

July 2, 1935.

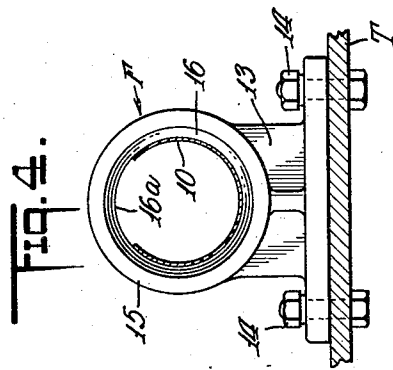
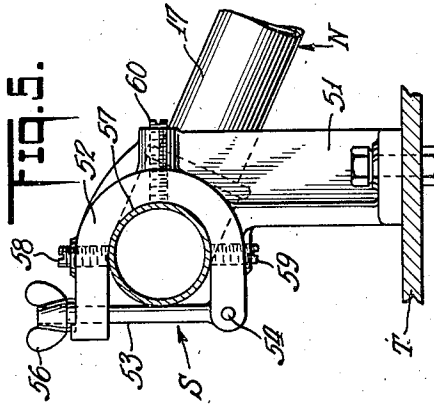
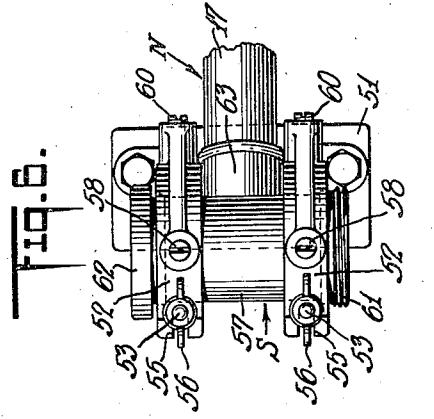
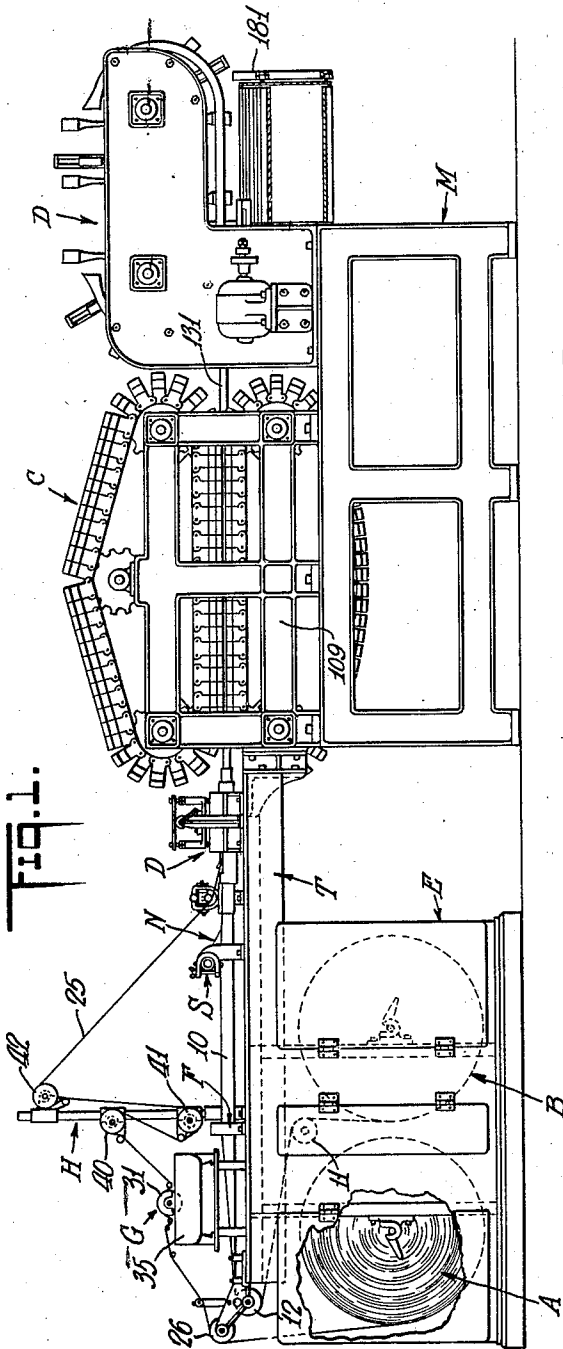
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2,006,376

METHOD AND APPARATUS FOR FORMING ENWRAPPED COMESTIBLE BARS AND THE LIKE

Filed Feb. 3, 1934

6 Sheets-Sheet 1



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July 2, 1935.

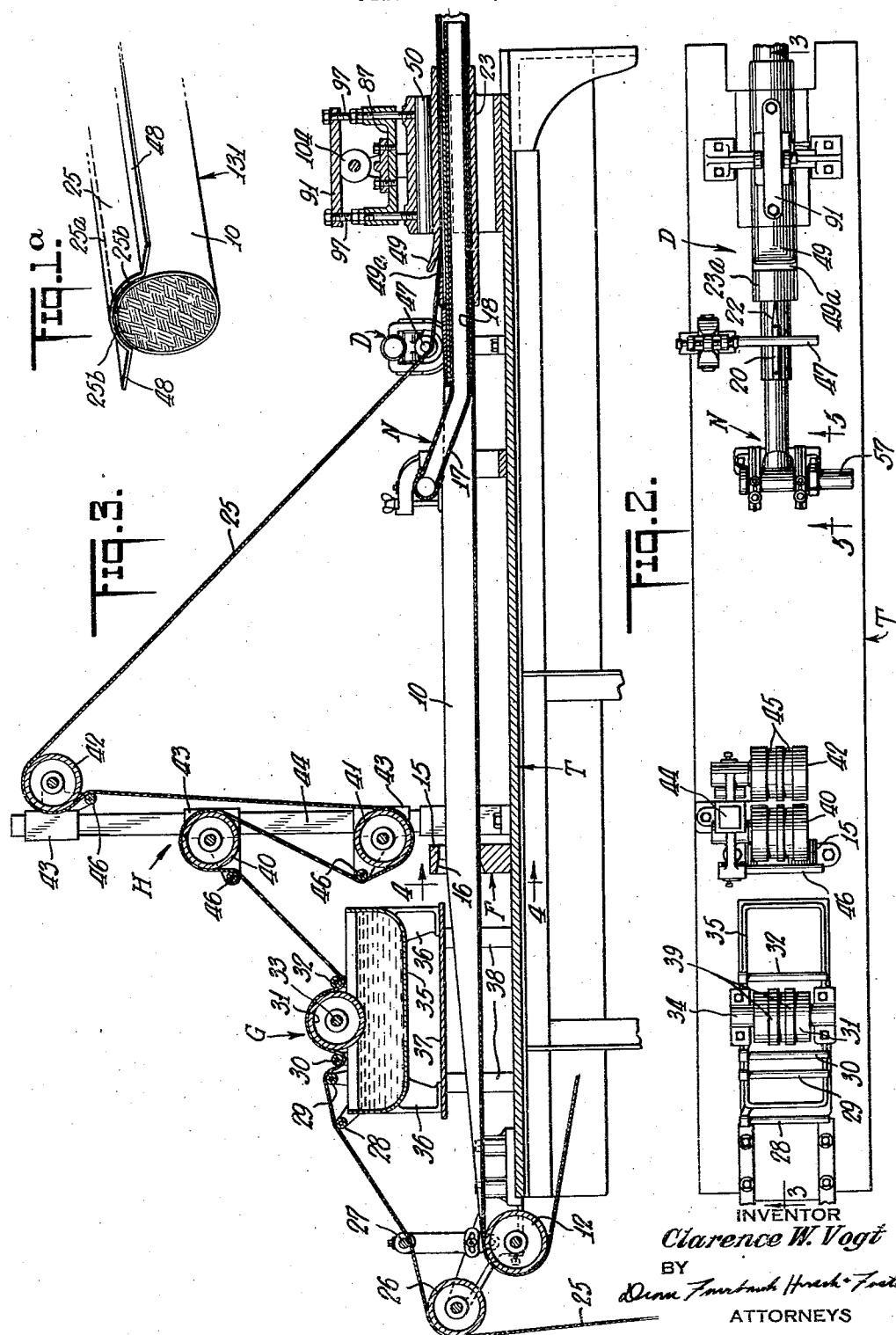
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6 Sheets-Sheet 2



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Filed Feb. 3, 1934

6 Sheets-Sheet 3

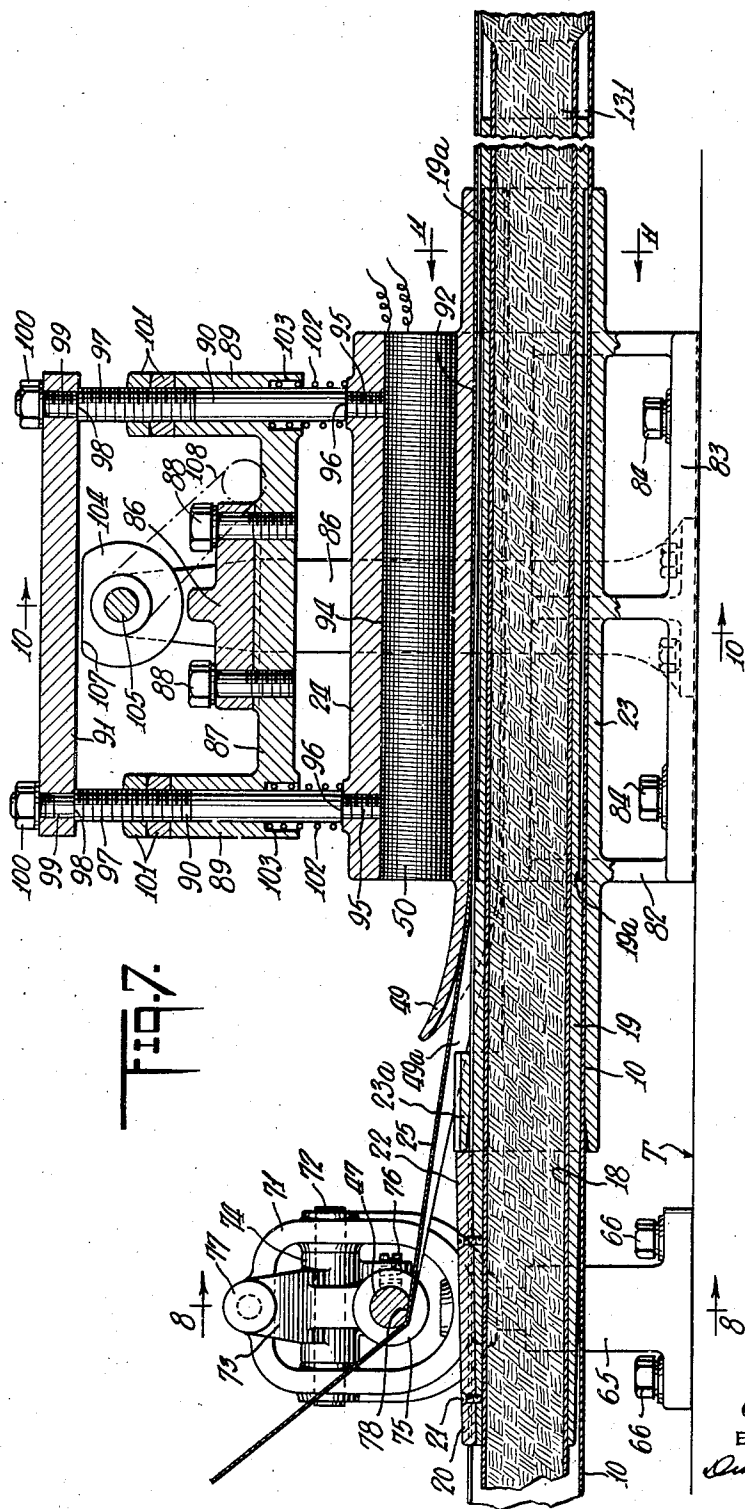


Fig. 7.

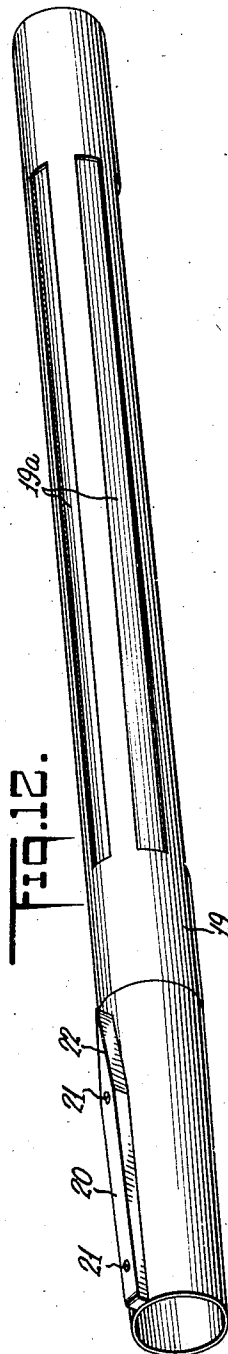


Fig. 12.

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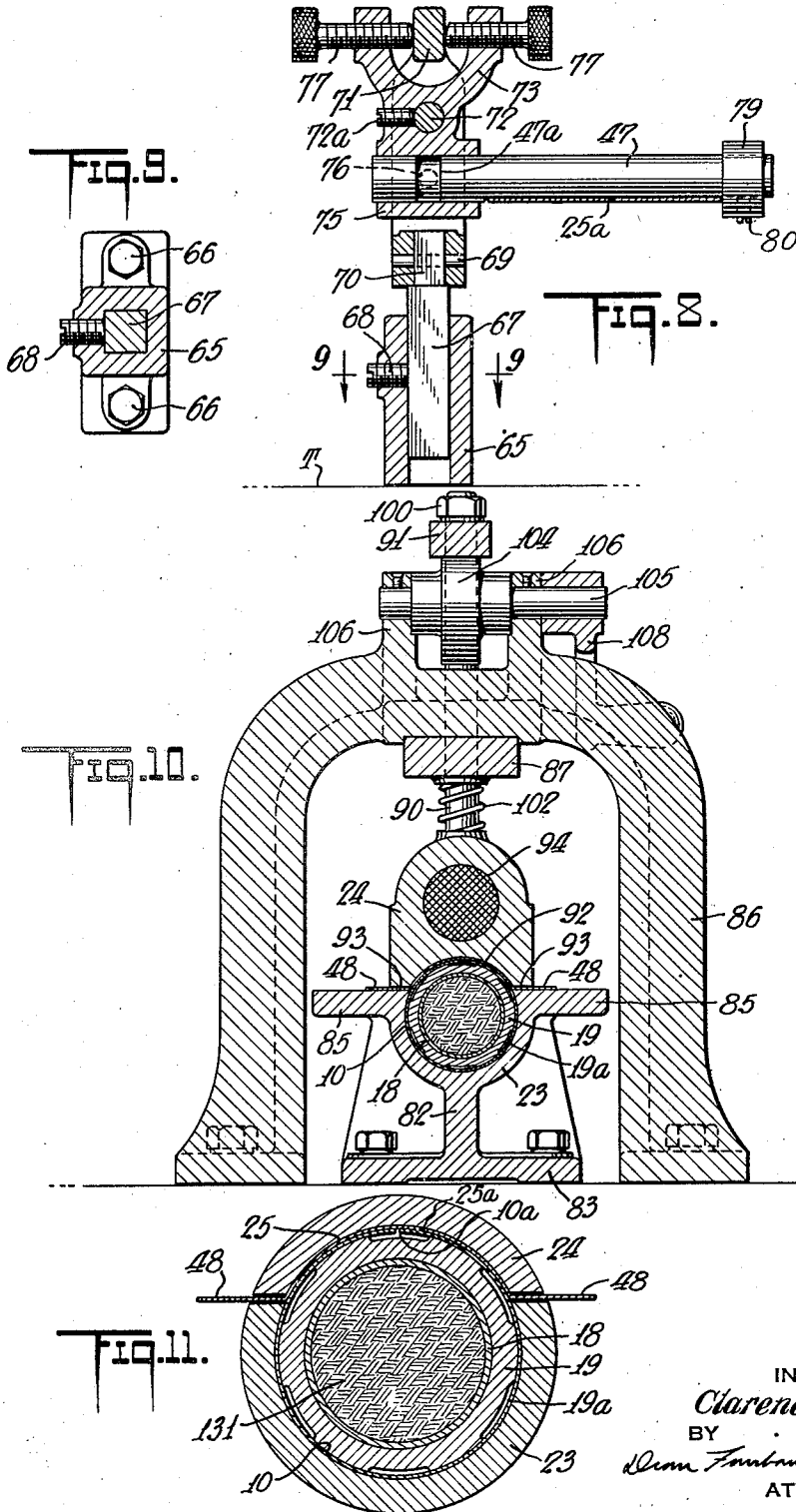
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2,006,376

METHOD AND APPARATUS FOR FORMING ENWRAPPED COMESTIBLE BARS AND THE LIKE

Filed Feb. 3, 1934

6 Sheets-Sheet 4



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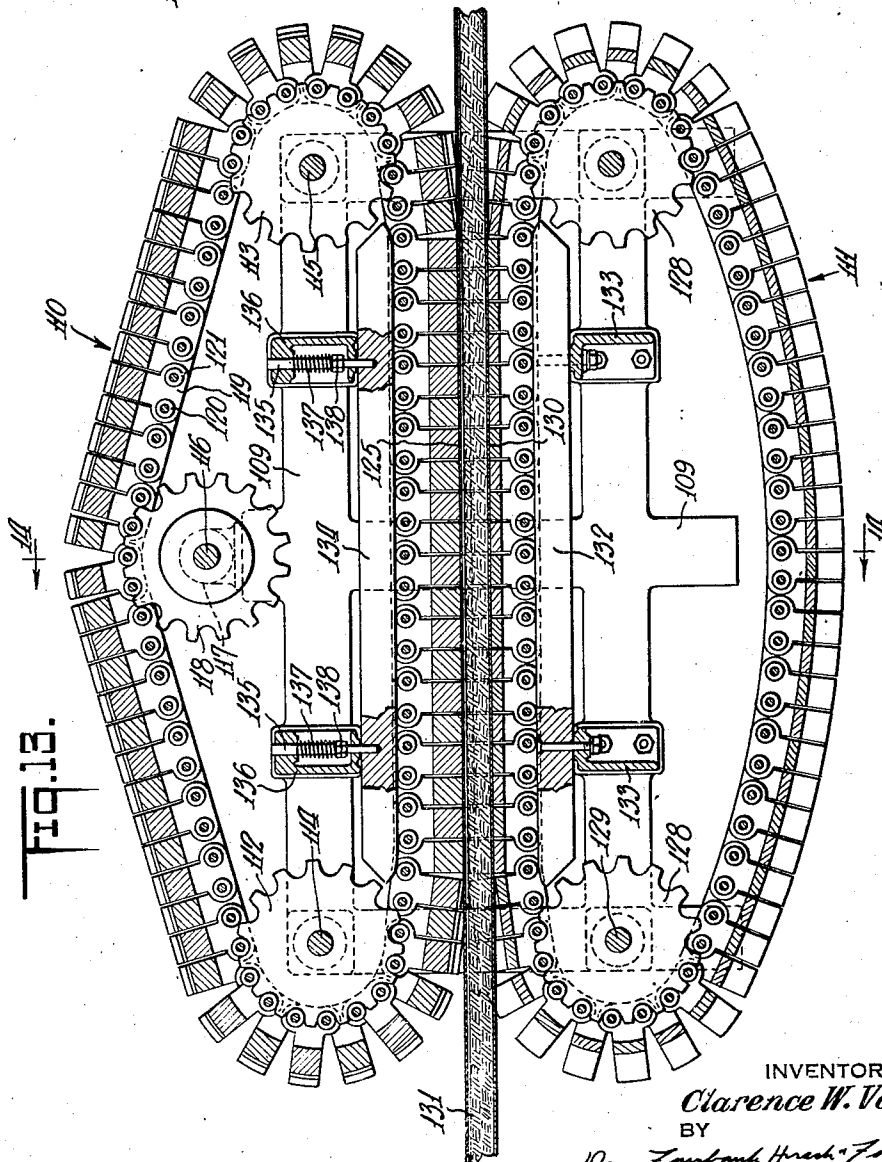
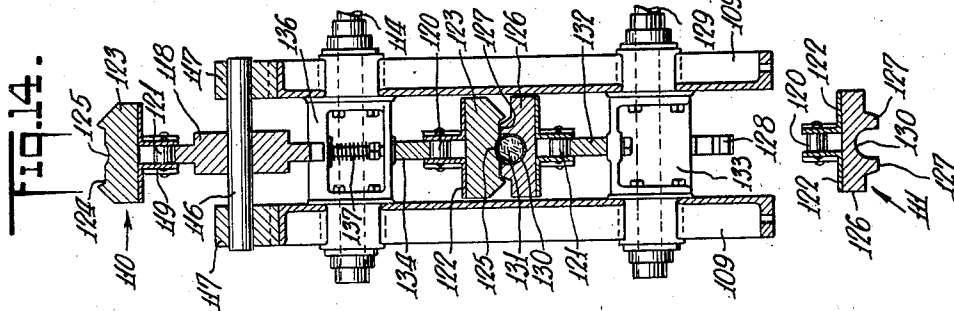
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2,006,376

METHOD AND APPARATUS FOR FORMING ENWRAPPED COMESTIBLE BARS AND THE LIKE

Filed Feb. 3, 1934

6 Sheets-Sheet 5



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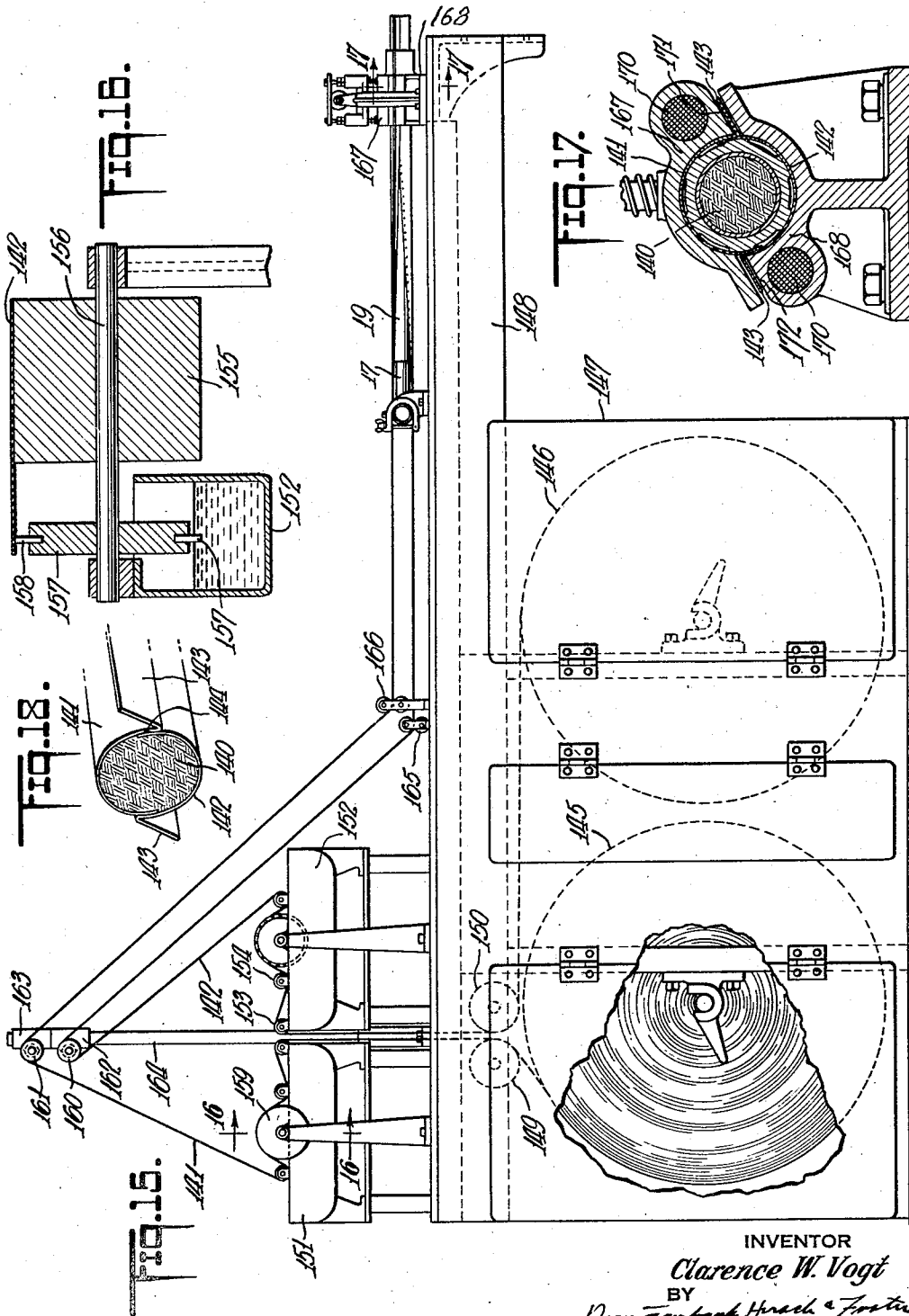
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METHOD AND APPARATUS FOR FORMING ENWRAPPED COMESTIBLE BARS AND THE LIKE

Filed Feb. 3, 1934

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,006,376

METHOD AND APPARATUS FOR FORMING
ENWRAPPED COMESTIBLE BARS AND
THE LIKE

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Application February 3, 1934, Serial No. 709,642

17 Claims. (Cl. 93—2)

My present invention relates to the production of enwrapped plastic material, such as an en-
cased bar or rod of any desired length of any
enwrapped plastic material, although the inven-
tion particularly relates to the enwrapping of
partially frozen comestibles, such for instance as
ice cream, water ice, sherbet and the like, which
are normally liquid at body temperatures.

More specifically, the invention relates to an
improved method of and apparatus for continu-
ously forming a tube of wrapping material about
a continuously extruded plastic substance.

One object of the invention is to provide a
method and apparatus which will insure uniform-
ity of the product and by which the wrapper is
securely sealed against inadvertent unfolding
during subsequent operations on the product,
such for instance as conveying, freezing, sub-
dividing, and packing.

Another object is to so apply the wrapper that
it will be securely held in position without rely-
ing upon the stiffness of the wrapping material
or the adherence of the contents to the wrapper.

Preferably the material to be encased is con-
tinuously delivered from a suitable apparatus,
such for instance as a continuous ice cream
freezer which partially freezes the cream to a
comparatively stiff plastic condition while in-
corporating the required amount of air to give
the desired overrun. The wrapping material is
delivered as strips from two separate sources of
supply, these strips being continuously folded
about the plastic material and connected to each
other by adhesive to prevent inadvertent un-
folding of the wrapper tube thus formed.

The tube forming strips afford one or more
projecting edges which define projecting flaps or
tabs in the finished wrapped product. The tube
is designed to open up along a predetermined
line or lines under the influence of a pull on the
tabs.

It is to be understood that after the enwrapped
bar of ice cream or analogous material has been
formed, it may be cut in sections. If the sections
be long ones, these may be frozen hard and then
severed transversely into individual service por-
tions. These portions may be readily unwrapped
by simply grasping the two projecting tabs and
pulling them in opposite directions to open up
the wrapper so that the enwrapment will be un-
rolled or peeled from its contents by a continued
pull on the tabs. As they are unwrapped they
may be dropped into a dish, cone, or glass without
coming in contact with the fingers of the dis-
penser.

The tabs serve a further function in that they
may be conveniently gripped by conveying or
other mechanism to advance the wrapper ma-
terial to the tube forming mechanism and ad-
vance the bars during processing thereof.

Preferably, the plastic material is delivered
through an elongated nozzle or conduit. The
supply pipe for this nozzle leads into the tube in
advance of the point at which the tube is com-
pletely closed and sealed, the nozzle serving as or
carrying a tube forming mandrel. The wrapper
forming strips, one or both of which have had
adhesive applied thereto on the way to the fold-
ing mechanism, are folded into tubular form
about the mandrel and the overlapping adhesive
bearing portions of the strips are subjected to
heat and pressure while the tube is still on the
mandrel. Thus, while the ice cream or other
material and the delivery nozzle are disposed
inside of the tube the ice cream does not come
into contact with the tube proper until after this
tube has been formed and sealed.

Although the nozzle which delivers the ice
cream has a smaller internal diameter than the
internal diameter of the tube to be filled with
cream, the tube is completely filled due in part
to the expansion of the cream as it passes from the
nozzle and in part to the fact that the rate of
cream feed is just enough faster than the rate of
tube formation to completely fill the tube as the
latter is formed.

The invention, including many additional im-
portant features of the machine and method,
may be more fully understood from the following
description in connection with the accompanying
drawings, wherein

Fig. 1 is an elevational view of a machine em-
bodying the invention.

Fig. 1a is a perspective view of the wrapped bar
formed by this machine.

Fig. 2 is an enlarged top plan view of the tube
forming and filling mechanism.

Fig. 3 is a vertical sectional view on the line
3—3 of Fig. 2.

Fig. 4 is an enlarged transverse sectional detail
on the line 4—4 of Fig. 3.

Fig. 5 is a view on the line 5—5 of Fig. 2 show-
ing the supply pipe for the ice cream in section,
and showing the supporting bracket in side ele-
vation.

Fig. 6 is a top plan view of Fig. 5.

Fig. 7 is a considerably enlarged longitudinal
sectional view through the final tube forming and
adhesive drying mechanism.

Fig. 8 is a transverse sectional view through

part of the adjustable guide mechanism for the flap forming strip, this view being taken on the line 8-8 of Fig. 7.

Fig. 9 is a transverse sectional detail on line 9-9 of Fig. 8.

Fig. 10 is a transverse sectional view on the line 10-10 of Fig. 7.

Fig. 11 is a further enlarged transverse sectional view on the line 11-11 of Fig. 7.

Fig. 12 is a perspective view of the final tube forming mandrel.

Fig. 13 is a longitudinal vertical sectional view through the conveyer mechanism which advances the rod to the cutters.

Fig. 14 is a transverse sectional view on the line 14-14 of Fig. 13.

Fig. 15 is an enlarged side elevational view of a modified type of tube forming mechanism.

Fig. 16 is an enlarged transverse sectional view on the line 16-16 of Fig. 15.

Fig. 17 is an enlarged transverse sectional view on the line 17-17 of Fig. 15, and

Fig. 18 is a perspective view of a wrapped bar produced by the mechanism of Figs. 15 to 17.

Referring now to Figs. 1 to 14 of the drawings, Fig. 1 shows the entire machine in side elevation. T represents a table or bed plate, and a cabinet or housing E arranged under this bed plate conceals the two paper supply rolls designated at A and B. The wider paper roll B supplies a tube forming strip 10 which is led over the table and through suitable forming mechanism including the folding guide F. The roll A carries a narrower sealing and tab forming strip 25 which is led past an adhesive applying mechanism G, which applies two stripes of adhesive to the strip, then through a timing mechanism H which gives the adhesive a chance to become tacky and then finally to a pressing and drying mechanism D at which point the strip bearing the adhesive is folded and pressed into engagement with the formed tube and the drying of the adhesive completed.

In advance of the point of application of the sealing strip to the tube, the plastic material enters the partially formed tube through a supply pipe S and a feeding nozzle N which latter extends into the tube between the as yet non-abutting edges thereof.

As will be more fully hereinafter described the final tube forming mandrel is arranged adjacent to the folding, pressing and drying mechanism for the sealing strip; the nozzle extends through this mandrel so that the completion of the tube is upon the outside of the mandrel; and the sealing and tab forming strip is pasted to the tube under heat and pressure with the mandrel serving as a platen.

Beyond the table T a main frame structure M is provided for supporting the conveyer mechanisms indicated at C. These grasp the tabs of the continuously formed and enwrapped cylindrical bar of comestible material and carry the bar to any suitable type of cut-off mechanism, where the continuously advancing bar is transversely severed into successive sections of uniform length and carried off on some suitable type of conveyer 181. This particular cut-off mechanism indicated at D in Fig. 1 is disclosed in my copending application Serial No. 710,367, filed February 8, 1934.

The unwinding of the paper from the rolls is actually effected by the conveyer mechanism which grasps the tabs of the formed tubes and positively advances them, it being understood

that both of the paper rolls may be equipped with any conventional type of drag mechanism (not shown) to maintain the two strips of paper taut.

The paper strip 10 which forms the tube is led from the paper roll B over guide rolls 11 and 12 and thence through the folding guide F (Fig. 4). This is in the nature of a bracket 13 bolted at 14 to the table and presenting a paper guiding eye 15. This eye is provided with a conical taper portion 16 which the paper enters and with a straight cylindrical portion 16a at the smaller end of the tapered portion and through which the paper leaves.

The internal diameter of the cylindrical portion 16a of the guide eye exceeds the proposed diameter of the finished tube so that the paper strip 10 is bent into approximately three-quarter cylindrical conformation by passing through the eye, this being illustrated in Fig. 4. This cross-section of the tube forming paper strip is substantially maintained to a point beyond the inclined end 17 of the ice cream delivery nozzle N.

To understand the final folding of the tube, reference may be had to Figs. 7, 10, 11 and 12. The horizontally disposed end 18 of the nozzle N, which is of relatively thin pipe stock, carries near its outlet end an elongated mandrel 19 telescoped and sweated on or otherwise rigidly affixed thereto. The mandrel is provided with a plurality of longitudinally extending recesses 19a, the purpose of which is to minimize friction of the paper tube as it slides over the mandrel. That end of the mandrel which is first encountered by the paper 10 as the latter is being worked into tubular form is provided with a longitudinally extending bar or block 20 secured upon the mandrel body in any suitable manner as by screws 21 and terminating in a tapering or pointed end 22.

The mandrel, as above described, is supported on the nozzle 18 and the intermediate portion of the mandrel, which is of considerably heavier stock than the nozzle, is encircled by but disposed within a cylindrical passageway conjointly formed by the opposed recessed faces of a stationary paper folding guide member 23 and a complementary spring pressed plunger and guide member 24. The element 23 has a collar 23a at the end of the bar 20, which folds the edges of the paper strip 10 into final tubular form as the edges of the strip pass the pointed end 22 of said bar. The element 24 folds the sealing strip about the tube, and folds the tab forming edges of this strip outwardly. The element 24 being movable as a plunger exerts the necessary pressure to insure gluing of the two paper strips together and may be heated to insure thorough drying of the glue.

This tab forming strip 25 passes from the paper roll A and after being trained over any suitable arrangement of guiding rolls 26, 27, 28 and 29 (Fig. 3), passes under a guide roll 30, over an adhesive applying roll 31, and under a guide roll 32, the rolls 30 and 32 insuring that the paper strip will be brought in contact with the adhesive applying roll.

The adhesive applying roll is fixed on an axle 33, the ends of which are journaled in suitable bearings 34 disposed at the opposite upper edges of a tank 35 for liquid adhesive. The legs 36 of the tank 35 rest upon a platform 37 supported by legs 38 above the table T and above the path of travel of the paper strip 10. The bath of

adhesive is maintained at a sufficiently high level so that the roll 31 dips therein as it is rotated by the passage of the paper over its surface.

The tab forming and sealing strip 25 is provided with a longitudinally extending score or weakened portion 25a (Fig. 1a) preferably slightly off center which may be formed by a row of spaced slits or other form of weakening. The adhesive applying roll 31 is so designed that it will distribute two spaced stripes of glue 25b on the paper strip 35 at opposite sides of the weakened line 25a. For instance, the roll may have a pair of ribs 39 (Fig. 2) which contact the paper at opposite sides of and spaced from the weakened line 25a, but permit the remainder of the surface of the paper to pass without contact with the adhesive applying roll 31. It will be understood that the adhesive may have been previously applied to the strip and dried thereon and that the roller 31 may act merely to apply a liquid which will wet and soften the adhesive.

After the paper with the two wet glue stripes thereon leaves the roll 32, it is led over three guiding and timing rolls 40, 41 and 42. Each timing roll is mounted upon a bracket 43 vertically adjustable along and adapted to be clamped in position on a standard 44. Each bracket preferably carries a small guide roll 46, which serves to direct the paper strip 25 so as to give increased wrapping or surface contact with its corresponding guiding roll. As illustrated in Fig. 3 the paper is led over the intermediate roll 40, then under the lower roll 41 and then over the top roll 42.

These rolls, or at least the rolls 40 and 42, are provided with grooves 45 therein (Fig. 2) corresponding to but wider than the adhesive applying ribs of the roll 31 so as to prevent the strips of glue on the paper from being transferred to the rolls 40 and 42. The paper is carried in a tortuous path around these various guide rolls so as to give the strips or ribbons of glue time in which to partially dry, that is, to become sticky or tacky so that they will more readily adhere to the tube forming strip 10 when the two strips are pressed together. The three guide rolls 40, 41 and 42 are referred to as timing rolls since the adjustment of these rolls along their supporting standard is operative to vary the total distance traveled by the sealing strip 25 before it comes in contact with the tube forming strip 10 and thereby vary the time between the application of the glue and the gluing of the two strips together. This time may vary depending on the temperature or humidity of the air, the temperature or character of the glue and other conditions, and the proper adjustments may be made to insure that the glue be of just the right sticky consistency and neither too wet nor too dry at the time of gluing the strips together.

From the upper roll 42 the strip 25 passes under a guiding arm 47 and thence through an opening 49a above the collar 23a and below a guide lip 49 carried by a sealing shoe 24. The lip curves the strip 25 and brings it into position on the strip 10. The sealing shoe 24 is preferably equipped with a heating coil 50, which will complete the drying of the glue as the strip 25 is pressed onto the formed tube by the pressure of the plunger.

In applying the sealing strip 25 to the main tube strip 10 (Fig. 11) the scored or weakened line 25a of the strip 25 is placed off center with respect to the crack or crevice 10a defined by the abutting or substantially abutting edges of the strip 10 and both the edges and the score line are located between and spaced from the two

glue strips by which the tab forming strip 25 is attached to the tube forming strip 10.

The ice cream delivery pipe enters the partially formed tube in advance of the point where the sealing strip 25 is applied. The pipe is supported on a bracket member 51 mounted upon the table T (Figs. 5 and 6). The bracket has a pair of spaced parallel laterally opening vertically disposed rigid yokes 52, the mouths of which may be closed by pins 53 hinged at 54 in one yoke arm and having their free ends movable into notches 55 in the other yoke arm and held in place by wing nuts 56.

Locked in position within the yokes is a short length of horizontal pipe 57 disposed transversely to the direction of travel of the partially formed paper tube which passes over the base of the bracket between the side portions thereof. This pipe 57 may be additionally secured in position by set screws 58, 59 and 60 threaded in the yoke. Thus the filling tube is centralized in order that the filling tube or nozzle 18 will lie parallel with the sealing shoe 24 and its complementary member 23 and any misalignment which might cause pinching of the paper is prevented. These set screws, together with the pins 53, lock the short pipe length 57 and the nozzle N firmly in position yet permit ready removal thereof for purposes of cleaning. This pipe length 57 constitutes the head or cross piece of a T coupling, one end of the head being threaded as at 61 for engagement with a supply conduit delivering ice cream and the other end of the head being closed by a cap 62. The cap may be put on either end depending on the side of the apparatus on which the supply pipe is located. The short leg 63 of the T coupling carries the inclined portion 17 of the nozzle N.

Beyond the point at which the nozzle enters the tube is located the adjustable arm 47 over which the glued tab forming strip 25 is led to the heating and sealing shoe 24. The arm 47 is adjustably supported by parts (Figs. 7, 8 and 9) which include a hollow post 65 bolted at 66 to the table T at one side of the path of travel of the tube forming paper strip. A standard 67 is vertically adjustable within the post, being locked in adjusted position by a set screw 68. Pinned as at 69 upon the upper reduced end 70 of the standard 67 is a frame 71 in which an axle or pivot pin 72 is journaled. Upon this axle is rockably mounted a member which includes an upstanding yoke portion 73 which straddles the top of the frame, a sleeve portion 74 which encircles the shaft 72 and a socket 75 in which one end of the arm 47 is mounted, the socket extending at right angles to the axis of the shaft 72.

The end of the pin 47 which is disposed within the socket 75 may be provided with a groove 47a receiving a set screw 76 which serves the two-fold purpose of locking the pin 47 against rotation and restraining it against endwise movement. A pair of set screws 77 in the yoke 73 bear against the top or cross bar of the frame 71 so that by adjusting these screws in opposite directions the member which carries the arm 47 may be rocked about the shaft 72 as an axis so that the arm 47 may be tilted or adjusted to a horizontal position or slightly out of such position, as may be desirable to assure correct guiding of the glued tab forming strip into position under the upwardly flared lip 49 of the sealing shoe 24. The arm 47 may be locked in the correct position of adjustment by a set screw 72a engaging the pivot pin 72.

In order that the paper may be perfectly flat as it runs over the guide arm 47, this arm is pref-

erably flat on its under side, as indicated at 78 (Fig. 7) and to prevent it from slipping laterally there is provided a collar 79 adjustable along the arm 47 and held in adjusted position by a screw 80. Adjustment of this collar may be made to accommodate tab forming strips of various width. Any tendency of the paper to feed incorrectly under the sealing shoe 24 and about the previously formed paper tube on the mandrel may be corrected by slight adjustment in the angle of the guide arm 47, this guide arm serving in effect as a compensating device to correct any minor inaccuracy of the feed of the paper over the various guide rolls 40, 41 and 42.

The construction of the sealing shoe 24 and its fixed complementary folding guide 23, which cooperatively constitute the final tube forming, sealing, tab folding and adhesive drying means, is most clearly apparent from Figs. 7, 10 and 11. The stationary member 23 consists of an elongated roughly two-thirds or three-quarters cylindrical trough connected by webs 82 to a base 83 bolted at 84 on table T. The trough at the upper edges is provided with oppositely extending horizontal flanges 85 upon which ride the tabs 48 constituting the edge portions of the sealing strip 25.

Arching over the member 23 is an inverted U-shaped frame member 86, the upper intermediate portion of which carries a fixed plate 87 extending above and in parallelism with the mandrel. Plate 87 which is secured to the bracket 86 by bolts 88 or otherwise has at each end thereof a vertically disposed guide sleeve 89 for the guide rods 90 of a cross head 91. These rods at their lower ends are connected to the sealing shoe 24 which has a groove 92 in its under surface which complements the trough 23 to form an approximately cylindrical passageway for the paper tube. The lower outer edges of the shoe have flat faces 93 which complement the platform portion 85 of the platen member 23, but are spaced therefrom and serve as folding guides for the flaps. The heating coil 50 is arranged within a cylindrical recess or bore 94 which extends longitudinally of the sealing shoe, the latter being of suitable heat conducting material.

The guide rods 90 have reduced threaded lower ends 95 screwed into the shoe 24 to an extent limited by the shoulders 96 on the rods. The rods slide freely through the sleeves or guides 89 and the upper portions of the rods are threaded as at 97. The extreme upper ends of the rods are reduced to define shoulders 98 upon which the cross head 91 rests and these reduced extensions which pass through the cross head are likewise threaded at 99 for the accommodation of nuts 100.

A pair of lock nuts 101 arranged on each guide rod 90 limits the downward movement of the cross head under the influence of coiled expansion springs 102 which encircle the lower ends of the guide rods. These springs bear against the shoe 24 and their upper ends are housed within and react against the bottoms of sockets 103 formed by enlarging the lower ends of the bores of the guide sleeves 89. This construction permits a very accurate adjustment of the extent to which the sealing shoe may be pressed down under the influence of the springs to fold the upper glued strip about the previously formed tube and press it into firm contact therewith in the presence of heat, the unglued projecting tabs 48 being nevertheless subject to no pressure, as illustrated in the enlarged sectional view at Fig. 11.

For convenience in threading the paper strip

25 at the commencement of the operation, the sealing shoe or plunger 24 may be readily raised from its operating position. For this purpose there is provided a cam 104 fixed upon a short rock shaft 105 having its ends journaled in lugs or ears 106 on the inverted U-shaped bracket 86. The cam has a flat side 107 which is normally disposed parallel to the superjacent cross head 91 and may be rotated by a crank handle 108 fixed on the end of the rock shaft 105 to elevate the cross head, guide rods and plunger against the action of the springs 102 and gravity.

The mandrel 19 terminates somewhat short of the discharge end of the nozzle 18 (Fig. 7) and the inside diameter of the formed paper tube is larger than the extruded cylindrical mass of ice cream. As the ice cream is under pressure and is highly aerated to give the desired overrun it will inherently tend to expand and substantially fill the paper tube as it is extruded from the end of the nozzle. Furthermore by feeding the material at a slightly faster lineal rate than that at which the tube forming strips are advanced and folded, the paper tube will be thoroughly packed with the material even without expansion.

From the foregoing it will be apparent that during the final folding of the paper tube and during the pasting of the tab forming strip thereto the tube is firmly reinforced by the rigid mandrel which takes all of the pressure necessary to effect the gluing operation. Furthermore the tube is held by the final folding mechanism, that is, the mandrel, platen and sealing shoe in its tubular form until such time as the adhesive connections have been thoroughly stuck by the heating coil. The heat of the coil is not transmitted through the mandrel to any appreciable extent to affect the ice cream inside of the mandrel.

The tube at no time is subjected to any crushing pressures, the projecting tabs 48 serving as convenient means which may be gripped to effect the advancing of the enwrapped comestible bar to the point where the leading end of the bar is severed.

The enwrapped bar is advanced from the end of the mandrel and filling nozzle, and the paper strips are pulled into and through the tube forming mechanism by a conveyer which grips the tabs or edges of the sealing strip. A suitable conveyer for the purpose is illustrated in Figs. 13 and 14.

The conveyer is mounted on spaced parallel skeleton frame members 109 mounted on the main frame M and includes a pair of cooperating endless articulated chains 110 and 111. The upper chain 110 travels over sprocket wheels 112 and 113, mounted on shafts 114, 115, extending between the two upper corners of the frames 109. A third sprocket wheel 116 is mounted on a shaft 116 rotatable in bearings 117 also on the frames 109 and supports the idling upper run of the upper conveyer chain.

The links 119 of the chain are connected by pins 120 carrying rollers 121. Each link includes sheet metal plate portions 122 having outwardly bent parallel flanges for the connecting pins, said plate portions forming a backing and support for the block 123. The working face of each block is provided with a flat shallow trough 124 therein in the center of which is an arcuate groove 125.

The lower endless conveyer chain 111 is mounted upon a pair of sprocket wheels 126 carried by shafts 129 journaled in the frames 109. The lower chain is similar to the upper chain except that

the blocks 126 which complement the blocks 123 include outwardly extending flanges 127 to fit within the troughs 124, and between the flanges is an approximately three-quarter circular groove 130 complementing the relatively shallow grooves 125 of the upper blocks. The grooves 125 and 130 cooperatively define substantially cylindrical passageways to accommodate the enwrapped comestible bar 131. The outer portions of the projecting flaps 48 are clamped and gripped between the flat faces of the flanges or ridges 127 and the flat bottom of the trough 124.

Means is provided for exerting downward pressure upon the lower working run of the upper chain 110 and for rigidly backing the upper working run of the lower chain 111 to the end that the tabs may be firmly gripped. In the form shown the support for the working run of the lower chain consists of a bar 132 bolted to cross frame pieces 133 forming a part of the frames 109. The rolls 121 of the chain links travel upon the upper edge of the bar 132 so that all of the working blocks or links of the chain 111 are firmly backed against downward movement.

Bearing downwardly against the rollers of the lower run of the upper chain is a bar 134 corresponding in cross-sectional shape to the bar 132. Extending upwardly from bar 134 are a pair of studs or pins 135 slidable in the flanges of channeled cross members 136 of the frames 109. Springs 137 encircling the intermediate portions of the pins 135 and reacting against the inner faces of the upper flanges of the cross pieces 136 bear against stops 138 on the pins and thereby urge bar 134 downwardly. Thus the working run of the upper chain is spring pressed into engagement with the firmly backed run of the lower chain so that the tabs of the enwrapped bar are firmly clamped and the bars positively drawn forward, but no crushing or other strain is imposed on the bar itself as the complementary grooves 125, 130 receive without pressing the bar.

It will be understood that the driving wheels of the two conveyer chains are synchronized with each other and that the rate of feed of the ice cream is synchronized with the speed of movement of the conveyer chains. The power required for advancing the two paper strips through the gluing and forming mechanism previously described is supplied from a suitable source to these conveyer chains and as will be understood the two chains are interconnected by suitable means (not shown) for advancing them at the same lineal speed.

It is likewise necessary that the driving sprockets for the conveyer chains be synchronized with the bar cut-off mechanism herein indicated generally at D. Various means by which this may be accomplished will be apparent to those skilled in the art and therefore for the sake of simplicity and clarity I have not illustrated the prime mover and the driving mechanism for the advancing elements.

While the operation of the machine may be understood from the foregoing description it may be summarized as follows:

The tube forming strip 10 is drawn from its supply roll B out over the guide roll 12 through the first forming eye F, which folds it into the approximately three-quarter circular form (Fig. 4) and then led between the legs 51 of the bracket which supports the supply tubes for the plastic material. Just beyond this bracket the inclined portion 17 of the nozzle N enters the partially opened tube 10 and this tube as it is carried for-

wardly is folded in the annular space, cooperatively defined by the mandrel, and the folding collar 23. The complete folding of the tube forming strip occurs as this strip passes the folding guide bar 20 on the mandrel and just as the tube becomes encircled by the collar 23.

The tab forming strip 25 which has been withdrawn from its supply roll is carried around the guide rolls 26, 27, 28 and 29, has two spaced stripes of adhesive applied to it by the adhesive applying roll 31, and travels over the timing rolls 40, 41 and 42, the adhesive being prevented from contacting with the timing rolls due to the grooves 45 in the timing rolls.

This strip 25 with its adhesive face undermost, then passes under the arm 47 and is led through the opening 49a under the lip 49 of the sealing shoe and becomes folded by the shoe into partially arcuate form (Fig. 10) with the free edges 48 of the tab forming strip folded outwardly and lying in the same plane between the table 85 and the flat bottom surfaces 93 of the shoe.

The shoe which is heated by the coil 50 completes the sealing of the tube which then passes off the end of the mandrel and receives the plastic mass which is being continuously extruded from the nozzle.

The tube with its plastic filling is then passed through the conveyer mechanism C which constitutes the traction means for drawing the paper from its supply rolls and advancing the filled tube.

In the case of some quick setting materials, such as lard, margarin, which has been chilled by the use of embodying the principles disclosed in my Patent 1,783,864 no further chilling or freezing may be necessary. However, if the material within the bar is ice cream, the enwrapped bars, after having been severed by the cutter mechanism D, are preferably passed into a hardening room (not shown) and after they have been hardened are further preferably severed into relatively short lengths, each cylindrical length being of suitable diameter and suitable length to constitute a service portion of ice cream such as the portion illustrated in my Patent 1,906,183, issued April 25, 1933 and my copending application Serial No. 707,005, filed Jan. 17, 1934. In order to unwrap this portion for deposition in a plate, soda glass or sundae dish, it is merely necessary to grasp the two protruding flaps 48 and pull them in opposite directions. Thereupon the tab forming strip will separate along the weakened line and the wrapper is pulled off the cream.

By arranging this weakening slightly off center with respect to the crack or crevice formed by the abutment of the ends of the tube forming strip 10, any slight leakage of plastic material through this crevice cannot continue through the weakened or perforated line of the tab forming strip.

While the tube forming strip has been shown just wide enough to form a complete tube when completely folded, it is obviously within the scope of the invention to overlap the edges of the tube forming strip or to bridge a space between non-abutting edges thereof by the sealing strip or to use any other type of wrapment.

Figs. 15 to 18 illustrate a slightly different style of wrapper and a slightly different type of apparatus for forming it.

For making the product shown in Fig. 18 one may employ the machine illustrated in Figs. 15 and 17. This product includes a bar of plastic material 140 and a pair of sheets of wrapper material 141 and 142 each wrapped around slightly more than half of the bar. One edge of each

sheet is overlapped by the other and the opposite edge of each sheet is bent at an acute angle to define a projecting flap or tab 143. The overlapped portions of the sheets are adhesively connected together by spots of adhesive material 144 applied in a manner to be later pointed out. Preferably an adhesive is used which will secure the two parts of the wrapper together against inadvertent unfolding, but will yield under a pull on the tabs so that the overlapped portions of the wrapper sheets will pull apart permitting unpeeling of the contents of the wrapper. This adhesive may embody glycerin or some similar agent which will prevent the adhesive from drying or hardening to such an extent as to form a permanent bond under the conditions existing when the product is dispensed.

With this form of the invention a pair of paper supply rolls 145 and 146 are housed in a cabinet 147 arranged under a table 148. The paper strips 141 and 142 are drawn from these rolls by conveyor mechanism, such for instance as that shown in Figs. 13 and 14. Passing around guide rolls 149, 150, the two strips are drawn in a parallel path upwardly through the table and between a pair of containers for adhesive material such as the glue pots 151 and 152. The two strips are then led in opposite directions to the adhesive applying mechanism.

The strip 142 having been led over and under guide rolls 153, 154 travels over a wheel 155 supported on a spindle or axle 156 disposed laterally of pot 152, this wheel being somewhat narrower than the paper strip 142. Fixed to the same spindle 156 is a narrow wheel 157 provided at regular intervals with a plurality of pins, brushes or the like 158 which apply the adhesive as the wheel 157 rotates. The overall diameter of the wheel 157 and its projections corresponds with the diameter of the wheel 155 so that the projecting edge of strip 142 has a series of glue spots applied thereto by the successive pins, brushes or the like 158.

The strip 141 on the other hand passes in the opposite direction over a roller 159 corresponding to the roller 155, but on the opposite side its associated pot 151 has its opposite edge projecting from this roller and spotted with adhesive material by a pin carrying wheel (not shown) corresponding to the wheel 157.

The two strips, one with glue spots near one edge and the other with glue spots near its opposite edge, are then carried over timing rolls 160, 161, secured to brackets 162, 163 adjustable on the standard 164 and from these rolls the two strips are led in parallel lines between sets of scoring rolls 165, 166 secured in standards rising to different heights above the table 148. Thence the strips are passed along opposite sides of the nozzle 18 which is emitting ice cream, or guided around the mandrel 19 which encircles this nozzle and pass between the folding guides cooperatively afforded by the mandrel 19 and by a spring pressed shoe 167 and complementary stationary guide element 168 (corresponding to elements 23 and 24 of Fig. 10). Here the completion of the folding and the bending out of the tabs and the pressing of the overlapped glue spotted edges of the strips together is effected.

In this case, as seen in Fig. 17, both the shoe and the stationary guide are provided with heating coils 170. These elements cooperatively define an upwardly inclining slit 171 in which the edge of the strip 141 is bent back at an acute

angle to define one tab 143, and a diametrically opposite downwardly inclining slit 172 in which the free edge of the strip 142 is bent in an acute angle to define the other tab. With this form of the invention as with the form previously described, the tube is completely formed and sealed in the mandrel, then as it passes off the mandrel, the stream of plastic material from the nozzle enters and fills the tube.

It will be evident that if desired stripes instead of spots of glue might be applied to the strips 141 and 142; likewise that spots instead of stripes might be used in forming the type of enwrapment illustrated in Fig. 1a and that various other forms of peripheral wrappers might be folded and sealed into tubular formation about a mandrel through which extends the nozzle discharging the plastic mass of material to be enwrapped.

Although in the form first described two rows of adhesive are applied to one strip and in the other form one row is applied to one strip and the other row is on the other strip, one may by appropriate change in the details apply both rows of adhesive to either strip in either form or one row to one strip and one to the other in the first form.

Instead of using paper strips one might use any other sheet material as the sealing together of the strips makes stiffness of the sheet material non-essential.

The weakened line may be formed by a part of the apparatus or may be previously formed and the strips may have scored lines to facilitate accurate bending of the edge flaps or tabs. With some kinds of adhesive heating may not be necessary and the pressure may be effected in various other ways, such as by yielding wipers or brushes or by rollers.

If the conveyor C be outside of the hardening room, the blocks or gripping elements thereof may be of rubber or other such material, but if the conveyor be inside of the hardening room the conveyor blocks or gripping portions are preferably of metal with radiating fins or flanges for rapidly radiating heat and further chilling or hardening the outer portions of the material before it reaches the cutter.

By having the strips sealed together the tube may be made rounder and filled more effectively, and may extend across longer intervening spaces in the apparatus, for instance, to and from the conveyor, and it is practical to have the conveyor outside of the hardening room.

In the form shown in Fig. 18 an adhesive is selected which will set quickly, but which might later soften up due to the gradual moisture absorption while the product is in the dispensing cabinet which is usually at a higher temperature than the storage room.

The filling tube may be made to slide or fit loosely within the mandrel, and thus be free to move backward and forward, this latter construction being somewhat more fully shown in my co-pending application Serial No. 628,322 with the exception that in this latter case the mandrel would be supported from forward movement as shown in Fig. 15 with an opening in the rear wall of the mandrel support to permit the entrance of the filling tube through this hole and also to take care of the relative longitudinal movement of the filling tube with relation to the mandrel.

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

1. A tube forming and filling apparatus including a conduit having a substantially straight terminal section for delivering the filling material, means for delivering a plurality of separate strips of wrapper material along different sides of the conduit, one of said strips having adhesive thereon, and means for folding said strips in overlapped relationship with the adhesive therebetween and a heated clamp under which the overlapped portions of the strips are guided, yielding means urging the clamp against the overlapped portions of the strip to press them together and dry the adhesive and form a sealed tube in advance of the point of delivery of the filling material.

2. A tube forming and filling mechanism including a conduit having a substantially straight terminal section for delivering the filling material, means for delivering a plurality of separate strips of wrapper material along different sides of the conduit, one of said strips having adhesive thereon, means for folding said strips to form a tube and pressing them together in overlapped relationship to afford a sealed wrapper, and means for folding an edge of at least one of said strips outwardly to define a tab.

3. A tube forming and filling mechanism including a conduit having a substantially straight terminal section for delivering the filling material, means for delivering a plurality of separate strips of wrapper material along different sides of the conduit, one of said strips having adhesive thereon, means for folding said strips and pressing them together with the adhesive coated portion of one strip overlapping the other strip to form a sealed wrapper, means for folding a portion of one of said strips outwardly to define a tab, and means beyond the folding mechanism for engaging said tab to continuously draw the strips through the folding and pressing mechanism and to continuously advance the formed and sealed wrapper with the plastic material therein as the wrapper passes beyond the delivery conduit.

4. Apparatus of the class described including a conduit having a terminal section through which plastic material is adapted to be continuously delivered, means for continuously advancing a strip of wrapper material and folding it in tubular fashion externally of said conduit, means for continuously advancing a second narrower strip, means for continuously applying stripes of adhesive material to two areas of the narrower one of said strips, and means for pressing the second strip against the formed tube with the adhesive areas on opposite sides of the adjacent edges of the tube forming strip and means for folding the edges of the adhesive bearing strip outwardly to define tabs.

5. In an apparatus of the class described, a hollow tubular mandrel through which plastic material may be continuously extruded, means for continuously folding wrapping material in strip form and having adhesive material thereon into tubular form about the mandrel and advancing it over said mandrel, and a yieldably mounted member for applying heat and pressure to press the wrapping material onto said mandrel, and secure it in said tubular form along a section of the mandrel in advance of the end of the mandrel from which the plastic material is extruded into the formed tube.

6. In an apparatus of the class described, a tubular mandrel through which a plastic material may be delivered, means for guiding a pair of strips of paper and folding them about the man-

drel, means to continuously apply an adhesive to at least one of said strips, means for exerting pressure on overlapping portions of said strips and against said mandrel to secure adhesion, means for bending one free edge of each of said strips outwardly to form free flanges, and conveying means adapted to engage said flanges and draw the strips through the folding and sealing mechanism.

7. A machine of the class described including a hollow cylindrical mandrel, means for continuously folding a strip of wrapper material into tubular form around the mandrel, means for continuously applying a pair of stripes of adhesive material to a second strip, and heated spring pressed means for forcing said second strip into adhesive engagement with the first mentioned strip while the latter is on the mandrel, whereby the wrapper is formed and sealed and the adhesive dried before the plastic material comes in contact with the wrapper.

8. In a machine of the class described a cylindrical nozzle through which a plastic substance is adapted to be continuously extruded, a mandrel encircling the nozzle, and an annular device encircling and spaced from the mandrel for continuously folding strips of material about the mandrel to form a tube, at least one of said strips bearing adhesive material to seal the tube, said device including a displaceable portion applying yielding pressure on said strips as they come in contact with each other, and means carried by said displaceable portion for heating the same to dry or set the adhesive.

9. Tube forming, sealing and filling apparatus including a tubular conduit from which filling material may be extruded, means for delivering a strip of wrapping material and forming it into tubular form around said conduit, means for continuously advancing a strip of sealing material, an adhesive applying wheel for applying adhesive material on one side of said sealing strip, and a timing guide roll for the adhesive bearing strip arranged beyond the adhesive applying roller and over which the strip runs with its adhesive bearing face toward the guide roll, said guide roll engaging only with the portions of the strip free of adhesive.

10. Tube forming, sealing and filling apparatus including tubular conduit from which filling material may be extruded, means for folding a plurality of sheets of wrapping material into tubular form around said conduit and in overlapping relationship, adhesive applying wheel for applying adhesive material to that portion of one strip which overlaps the other, and means for pressing the strips together to seal the tube in advance of the point of entry of the plastic material into the tube, said wheel having a plurality of spaced projections on its periphery for applying the adhesive in successive spaced spots.

11. A tube forming apparatus including a mandrel, means for delivering a plurality of wrapper strips, means for applying adhesive to one of said strips, means for folding said strips about said conduit and each extending lengthwise thereof with overlapping portions with adhesive therebetween, and an adjustable guide between said adhesive applying means and said folding means for varying the length of travel of said strip therebetween.

12. The method of forming a tube which includes continuously delivering and folding a strip to tubular form, continuously delivering a second strip, one of said strips having adhesive along

the length thereof, applying said second strip lengthwise of the first strip and over the adjacent edges of the latter, and bending the edges of the second strip to form free flanges along the sides of the tube.

13. A tube forming and filling apparatus including a nozzle from which a stream of plastic material may be continuously extruded, means for continuously advancing a strip of wrapper material and bending it into tubular form about said nozzle means for continuously applying spaced longitudinal stripes of adhesive material to a narrower, centrally longitudinally weakened sealing strip with the glue stripes at opposite sides of the weakened portion of said strip and continuously applying said sealing strip over the abutting edges of the first mentioned strip to cover said edges and with the lines of adhesive arranged at opposite sides of the line of abutment of the edges of the first strip to complete and seal the tube in advance of the point at which plastic material is introduced into it.

14. A tube forming and filling apparatus including a nozzle from which a stream of plastic material may be continuously extruded, means for continuously advancing a strip of wrapper material and bending it into tubular form about said nozzle, means for continuously applying spaced longitudinal stripes of adhesive material to a narrower, centrally longitudinally weakened sealing strip with the glue stripes at opposite sides of the weakened portion of said strip and continuously applying said sealing strip over the abutting edges of the first mentioned strip to cover said edges and with the lines of adhesive arranged at opposite sides of the line of abutment of the edges of the first strip to complete and seal the tube in advance of the point at which plastic ma-

terial is introduced into it, and means for bending the unglued edges of the sealing strip outwardly to afford tabs by which the completely formed tube may be grasped and advanced.

15. Apparatus for forming a tube including means for continuously delivering and folding a plurality of strips into tubular form with portions of the strips overlapped and carrying adhesive material to effect adhesive connection with the overlapped portions of the strips and means for folding the free edges of certain of said strips outwardly to define flanges along the sides of the tube, which flanges are disposed in substantially parallel planes.

16. Apparatus for forming a tube including means for continuously delivering and folding a plurality of strips into tubular form with portions of the strips overlapped and carrying adhesive material to effect adhesive connection of the overlapped portions of the strips and means for folding the free edges of certain of said strips outwardly to define flanges along the sides of the tube, which flanges are disposed in substantially parallel planes and are joined to the tube at substantially diametrically opposite points.

17. A tube forming and filling apparatus including a hollow mandrel through which plastic material is adapted to be continuously extruded, means for delivering a plurality of wrapper forming strips and folding them into tubular form about the mandrel and continuously advancing said strips beyond the end of the mandrel at substantially the same rate of speed as the rate of extrusion of the material, said mandrel having a plurality of longitudinally extending grooves therein to minimize friction between the strips, tube and the mandrel.

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