advanced to its next position in which the upper end of the bag is operated upon by a flaring device for the purpose of ensuring a correct flare on the upper end of the bag 42, since the flat member 41 only approximates the flare or collar desired. This may be done by means of a device as shown in Fig. 8, having a stud or projection 44 of a diameter to fit loosely within the tube or bag 42 and a rubber or other resilient member 45 formed to engage the upper flared end or collar 40 of the bag and to press the same flatly against a bag supporting plate 46, which moves with and may be a part of the movable bag carrier 33. This rubber pressure member 45 may be mounted on the lower end of a flange 47 secured on a rod 48 which is movable downwardly to press the upper end of the bag into correct flattened position and also assure that the opening at the upper end of the bag will be unobstructed, this being done by the stud or projection 44.

The bag is now ready to move with the table or carrier 33 into filling station and when in this position, a funnel-like holding member 50 is positioned over the bag 42. This holding member fits against the upper flared-out end of the bag and presses the same against the plate 46 so as to hold the bag in correct position while being filled. This funnel member 50 also has a hole terminating in a short cylindrical extension or tube 51 which enters into the upper end of the bag.

Prior to placing the tobacco or other substance into a bag, a predetermined quantity of the same is placed in a measuring tube 54, Fig. 1. This measuring tube may be filled in any suitable or well known manner, for example, by gravity from a hopper, and the measuring tube and the bag are brought into registration with each other by means of suitable mechanism (not shown). The lower open end of the measuring tube is normally arranged in close proximity to a plate 55 provided with a hole or opening 56. When the measuring tube 54 moves in correct relation to the bag to be filled, it will be in registration with the opening 56 in the plate 55 and directly above the bag to be filled. This tube then moves downwardly and enters into the bag 42 substantially to the lower end thereof, as shown in Fig. 11. Since some or all of the substance to be placed into the bag may adhere to the inner wall of the measuring tube 54, a plunger 60 is provided which is mounted to enter into the measuring tube 54 after the same has passed into the bag 42. The plunger 60 may compress the substance in the measuring tube to some extent, as shown in Fig. 12, and after the plunger 60 has passed downwardly so that the lower end thereof is in the upper portion of the bag, the measuring tube 54 is moved upwardly as shown in Fig. 13, whereupon all of the contents of the measuring tube will be in the bag 42 which is then ready to be closed, after the plunger 60 has been retracted.

The closing of the upper end of the bag is effected at another station, as indicated at Fig. 14, and after the upper end of the bag has been closed, the carrier 33 moves to a discharge station, as indicated in Fig. 15, in which the bag is moved out of the recess 30 in the carrier 33, for example, by means of a discharge plunger 63.

The closing of the ends of the fabric tubing which has been cut off to form a bag may be accomplished

in any suitable or desired manner. The same mechanism may be used for closing both ends of the bag. Such closing means are shown, partly diagrammatically, by way of example in Figs. 16 and 17, and include, in the first place, two pairs of gathering fingers 65, which have V-shaped recesses 66 in the adjacent ends thereof. These gathering fingers move toward the bag material from opposite directions, and thus bring the fabric of the upper end of a bag or of the lower end of the tubing to be formed into a bag into a compacted mass. The two pairs of gathering fingers are spaced apart far enough so that a suitable stapling device 68, which is shown diagrammatically in Fig. 17, may operate between the two sets of gathering fingers and staple together the gathered part of the bag between the two pairs of gathering fingers. Since stapling devices of this kind are a commodity which can be purchased, it is not deemed necessary herein to illustrate or describe the same. In Fig. 17, the gathering fingers and coupling device are shown as operating on the upper end of a bag after the same has been filled. It will be understood, however, that identical gathering fingers and stapling mechanism may be used in closing the lower end of a bag while the same is in the station indicated in Fig. 5. For closing the lower end of the bag, the gathering and stapling mechanism is arranged transversely of the direction of movement of the bag carrier and extends into the opening 34 which intersects the lower ends of the recesses 30 of the carrier 33 and for closing the upper end of the bags, this mechanism is arranged in the space between the carrier and the stationary plate 46. Any other means for closing the ends of the bags may be employed.

It will be understood that various changes in the details, materials, and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim as my invention:

1. A method of making and filling a bag formed of woven tubing, comprising the steps of cutting off a length of tubing, closing the lower end of said length of tubing, flaring outwardly the upper end of said bag, holding the flared-out upper end of the bag while feeding a quantity of a substance into the bag through the upper end thereof, and then closing the upper end of the bag.
2. A method according to claim 1, in which the tubing is of glass fiber of basket weave and in which the upper end of the bag is flared out into approximately circular form lying in a plane extending substantially at a right angle to the axis of the bag.
3. A method according to claim 1, in which the feeding is effected by inserting into the bag a tube containing the substance with which the bag is to be filled, pressing the substance in said tube toward the bottom of the bag, and continuing the pressure on said substance while said tube is withdrawn from the bag.
4. A method of making and filling a bag formed of woven tubing, comprising the steps of inserting an end of a length of tubing into the open end of a recess formed in a movable member, cutting off the desired length of tubing while the same is in said recess, advancing said member with said length of tubing in the recess thereof into another position, closing the lower end of said tubing while in said other position to form the tubing into a bag, further advancing said movable member with the bag in place in the recess therein, pushing down the upper end of said bag to flare the same outwardly, holding the upper end of said bag in flared-out position, filling the bag with the desired quantity of substance while in another position and while said bag is in flared-out position, and moving the bag into still another position, and closing the upper end of said bag.
5. A method according to claim 4, in which the filling of the bag is effected by inserting into the bag a rigid

measuring tube filled with the desired quantity of the substance, forcing the substance out of said tube into said bag while removing said tube from said bag, and then closing the upper end of said bag above the substance therein at another station.

6. A method according to claim 4, in which the filling of the bag is accomplished by inserting into the open upper end of the bag a measuring tube filled with the desired quantity of substance, partly compressing the substance in said tube while the same is inserted in said bag, removing said tube from the bag while the substance in said tube is prevented from moving with said tube, and then closing the upper end of the bag.

7. A method of making and filling a bag formed of woven tubing, comprising the steps of inserting an end of a length of tubing into the open end of a recess formed in a movable member, cutting off the desired length of tubing while the same is in said recess, advancing said member with said length of tubing in the recess thereof into another position, closing the lower end of said tubing while in said other position to form the tubing into a bag, further advancing said movable member with the bag in place in the recess therein, pushing down the upper end of said bag to flare the upper end thereof outwardly, pressing the upper end of the bag outwardly into a flange extending substantially perpendicular to the sides of the bag, holding the upper end of the bag in said pressed-out position, moving the movable member into another station, filling the bag with the desired quantity of substance, then moving the movable member into another station, closing the upper end of said bag while in said other station, and then discharging the filled bag from said movable member in still another station.

8. A method of making and filling a bag formed of woven tubing, comprising the steps of inserting an end of a length of tubing into the open end of a recess formed in an intermittently movable member, cutting off the desired length of tubing while the same is in said recess, gathering together the material of said tubing at the lower end thereof in two spaced apart portions of said tubing, securing together the lower gathered end of the bag between said two portions of said bag, filling the bag with the desired substance, and then gathering together the walls of the bag above said substance in two vertically spaced portions thereof, and securing together the gathered portions of said tubing between said two spaced portions.

9. Apparatus for forming a bag from tubular woven material and filling the same with a substance, including a member movable intermittently to different stations and having recesses for receiving lengths of tubing, means for feeding a portion of tubing into said recesses, said movable member having openings extending from opposite sides into the lower ends of said recesses, gathering devices extending through said openings into said recesses for gathering the material at the lower end of said tubing together at an axial portion of said tubing, said gathering devices being spaced apart, securing means between said gathering devices for securing together said gathered portion of said tubing to form a bag, means for inserting the desired quantity of substance into said bag, and another pair of gathering devices operating on the upper end of said bag above the substance therein, and closing means for securing together the gathered material between said gathering devices at the upper end of said bag.

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