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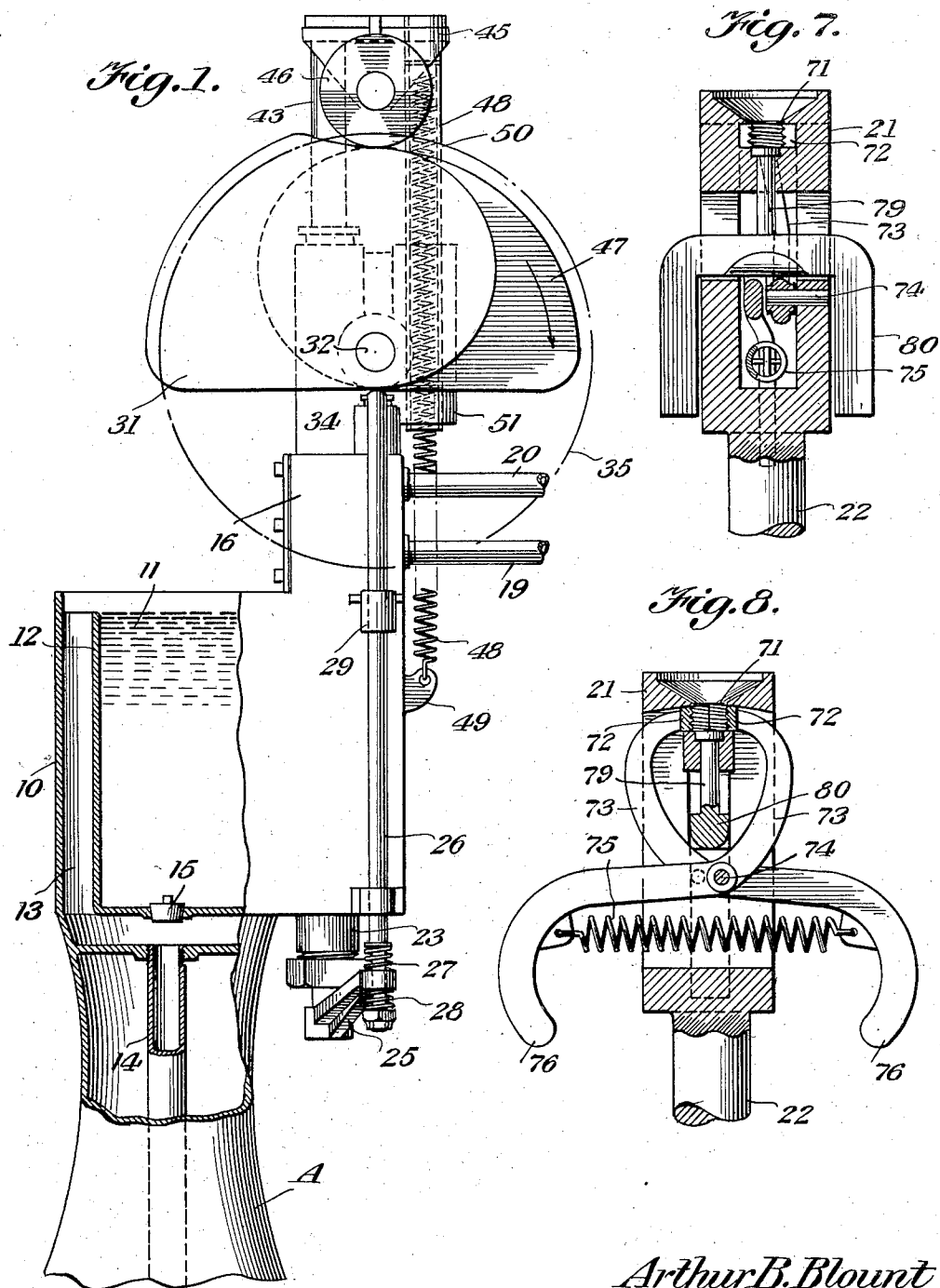
A. B. BLOUNT

2,008,487

METHOD OF MANUFACTURING A CELLULOSE-VISCOSE COLLAPSIBLE TUBE

Filed Dec. 5, 1932

3 Sheets-Sheet 1



Arthur B. Blount

INVENTOR

BY Victor J. Evans & Co.

ATTORNEYS

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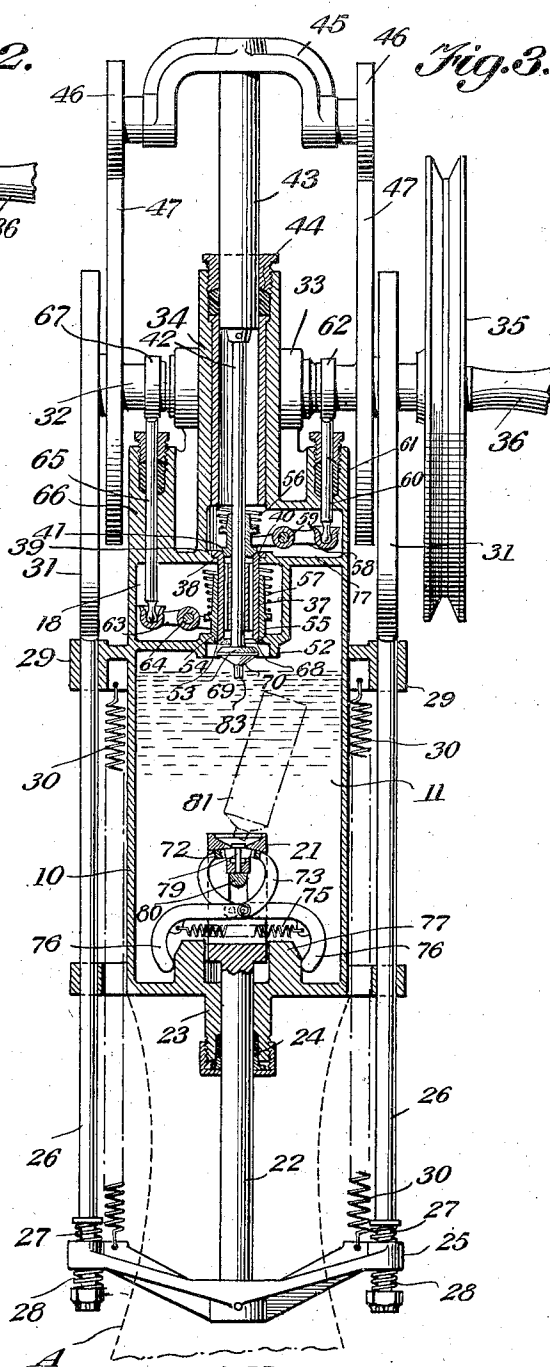
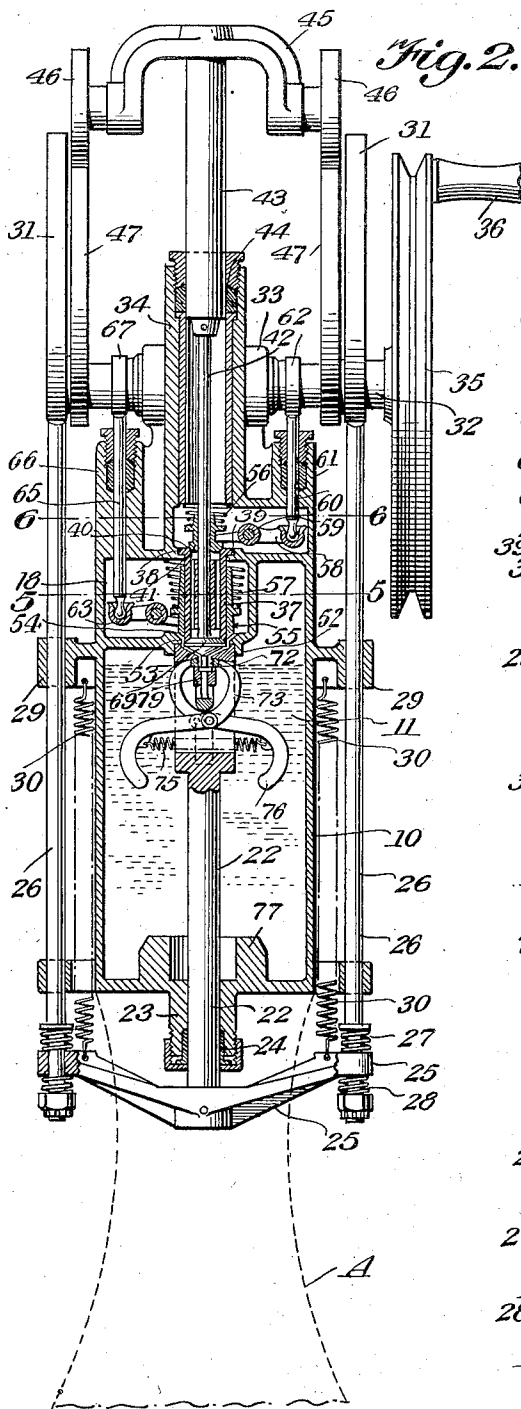
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Arthur B. Blount

INVENTOR

BY Victor J. Evans & Co.

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3 Sheets-Sheet 3

Fig. 4.

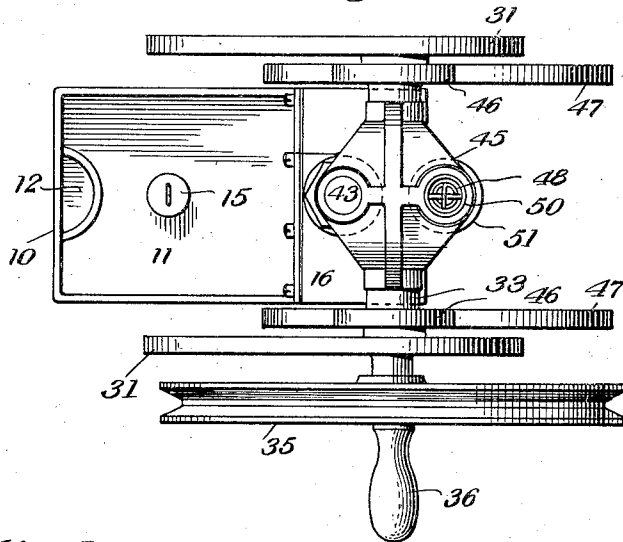


Fig. 5.

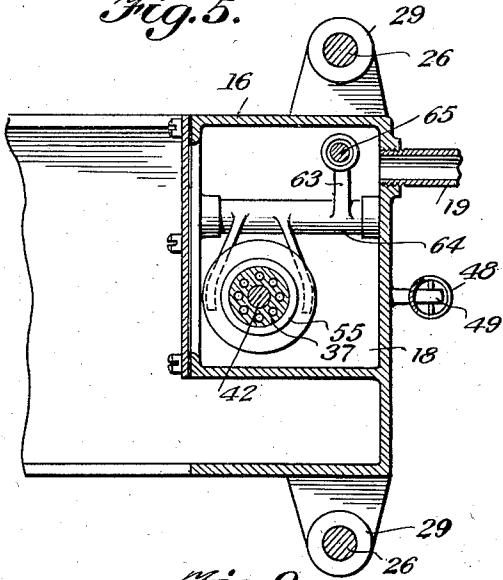


Fig. 6.

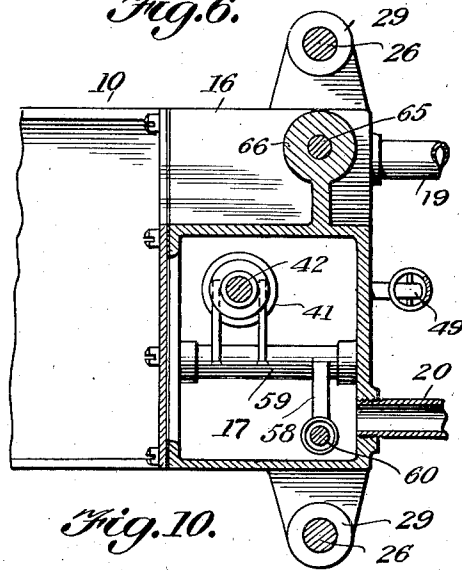


Fig. 9.

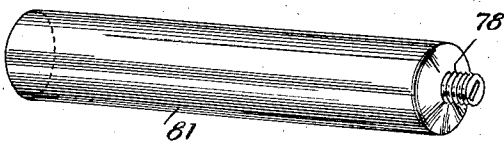
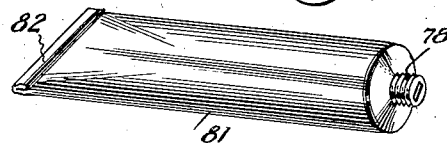


Fig. 10.



Arthur B. Blount
INVENTOR

BY Victor J. Evans & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE

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METHOD OF MANUFACTURING A CELLULOSE VISCOSE COLLAPSIBLE TUBE

Arthur B. Blount, St. Louis, Mo.

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2 Claims. (Cl. 18—58)

The invention relates to a method of making a cellulose viscose collapsible tube.

The primary object of the invention is the provision of a tube of this character wherein the threaded nipple end for the adaptation of a cap thereon and the body of such tube are unitary and made entirely from cellulose viscose now commonly termed "cellophane", so that a transparent non-soluble container used to distribute commodities of liquid or semi-liquid form is had, whereby the contents can be seen and sanitation in the handling thereof assured, as the container may be sterilized and will hold commodities that would be rendered unfit if contained in the usual collapsible lead tube now commonly used.

Another object of the invention is in the use of cellulose viscose by introduction into a mold through a circular orifice so that the threaded nipple end of a collapsible tube will be formed within this mold, then said mold is drawn upon causing it to be followed by a cylindrical film of the cellulose viscose and under this drawing action a tube formation thereof is had to produce the body of the tube and this tube formation is submerged in a coagulating solution for the setting thereof and likewise the interior of the tube is subjected to a filling of coagulating solution while being introduced into a bath thereof so as to prevent the collapsing of the tube formation during the drawing of the same, whereupon after the release of the formation the same is chemically treated and dried for production of the finished product ready to receive its contents.

A still further object of the invention is the provision of a machine of this character, wherein a collapsible tube is produced in a single operation thereof, the machine being provided with valved ways, one intimate with the mold for the formation of the threaded nipple end of the collapsible tube and the feeding of cellulose viscose in a film fashion for the formation of the body of the tube, while the other valved way admits a fixing medium so that the tube formation may be set and under successive operation of the machine a cellulose viscose collapsible tube is produced, the body thereof being effected by a drying action upon the cellulose viscose as introduced into the machine, the valves for the ways being automatically controlled and successively timed in a novel manner.

Other objects will be in part obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combination and arrangement of parts as will be hereinafter more fully

described, illustrated in the accompanying drawings and pointed out in the claims hereunto appended.

In the accompanying drawings:

Figure 1 is a fragmentary side elevation of a machine constructed in accordance with the invention for the manufacture of "cellophane" collapsible tubes and the same being partly in section with its parts in normal starting position.

Figure 2 is a vertical transverse sectional view thereof.

Figure 3 is a view similar to Figure 2 showing the parts of the machine in the position when a "cellophane" collapsible tube has been produced or finished.

Figure 4 is a top plan view of the machine.

Figure 5 is a fragmentary transverse sectional view taken approximately on the line 5—5 of Figure 2.

Figure 6 is a fragmentary transverse sectional view taken approximately on the line 6—6 of Figure 2.

Figure 7 is an enlarged detail fragmentary sectional view through the nozzle end forming mold for the tube.

Figure 8 is a view similar to Figure 7 but taken at right angles thereto.

Figure 9 is a perspective view of the tube as produced by the machine and under the process of the manufacture thereof.

Figure 10 is a perspective view of the finished tube.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings in detail, A designates generally a portion of the stand of the machine which may be of any desirable shape and of the required height, it being supported in any suitable manner and has formed at its upper end a tank-like casing 10 forming a container for a suitable coagulating solution 11, the level of which is maintained by an overflow 12, its outlet 13 leading to a drain pipe 14 extending downwardly through the stand A. The bottom of the tank 10 has fitted therein a suitable drain plug 15 which when removed permits the draining of the tank and its contents carried off by the drain pipe 14 as should be obvious.

Formed with and rising from the tank 10 at one side thereof is a housing 16 having formed interiorly thereof the upper and lower chambers 17 and 18 respectively, the latter having leading thereto a supply pipe 19 adapted to deliver cellulose viscose into the chamber 18, while leading

into the chamber 17 is a supply pipe 20 for delivering thereto a coagulating solution, these pipes receiving their supply from any suitable source.

Vertically movable in the tank 10 is a mold head 21, the same being formed on a stem 22 slidably fitted in a guide 23 formed at the bottom of said tank 10 and having a packing gland 24 surrounding said stem 22 so as to avoid leakage about the same through the guide 23. The stem 22 is centrally fixed in a crosshead 25 having fitted in opposite ends push rods 26, the same at the fitting with the crosshead 25 being arranged with cushioning springs 27 and 28 respectively, these being on opposite sides of the head 25. Connected with the crosshead 25 and with guide brackets 29 for said rods 26 are coiled tensioning springs 30 which function to maintain the push rods 26 in contact with actuator cams 31 carried by and movable with a power shaft 32 journaled transversely in bearings 33 formed on a plunger barrel 34 rising from the housing 16, the power shaft 32 being fitted with a power pulley wheel 35 which is equipped with a handle 36 eccentrically arranged thereon. Thus the wheel 35 can be driven from a belt operated from any suitable source (not shown) or by hand on the turning of the handle 36 as should be obvious.

Disposed vertically through the chamber 18 is a drawing column or cylinder 37 having a flanged upper end 38 countersunk at 39 in the bottom of the upper chamber 17. This flanged upper end 38 has a valve seat 40 for accommodating a slide valve 41 surrounding and movable upon a shank extension 42 of a plunger 43 working within the barrel 34 through a packing gland 44 at the upper end of said barrel. The plunger 43 is mounted centrally of a crosshead 45 having journaled thereon at opposite ends rollers 46, these movable upon cams 47 carried by and movable with the power shaft 32. The crosshead 45 has connected therewith a coiled tensioning spring 48, the same being also connected at 49 with the tank 10, the spring being extended through a suitable housing 50 depending from the crosshead 45 and slidable in a guide 51 formed on the barrel 34 at one side thereof. The housing 50 is of less length than the spring 48 and reciprocates in the guide 51 as will be obvious from Figure 1 of the drawings. The forming column or cylinder 37 opens through a stationary head 52 formed at the bottom of the chamber 18 into the tank 10. The stationary head 52 receives the mold head 21 to cover the same when said mold head is at its uppermost stroke or extent of movement. The head 52 concentrically of the column or cylinder 37 is formed with an orifice 53 and this orifice has a valve seat 54 for a slide valve 55 movably mounted upon the column or cylinder 37.

The valve 41 is urged to its seat 40 in the upper end of the column or cylinder 37 by a coiled expansion spring 56 and likewise the valve 55 is urged to its seat 54 by a coiled expansion spring 57. The valve 41 is lifted from its seat 40 by a rocking lifting lever 58 pivoted at 59 and actuated by a push rod 60 movably fitted in a guide 61 and operated upon by a cam 62 carried by and movable with the power shaft 32. Likewise the valve 55 is lifted from its seat 54 by a rocking lift lever 63 pivoted at 64 and operated upon by a push rod 65 movably fitted in a guide 66, the rod being actuated by a cam 67 carried by and movable with the power shaft 32. The push rods 60 and 65 operate through suitable packing glands as the liquids in the chambers are under pressure and this avoids leakage about the said push rods.

The lower end of the column or cylinder 37 is formed with a valve seat 68 for accommodating a valve 69 formed on the shank extension 42 of the plunger 43. The valve 69 has formed there-with a die 70 for fitting with the mold head when engaged in the head 52 so that when the orifice 53 is opened by the lifting of the valve 55 the viscose within the chamber 18 will flow into the mold head 21 for the formation of the end of a collapsible tube, it being understood of course that the valve 69 at this moment is engaging its seat 68 in the column or cylinder 37, thereby shutting off the flow of coagulating solution from the chamber 17 through the column or cylinder 37 as will be apparent in Figure 2 of the drawings.

The mold head 21 has centrally formed therein a central opening 71 communicative with threaded nipple forming jaws 72 on levers 73, these being crossed and pivoted at 74 to each other and in the head 21. The levers 73 have connected therewith a coiled tensioning spring 75 which urges the jaws 72 toward each other while the free ends 76 of such levers 73 are adapted for engagement with a shoulder 77 which effects the spreading apart of the jaws 72 on the down stroke of the stem 22 of the head 21 as is shown in Figure 3 of the drawings. It will be apparent that when the jaws 72 are together and the mold head 21 engaged in the stationary head 52 with the valve 55 open the cellulose viscose within the chamber 18 will flow through the orifice 53 into the mold head 21 and into the jaws 72 so that the externally threaded nipple end 78 of a collapsible tube will be formed. The mold head 21 will be engaged in the stationary head 52 when the stem 22 has been raised to its uppermost stroke under the action of the cams 31 cooperating with the push rods 26 on the crosshead 25.

Arranged within the mold head 21 is an ejector pin 79 having an actuator 80 adapted to coact with the shoulder 77 on the down stroke of the stem 22 so as to free the nipple end 78 from the mold. The pin 79 normally or when the stem 22 of the mold head 21 is lifted becomes retracted and is passive against ejecting action, it moving to ejecting position by the actuator 80 thereof contacting with the shoulder 77 as heretofore mentioned.

When the nipple end 78 has been formed in the mold 21 the latter is caused to move away from the head 52 and instantly therewith a tubular formation or film 81 of cellulose viscose is drawn through the orifice 53 about the column or cylinder 37 and the valves 41 and 69 are opened so that a charge of coagulating fluid will flow from the chamber 17 through the column or cylinder 37 into the tubular formation or film so as to prevent the collapsing thereof during this drawing action, while the drawing of this tubular formation or film will carry the same through the bath of coagulation solution within the tank 10 and in this manner the cellophane collapsible tube will be produced as exemplified in Figure 9 of the drawings. When the mold head 21 reaches its lowermost extent of down stroke the levers 73 will be acted upon at their ends 76 to separate the jaws 72, these being spread completely before the actuator 80 strikes the flat surface of shoulder 77 in container 10, thus spreading the ejector 79 upward. The ejector pin 79 will eject the end 78 of the tube 81 into the bath of coagulating solution 11 in the tank 10 whence the said tube 81 can be removed therefrom in any approved manner, the upper end of said tank 10 being open for a major portion of the same for this purpose. The

die head 70 has a tip 83 which remains in contact with ejector pin 79 in mold head 21 throughout the greater part of the downward stroke of mold head 21. This die head tip 83 also is the means of forming the opening in nipple end of tube. When the die head 70 and mold head 21 reach a point on the downward stroke where the thread forming jaws 72 begin to open, the die head 70 returns very speedily to a position of about closing as is shown in Figure 3 of the drawings, thus clearing tube of all obstruction for the ejection process.

When the tube 81 has been removed from the bath of the coagulating solution 11 in the tank 10 the open bottom end of such tube is sealed by the formation of an overlapped clinched sealing seam 82 as is common to collapsible lead tubes, the sealing of this end being shown in Figure 10 of the drawings and thus a finished product had.

The bath of coagulation fluid 11 in the tank 10 serves to set the tubular film when being drawn by the down stroke of the mold head 21, while the coagulation fluid from the chamber 17, which is fed into the tubular film, prevents the collapsing of the tubular formation of the film during the drawing of the body of the "cellophane" collapsible tube in the operation of the machine.

It should be apparent that a collapsible container tube made from "cellophane" with a threaded nipple end is produced in a single operation of the machine by the drawing of cellulose viscose from a chamber containing the same and in the use of a mold head movable through a bath of a coagulation fluid or solution as contained in the tank 10 of the machine.

The cams as employed in the machine for controlling the mold head 21 and valves 41, 55 and

69 are timed for the successive operations thereof to effect the production of a "cellophane" collapsible tube. However, it is to be understood that the mold section 21 and the valves are susceptible of being operated otherwise than by cams and this is contemplated within the scope of the invention.

What is claimed is:

1. The method of making cellulose viscose tubes consisting in subjecting cellulose viscose to a mold head, confronting the head with oppositely movable nipple forming jaws, maintaining the mold head coated with a coagulating solution, drawing out the cellulose viscose by a downward movement of the mold head and jaws into a coagulating solution to form a thin-walled seamless tube, supporting the tube during the drawing and extruding action and maintaining treatment of the coagulating solution to the interior and exterior of the tube during the drawing and extruding period.

2. The method of making cellulose viscose tubes consisting in subjecting cellulose viscose to a mold head, confronting the head with oppositely movable nipple forming jaws, maintaining the mold head coated with a coagulating solution, drawing out the cellulose viscose by a downward movement of the mold head and jaws into a coagulating solution to form a thin-walled seamless tube, supporting the tube during the drawing and extruding action and maintaining treatment of the coagulating solution to the interior and exterior of the tube during the drawing and extruding period and releasing the said jaws at the termination of the drawing and extruding action.

ARTHUR B. BLOUNT.