

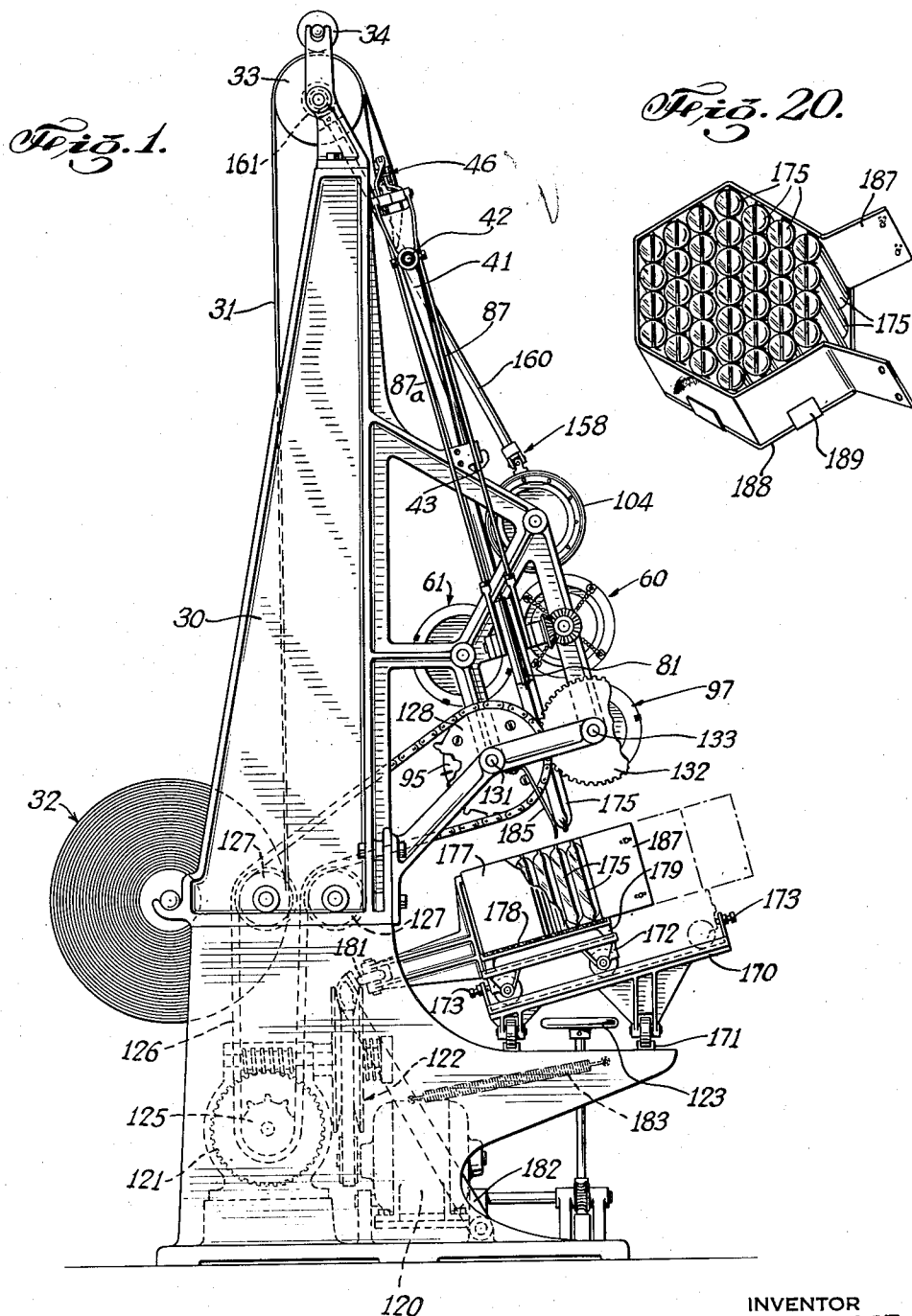
May 2, 1939.

C. W. VOGT

2,156,466

METHOD AND APPARATUS FOR MAKING PACKAGES

Original Filed Nov. 27, 1935 6 Sheets-Sheet 1



INVENTOR
CLARENCE W. VOGT

BY *J. P. Rosenberg*
ATTORNEY

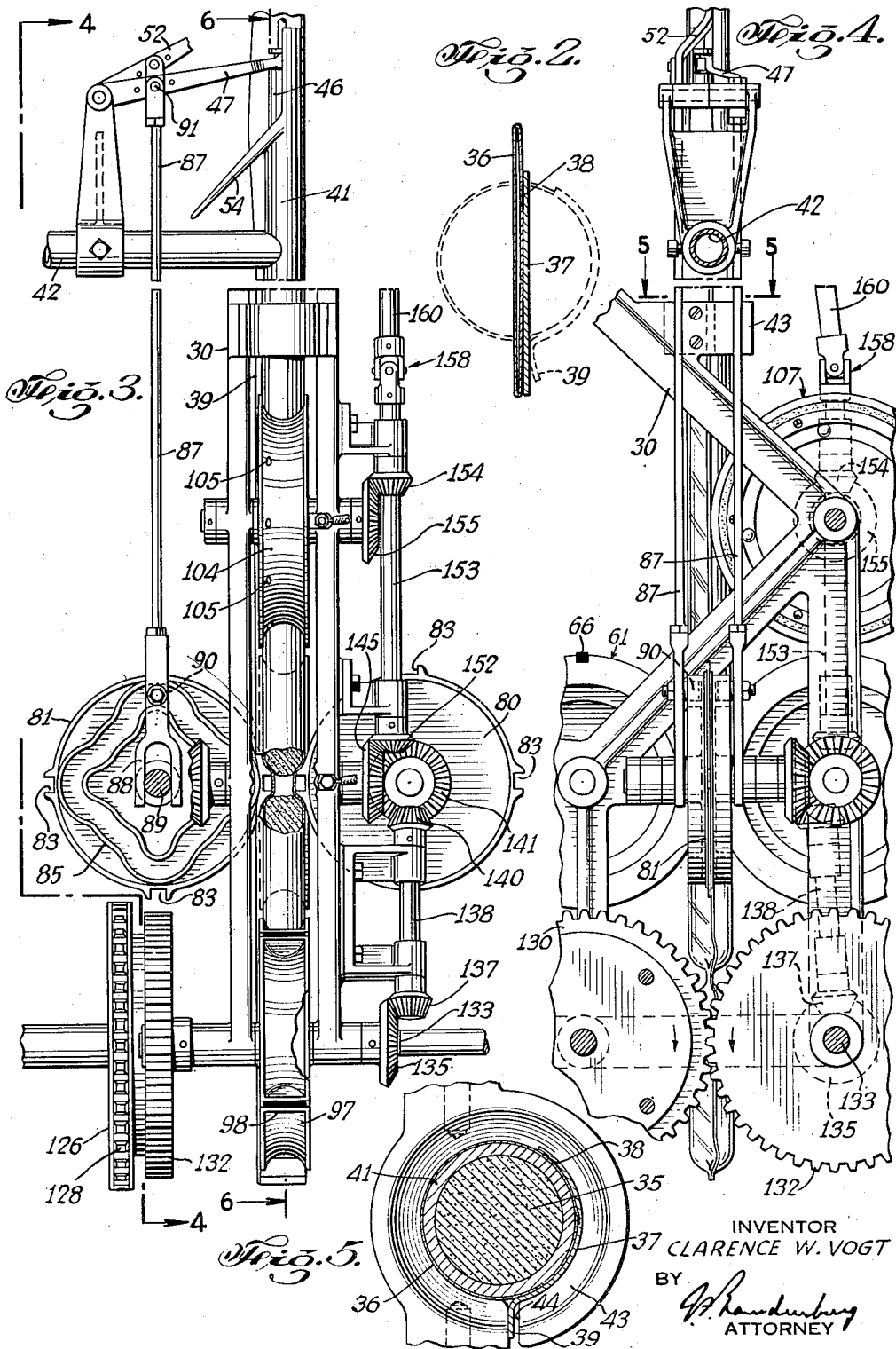
May 2, 1939.

C. W. VOGT

2,156,466

METHOD AND APPARATUS FOR MAKING PACKAGES

Original Filed Nov. 27, 1935 6 Sheets-Sheet 2



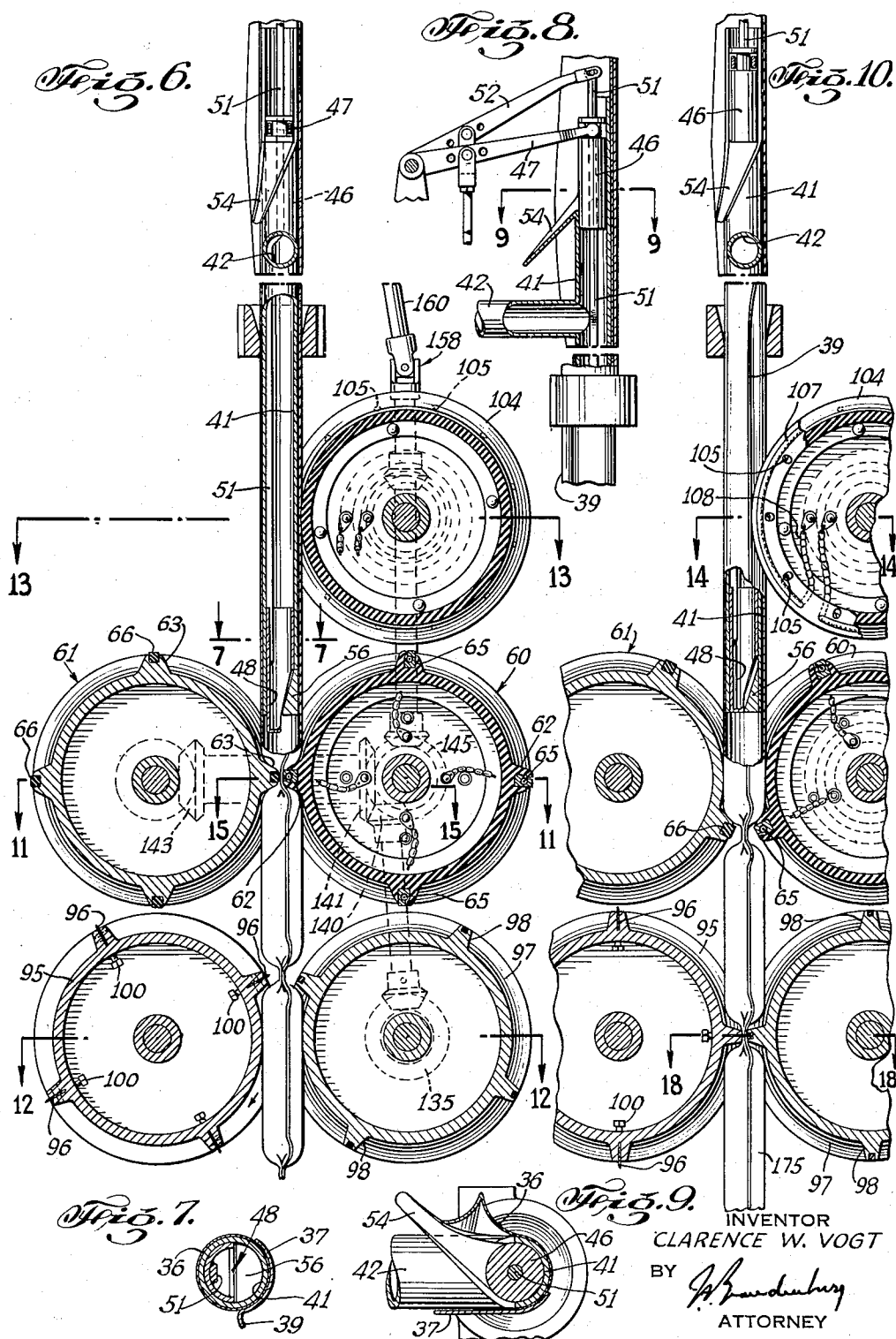
May 2, 1939.

C. W. VOGT

2,156,466

METHOD AND APPARATUS FOR MAKING PACKAGES

Original Filed Nov. 27, 1935 6 Sheets-Sheet 3



May 2, 1939.

C. W. VOGT

2,156,466

METHOD AND APPARATUS FOR MAKING PACKAGES

Original Filed Nov. 27, 1935 6 Sheets-Sheet 4

Fig. 11.

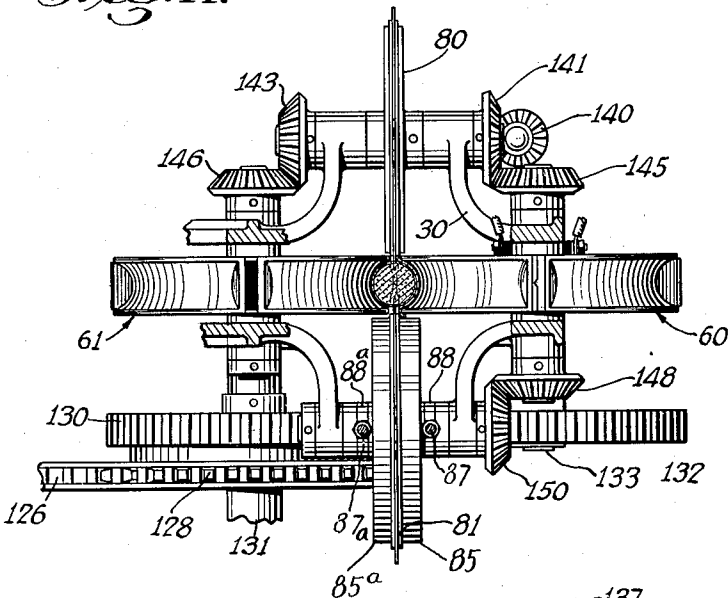


Fig. 12.

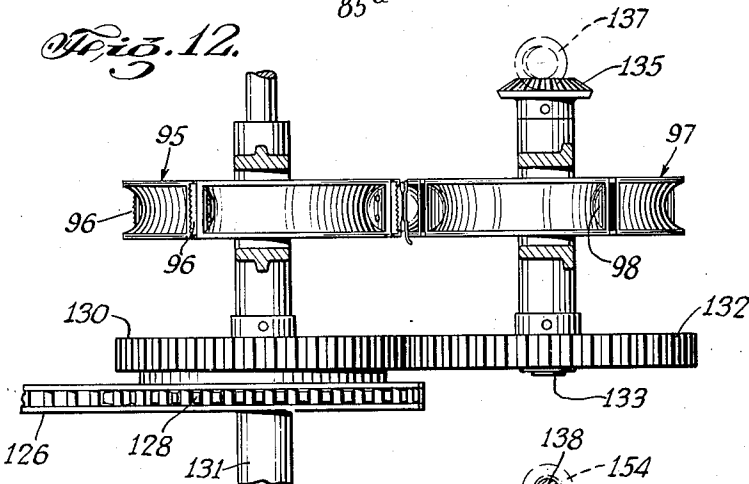
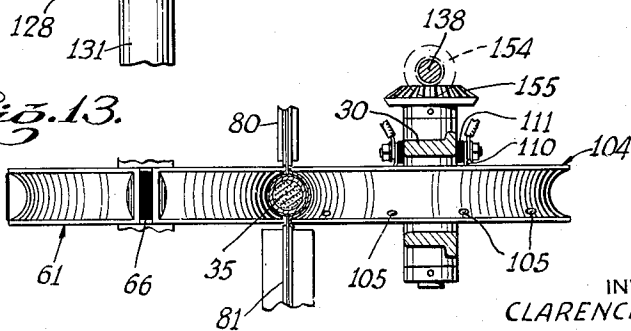


Fig. 13.



INVENTOR
CLARENCE W. VOGT
BY
J. Brandenburg
ATTORNEY

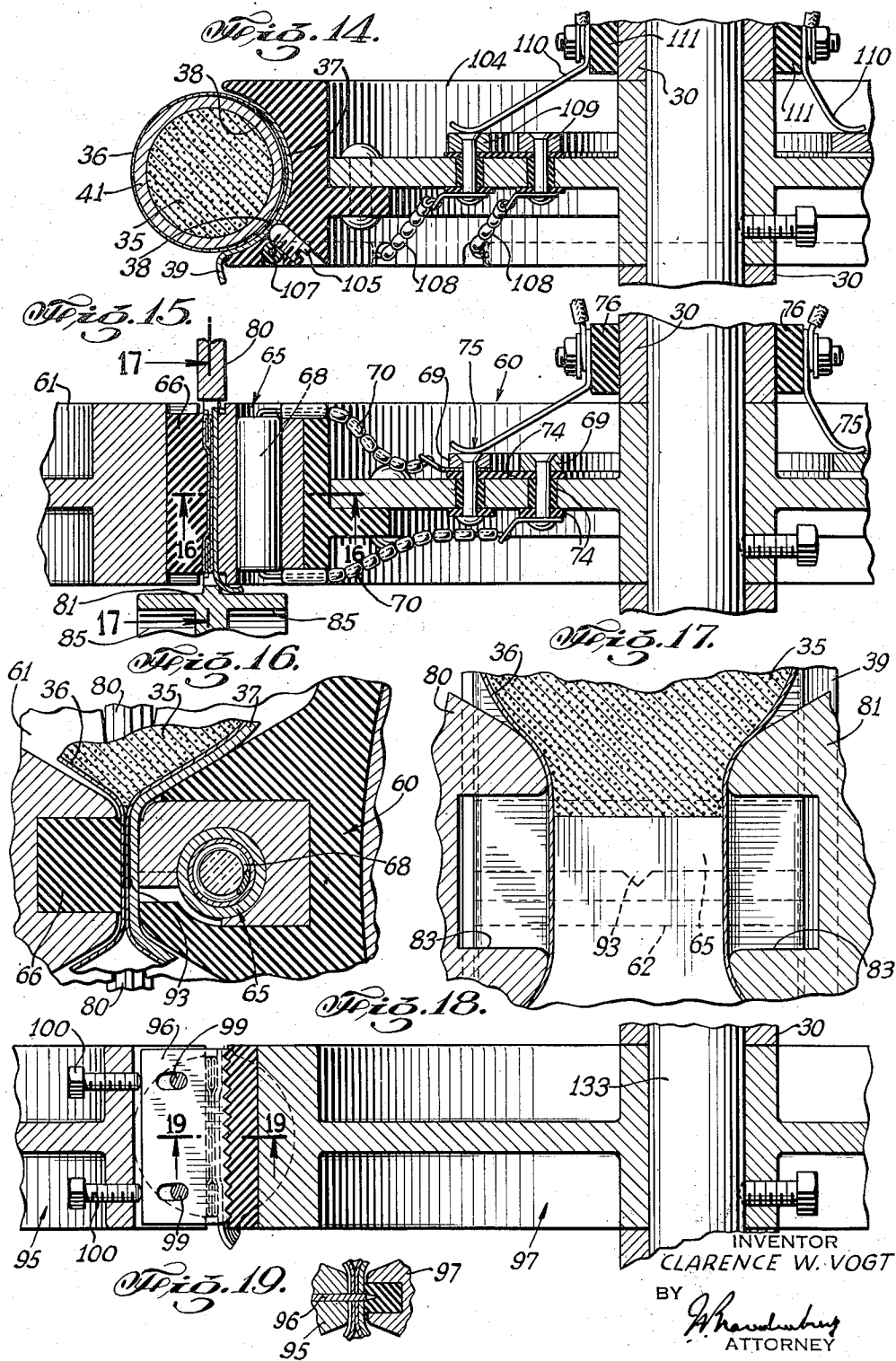
May 2, 1939.

C. W. VOGT

2,156,466

METHOD AND APPARATUS FOR MAKING PACKAGES

Original Filed Nov. 27, 1935 6 Sheets-Sheet 5



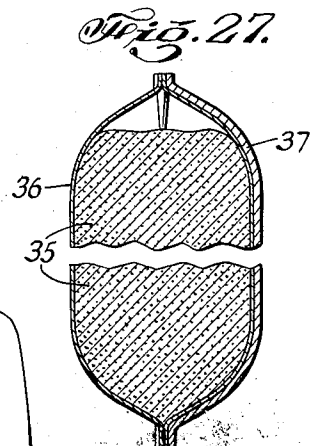
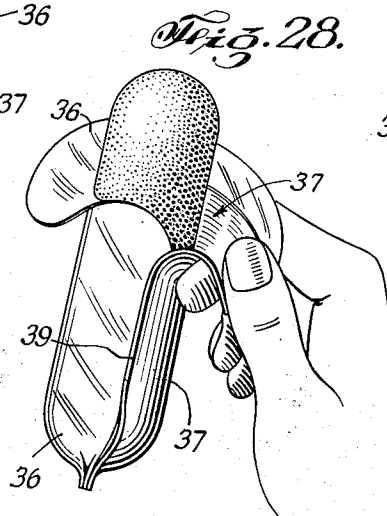
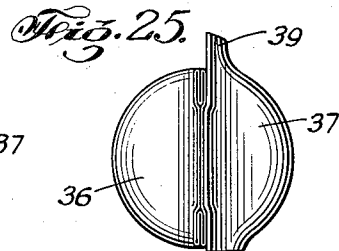
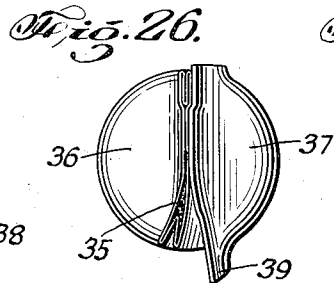
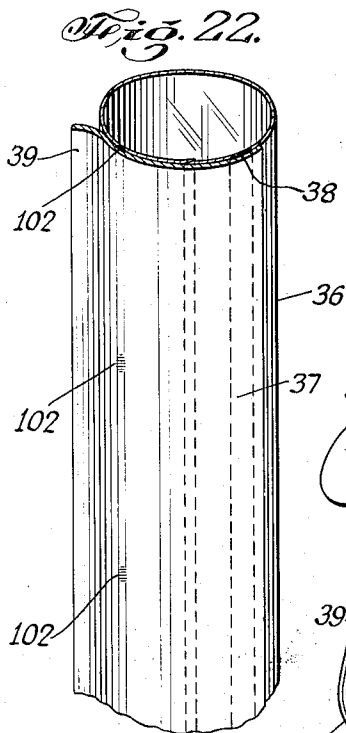
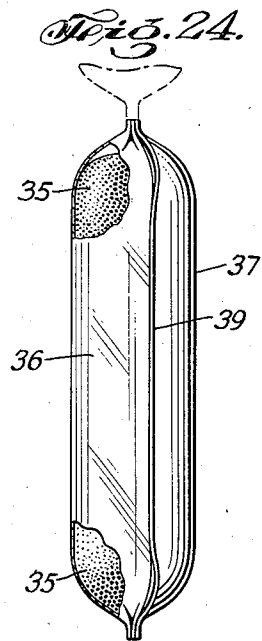
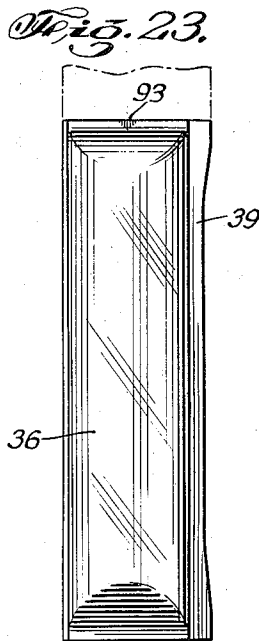
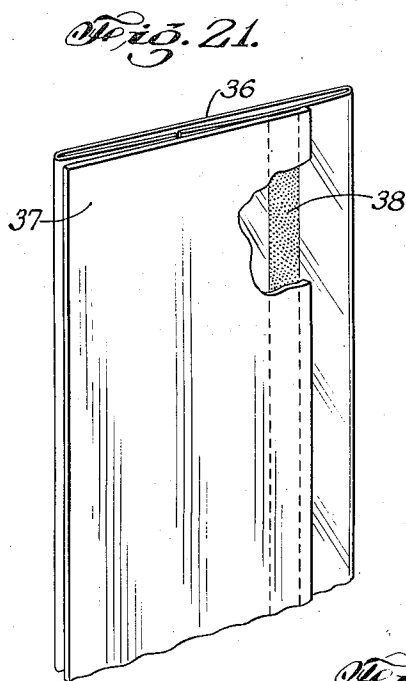
May 2, 1939.

C. W. VOGT

2,156,466

METHOD AND APPARATUS FOR MAKING PACKAGES

Original Filed Nov. 27, 1935 6 Sheets-Sheet 6



INVENTOR
CLARENCE W. VOGT
BY
H. Handenberg
ATTORNEY

UNITED STATES PATENT OFFICE

2,156,466

METHOD AND APPARATUS FOR MAKING
PACKAGES

Clarence W. Vogt, New York, N. Y., assignor, by
mesne assignments, to Owens-Illinois Glass
Company, Toledo, Ohio, a corporation of Ohio

Application November 27, 1935, Serial No. 51,791
Renewed October 13, 1938

27 Claims. (Cl. 93—3)

This invention relates to method and apparatus for packaging material, more particularly flowable material such as partially frozen ice cream, though features of the invention are applicable to the packaging of other substances.

The apparatus is of the type in which material is introduced into a continuous tubular enwrapment, which is then closed at spaced points and cut at the closed portions into separate packages. The enwrapment and package will be the subject-matter of divisional applications.

It is an object of the invention to provide an improved machine of the type described for packaging ice cream, or other material, having a semi-solid consistency. According to one feature of the invention, the ice cream is dispensed into the tubular enwrapment in successive charges, and means are provided for limiting the amount of each charge to a volume somewhat less than the capacity of the package formed by the apparatus.

Another object of the invention is to completely wrap and bundle individual portions of ice cream, while the ice cream is in a partially frozen or plastic condition. If the ice cream is to be extruded into an enwrapment, such an operation must be performed before the ice cream is hardened and no longer flowable. By completing the entire packaging and bundling operations while the ice cream is only partially frozen, the output of the apparatus is made entirely independent of the rate at which the ice cream is hardened. Slow hardening can be resorted to when a less smooth texture is desired, without reducing the production of the plant.

Another object of the invention is to provide a method and apparatus for enclosing ice cream in novel packages which remain closed to protect their contents during shipment and sale, but which can be easily opened and the enwrapment peeled back to uncover part or all of the ice cream. The individual portion packages serve as convenient holders from which the ice cream may be eaten.

According to one feature of the invention the packages are sealed by the application of heat and without adding any adhesive that might contaminate the contents. The packages are preferably made of thin, transparent, moisture-proof material reinforced by a strip of paper which forms an outer lamination around a portion of the package.

Another object of the invention is to dispense separate charges of material into a continuous tubular enwrapment, and form the enwrapment into separate packages while it moves at a uniform rate. The apparatus obtains this object by folding, sealing and cutting with rotary operating members combined in a novel manner to produce a simple and efficient machine.

Besides the simplicity which is obtained with the rotary operating members, the machine has the further advantage that it can be adapted to make packages of a different size by merely replacing the operating members with others of modified dimensions.

Another object of the invention is to provide an improved method and apparatus for bundling packages of ice cream delivered successively from a packaging means.

Although this invention is intended primarily for ice cream, it will be understood that it can be used with semi-solid or plastic material of a consistency similar to soft or partially frozen ice cream. Some features of the invention are applicable to methods and apparatus for packaging other types of material.

Other objects, features and advantages of the invention will appear or be pointed out as the specification proceeds.

In the accompanying drawings, forming part hereof:

Fig. 1 is a side elevation of a machine embodying the invention.

Fig. 2 is an enlarged sectional view through the enwrapment in the flattened condition in which it comes from the reel, the shape of the enwrapment when formed into a tube being indicated in dotted lines.

Fig. 3 is an enlarged front elevation of a portion of the machine shown in Fig. 1.

Fig. 4 is a view taken on the line 4—4 of Fig. 3.

Fig. 5 is an enlarged sectional view, taken on the line 5—5 of Fig. 4.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 3, showing the operation of the dispensing valve and the sealing means.

Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 is a sectional view of the upper part of the structure shown in elevation in Fig. 3.

Fig. 9 is an enlarged sectional view, on the line 9—9 of Fig. 8, showing the manner in which the enwrapment opens around the filling conduit.

Fig. 10 is a view similar to Fig. 6 but showing the positions of the parts at the time of cutting.

Figs. 11, 12 and 13 are sectional views, taken on the lines 11—11, 12—12 and 13—13, respectively, of Fig. 6.

Figs. 14 and 15 are enlarged sectional views along the lines 14—14 and 15—15 of Figs. 10 and 6, respectively.

Figs. 16 and 17 are enlarged sectional views taken on the lines 16—16 and 17—17 of Fig. 15.

Fig. 18 is an enlarged sectional view on the line 18—18 of Fig. 10.

Fig. 19 is a detail sectional view taken on the line 19—19 of Fig. 18.

Fig. 20 is an enlarged perspective view of a box

into which the packages are deposited in the manner shown in Fig. 1.

Fig. 21 is a perspective view of a section of the enwrapment in its flattened condition.

Fig. 22 is a view on a smaller scale showing the enwrapment of Fig. 21 after it is formed into a tube.

Figs. 23, 24 and 25 are front, side, and bottom views, respectively, of the package made by the apparatus and method of this invention.

Fig. 26 is a top view of the package shown in the preceding views, but with the package partly broken open.

Fig. 27 is an enlarged, sectional view on the line 27—27 of Fig. 23, showing the closing of the upper and lower ends of the package.

Fig. 28 is a reduced perspective view showing a package opened by peeling back the enwrapment, and illustrating the manner in which the opened package can be held while eating the contents.

The machine illustrated in the drawings has a frame 30, and the enwrapment 31 is delivered from a reel 32 supported by brackets on the back of the frame 30. The enwrapment passes upward and over a feed roll 33 at the top of the frame 30, and then downward to the filling and packaging mechanism at the front of the machine.

The feed roll 33 is power driven, and the enwrapment is held against the feed roll 33 by an idler roll 34. Beyond the feed roll the enwrapment is pulled downward by the weight of the ice cream 35 in the lower tubularly-formed portion of the enwrapment. The speed of the feed roll 33 determines the rate at which the enwrapment moves through the machine.

The enwrapment 31 is shown in Figs. 2 and 21, and comprises a tube 36 of thin flexible material with a strip 37, which is heavier and stiffer than the tube, affixed along one edge to the material of the tube by an adhesive 38, as shown in Fig. 21. The strip 37 covers the seam of the tube. The width of the strip 37 is less than that of the flat tube and it is not folded when the enwrapment is wound into a reel.

The tube 36 is preferably made of a material known on the market as "Pliofilm", which is thin, flexible, moisture-proof, and transparent, and believed to be composed essentially of a rubber-old material, and probably a form of chlorinated rubber. This material possesses the characteristics of being readily vulcanized, sealed or fused at a temperature of approximately 115° C. Such fusing causes a substantial reduction in the tensile strength and in the resistance to stretching at the point of fusing.

The strip 37 is preferably paper of "sulphite" or "tag" stock, strong enough to reinforce the "Pliofilm" where it is sealed when closing a package, and stiff enough to give the package a substantial amount of rigidity so that it will stand up in a container even though the ice cream or other contents are soft and plastic.

The strip 37 protects the "Pliofilm" from direct contact with the heating instrumentalities by which the enwrapment is sealed. When the tube is formed, as shown in Fig. 22, the free edge of the strip 37 extends out from the tube and forms a tab 39 by which the package can be torn open and peeled back to expose its contents.

This tab serves as a convenient handle by which the package can be held while a consumer eats the ice cream in somewhat the same manner as from a cone. The paper of the strip 37 provides enough insulation between the ice cream and the consumer's hand so that the package can be held

without discomfort, in the manner illustrated in Fig. 28.

Although the tube 36 is preferably made of "Pliofilm", it will be understood that in some cases other materials can be used. Another suitable material is sold under the trade name "Heat sealing Cellophane". The strip 37 is preferably paper, but I may employ any other suitable sheet material which may be transparent, opaque, or translucent, and which will not be melted or injuriously affected by the application of sufficient heat and pressure to seal together superposed layers of the "Pliofilm".

It will be further understood that wherever the terms "Pliofilm" and "paper" are used herein after, I use them as names of typical sheet materials for which equivalent materials may be used.

The enwrapment 31 is wound on the reel 32 with the "Pliofilm" toward the outside of the reel. Wound in this manner the "Pliofilm" stretches enough to compensate for the slight difference in diameter of each convolution of paper and its attached convolution of "Pliofilm" tube.

After passing over the feed roll 33, the enwrapment opens up around a conduit or hollow mandrel 41 from which ice cream is introduced into the enwrapment. The ice cream is supplied to the filling conduit through a pipe 42.

After the edges of the "Pliofilm" have separated sufficiently to pass the pipe 42, they are brought together and the "Pliofilm" tube is formed and closed around the filling conduit 41 by a closing die 43. The "Pliofilm" tube is shown closed with a lap joint in Fig. 5, and the closing die has a channel 44 into which the tab 39 extends so that it will stand out from the sides of the tube during the subsequent packaging and sealing operations.

The enwrapment may be supplied from the reel 32 (Fig. 1) as a flat strip instead of a collapsed tube, but an advantage of the enwrapment which has been described is that it can be used with a smaller machine. If the "Pliofilm" had to be formed from a flat strip into a tube while passing from the feed roll 33 to the die 43, a much longer distance would be necessary than is provided on the machine illustrated in which a collapsed tube opens up to pass around a supply pipe and then forms around the hollow mandrel as the edges of the "Pliofilm" move together again.

The construction of the hollow mandrel 41 is shown in Figs. 6 and 8. The pipe 42 joins the hollow mandrel with a T connection. The upper end of the mandrel above the pipe 42 is closed by a piston 46 which is moved up and down by a lever 47 in timed relation with the operation of a dispensing valve 48 located at the lower end of the hollow mandrel.

The ice cream 35 is supplied through the pipe 42 at a substantially uniform rate and passes downward through the hollow mandrel 41 and past the valve 48 into the "Pliofilm" tube when the valve 48 is in open position as shown in Fig. 6. During the time that the valve 48 is closed, or substantially closed, the lever 47 is operated to raise the piston 46 to provide space for the ice cream which is discharging from the pipe 42, but can not move downward in the hollow mandrel while the valve is closed.

While the valve 48 is open, the lever 47 pushes the piston 46 downward, and the ice cream introduced into the "Pliofilm" tube includes that which entered the mandrel under the piston 46 while the valve was closed as well as that which

enters from the pipe 42 while the valve is open.

The piston 46 and its operating means are not necessary if other means are provided for taking care of the ice cream supplied while the valve is closed, such as flexibility or extensibility in a preceding portion of the supply pipe, or where momentary arresting of the ice cream supply is permissible.

If it is desirable to avoid distorting the cross-section of the ice cream, a "rosette" or "orange peel" type of valve may be used, and the piston 46 may be in the supply line before the stream reaches the mandrel. In such case the T-connection of the supply pipe to the mandrel is preferably changed to a long radius L.

The valve 48 is moved by a rod 51 which extends up through the piston 46. The upper end of the rod 51 has a pin and slot connection with a lever 52.

Any ice cream which leaks past the piston 46 melts and drains down a spout 54 which extends out for a considerable distance from the hollow mandrel and prevents liquid from running down the outside of the mandrel or getting on the outside of the "Pliofilm" or paper.

Figs. 6 and 7 show the construction of the valve 48. This valve has a semi-circular end which fills one-half of the inside cross-section of the lower end of the hollow mandrel. The remaining cross-section of the lower end of the mandrel is closed by a baffle 56 having a sloping upper wall for deflecting ice cream toward the valve 48.

When the valve 48 is in the position shown in Fig. 6, ice cream is extruded between the end wall of the valve 48 and the lower face of the baffle 56. When the end wall of the valve 48 moves up flush with the baffle 56, as shown in Fig. 10, the valve is in closed position and no ice cream can be extruded from the mandrel.

The valve 48 is cam operated to dispense definite quantities of ice cream for each package. The amount of each charge can be regulated by changing the relative speed of the machine with respect to the rate at which the ice cream is supplied through the pipe 42. Each charge is preferably limited to an amount not quite sufficient to completely fill a package of the size produced by the machine. One of the advantages of supplying the ice cream in these limited, successive charges is that the subsequent sealing of the "Pliofilm" is between surfaces which have not been covered with ice cream. The clean "Pliofilm" surfaces make a better seal, and one of much neater appearance.

Another advantage of limiting each charge in the manner described is that the closing of the enwrapment above the ice cream does not tend to displace ice cream and swell the enwrapment. This makes it possible to leave the longitudinal seam of the enwrapment unsealed or spot-sealed for easy opening. The air space above the ice cream allows for expansion of the charge after it is in the package, and this is an important consideration with ice cream that has been partially frozen under pressure and discharged in a somewhat stiff consistency.

Just below the end of the hollow mandrel 41, the enwrapment tube passes between rolls 60 and 61, each of which has a concave face conforming to the shape of one-half of the tube. At suitable intervals around the rolls 60 and 61, the concave faces project outward to provide cross sealers 62 and 63, respectively. These cross sealers are flat across the width of the rolls instead of concave,

and they press the opposite sides of the enwrapment tube together, as shown in Fig. 6.

Heaters 65 are inset in the faces of each of the sealers 62, and these heaters contact with the paper strip of the enwrapment. The sealers 63 in the roll 61 have rubber faces 66 which contact with the "Pliofilm" of the enwrapment tube and serve as a platen during the sealing operation. The heat applied from one side through the paper strip is sufficient to vulcanize all layers of the "Pliofilm" and completely seal the enwrapment across its entire width.

The detailed construction of the roll 60 is shown in Fig. 15. An electrically heated coil 68 in the heater 65 has its terminals connected with slip rings 69 by insulated conductors 70. The faces of the heaters 65 are metal, but the peripheral portion 72 of the roll 60 is made preferably of insulation.

The hub and web of the roll 60 are metal. The slip rings 69 are attached to one side of the roll 60 by rivets but are insulated from the metal web of the roll by insulation 74. Power is supplied to the slip rings 69 through brushes 75 mounted on blocks of insulation 76 on the stationary frame 30.

In order to make a neater package and prevent the flattened ends of the package from being wider than the diameter of the circular portion of the package, the sides of the tube are tucked in before it is sealed. The manner in which the sides are tucked in is shown clearly in Fig. 15.

The tucks are made by rolls 80 and 81 (Fig. 11) which rotate on axes at right angles to the axes of rotation of the sealing rolls 60 and 61. The shape of the tuckers 80 and 81 and the manner in which they fold in the sides of the package are best shown in Fig. 3. Recesses 83 in the tuckers permit the cross sealers to contact with the enwrapment across its full width while the tuckers hold the "Pliofilm" folded.

The tucker 81 has cams 85 and 85^a on its opposite sides. The cam 85 operates the lever 47 which moves the piston 46 up and down in the hollow mandrel, and the cam 85^a operates the lever 52 which opens and closes the valve at the lower end of the hollow mandrel.

The motion transmitting connection through which the cam 85 operates its associated lever 47 include a rod 87 having a yoke 88 at its lower end fitting over the shaft 89 on which the tucker and cam rotate. A cam-follower 90 is connected with the yoke 88 above the shaft 89, and the upper end of the rod 87 is connected with the lever 47 by a pivot 91. A yoke 88^a (Fig. 11) is operated by the cam 85^a to move a rod 87^a which connects at its upper end with the lever 52, as shown in Fig. 3.

By making provision for moving the pivot 91 nearer to, or further from, the fulcrum of the lever 47, the angular displacement of the lever by the cam may be changed if it becomes desirable to change the stroke of the piston 46 to accommodate a more rapid supply of ice cream. The stroke of the valve can be similarly controlled by moving the pivot which connects the lever 52 with its operating rod 87.

Figs. 16 and 17 show the shape of the face of the heater 65. This face is rectangular above the center line of the cross sealer 62 and the only part of the face of the heater 65 which extends below this center line is a short central portion which makes the triangular seal 93. The heater therefore seals the upper half of each folded portion across its entire width and the lower half at its

center for a short distance only. The full-width seal is hermetic.

When the packages of ice cream are cut apart along the center lines of these folded portions, the bottom of each package is sealed across its entire width, but the top has only a short seal 93 at the center corresponding to the position of the triangular portion of the heater face. This manner of sealing makes the upper end of the package easy to open, yet holds the end folded against accidental opening. When the material to be packaged is a liquid, it is necessary to have the heater face high enough to seal the enwrapment both above and below the center line along which it is to be cut so that the upper as well as the lower end of the package will be sealed across its full width. For some packages the top may be folded without any sealing.

The means for cutting the packages apart is shown in Figs. 6 and 10. A roll 95 has knives 96 at spaced points around its periphery. Another roll 97 on the other side of the enwrapment has lugs 98 with rubber faces against which the knives 96 thrust the closed portions of the enwrapment during the cutting operation. Fig. 10 shows one of the knives 96 in cutting position.

Comparing Fig. 6, which shows the rolls 60 and 61 in sealing position, and Fig. 10, which shows the rolls 95 and 97 in cutting position, it will be observed that the sealing and cutting operations are not performed at the same time. In this way the load on the driving mechanism is more nearly equalized.

Figs. 18 and 19 show one of the knives 96 in detail. The knife fits a slot in the roll 95 and is held against transverse displacement by pins 99 which extend through slots in the knife. Screws 100 thread through the rim of the roll 95 and extend into the knife slot. These screws can be adjusted to determine the amount that the knife 96 projects beyond the rim of the roll 95.

The longitudinal seam of a short package will stay closed without sealing if the ice cream is wrapped in the manner already described. In order to obtain a stronger package, however, the paper strip 39 is heat-sealed to the Pliofilm of the formed tube at spots 102, as shown in Fig. 22.

If the material packaged by the machine is a liquid, the enwrapment tube must be closed by a continuous longitudinal seal, but it is a feature of the ice cream package made by this invention that the spot-seals 102 make the package strong and yet these spot-seals are small enough and widely enough spaced so that they can be conveniently broken when peeling back the enwrapment.

The spot-seals 102 are made by a roll 104 (Fig. 6) which has a face made of insulating material and a number of spot-heaters 105 projecting from its face. These spot-heaters touch the tubular enwrapment where it passes over the hollow mandrel 41.

The construction of the roll 104 is shown in Figs. 10 and 14. The spot-heaters 105 are screws threaded through the rim of the roll 104. These screws are heated by contact with an electric heating coil 107 located in an annular recess in the side of the rim. The ends of the heating coil 107 are connected by insulated conductors 108 with slip rings 109 on the web of the roll 104. The slip rings are insulated from the metal web and receive power through brushes 110 mounted on blocks of insulation 111 on the stationary frame 30.

If a continuous longitudinal seal is to be made,

the roll 104 is replaced by a different type of heating means having a heating element which contacts continuously with the paper strip of the enwrapment.

The longitudinal sealing, the tucking, cross sealing, and cutting operations are all performed by rotating elements. This feature of the invention is important because it produces a very simple machine, and one which can be adapted to make different-size packages by merely substituting different rotating elements and without changing any other parts of the machine.

All of the rotating elements are power driven. Most of the driving mechanism is shown in Fig. 1. An electric motor 120 is connected with a reduction gearing 121 by a variable speed, Reeves drive 122. The motor runs at a substantially uniform speed, and the Reeves drive 122 can be adjusted by a hand wheel 123 to vary the speed of the reduction gearing and thereby adjust the speed of operation of the entire machine to the rate at which ice cream is supplied through the pipe 42.

The reduction gearing 121 drives a sprocket 125. A chain 126 passes around the sprocket 125, over idlers 127, and around a sprocket 128 through which power is supplied to the feed, sealing, and cutting rolls. The sprocket 128 drives a gear 130 and the shaft 131 to which the roll 95 is secured.

The gear 130 meshes with a gear 132 on a shaft 133. The roll 97 is connected to the shaft 133, and a bevel gear 135 (Fig. 3) secured to one end of this shaft meshes with a bevel gear 137 on a shaft 138. A gear 140 secured to the upper end of the shaft 138 meshes with a bevel gear 141 on the axle of the tucker 80 and causes the tucker to rotate.

There is a bevel gear 143 (Fig. 11) secured to the other end of the axle of the tucker 80. These gears 141 and 143 on the axle of the tucker 80 mesh with gears 145 and 146 secured to the axles of the rolls 60 and 61, respectively, and transmit power to those rolls. A gear 148 on the other end of the axle of the roll 60 transmits power to the tucker 81 through a gear 150 on the axle of the tucker.

A bevel gear 152 (Fig. 3) fastened to a shaft 153 meshes with the gear 145. A gear 154 on the shaft 153 transmits power to the roll 104 through a bevel gear 155 on the axle of the roll 104.

A universal joint 158 connects the upper end of the shaft 153 with a shaft 160 shown in Fig. 1. The shaft 160 drives the feed roll 33 through the bevel gearing 161.

A sloping table 170 is supported on rollers which run on rails 171 on a support extending from the front of the frame 30. The table 170 supports a wheeled carriage 172 which is adapted to roll up and down the incline of the table between limit stops 173. The table 170 rolls in a direction at right angles to the direction in which the carriage 172 moves with respect to the table. This combination of movements gives the carriage universal movement in a plane under the cutting rolls from which the finished packages 175 are delivered. These packages may be placed in boxes or cartons individually or in groups.

If the material in the packages is partially frozen ice cream and it is desired that this product be further hardened in a short time, the filled packages are bundled into a cardboard sleeve 177 which rests on a wire tray 178 having feet 179 resting on the carriage 172. The purpose of the

feet 179 is to permit the circulation of cold air under the sleeve 177 and up through the wire tray and past the packages 175 after the sleeve is filled and placed in a hardening room. The wire tray 178 and its feet 179 are designed to rest on the top of another sleeve 177 so that a number of filled sleeves can be stacked in the hardening room.

A bracket extends from the rear of the carriage 172 and supports a roller 181 in position to contact with a lever 182 which is fulcrumed on the frame 30 below the carriage. A spring 183, connected at its opposite ends to the lever 182 and frame 30, urges the lever toward the front of the machine with sufficient force to counterbalance the carriage so that little effort is required to move it either up or down the incline of the table 170.

The enwrapment comes down the front of the machine with a rearward slope. The finished packages 175 come from the cutting rolls with this rearward slope. A guide 185 prevents the packages from dropping vertically after they are severed by the cutting rolls.

The plane of movement of the carriage 172 is substantially normal to the direction of movement of the packages as they enter the sleeve 177. The slope of the rear side of the sleeve causes the first row of packages to lie against the rear side without falling over. The attendant moves the table 170 to the right or left to cause each package to drop into a position alongside the preceding package. At the end of each row the attendant pushes the carriage 172 down the incline for a distance equal to the thickness of a package and a new row is deposited against the one just finished.

The carriage 172 is sufficiently wide to hold two of the hexagonal sleeves side by side so that when one sleeve has received the desired number of packages, the filled sleeve with its contents can be slid off the carriage onto a finishing table and the empty sleeve slid over to take its place.

The sleeve 177 is preferably of hexagonal shape, but during the bundling operation one side of the hexagon is left open so as to facilitate the introduction of the desired number of packages 175. This open side 187 is closed, after the sleeve is filled, by gummed tape, staples, or other fastening means.

If the ice cream is to be hardened slowly, a bottom can be attached to the sleeve 187 before it is filled with packages. Fig. 20 shows a bottom 188 connected to the sleeve by tape 189. After the box is filled, a hexagonal top is taped on in the same manner as the bottom 188 and the shipping package is complete.

When the sleeve 177 is filled while on a wire tray, as shown in Fig. 1, the top is applied first, after the hardening operation, and the sleeve is then inverted, the wire tray lifted off, and the bottom applied to the sleeve to complete the shipping package. The wire trays can be used again.

The preferred methods and apparatus of this invention have been described, but changes and modifications can be made, and some features of the invention can be used alone without departing from the invention as described in the claims.

I claim:

1. A packaging machine including a hollow mandrel, means for causing a tubular enwrapment to be drawn along said mandrel with continuous motion, apparatus including extruding means and cutting-off means for successively introducing separate charges of plastic material

from the end of the mandrel into the tubular enwrapment, and mechanism for closing said tubular enwrapment behind each charge and before the next charge comes from the mandrel.

2. Packaging apparatus comprising charging apparatus including extruding means and cutting-off means for introducing successive portions of plastic material into a continuously moving tubular enwrapment, apparatus for flattening and heat sealing the enwrapment between said portions with the enwrapment in continuous motion, and cutting means constructed and arranged to sever the moving enwrapment at successive seals.

3. A packaging machine comprising a conduit for introducing material into a tubular, heat sealing enwrapment, means for flattening the tubular enwrapment at spaced regions to form compartments which are subsequently cut apart to make separate packages, tuckers for folding in the sides of the tubular enwrapment at the regions to be flattened so that the width of the flattened regions is substantially the same as that of the filled enwrapment between the flattened regions, and heating means operable to seal the enwrapment at said flattened regions.

4. A packaging machine comprising a conduit for introducing material into a tubular, heat sealing enwrapment, means for flattening the tubular enwrapment at spaced regions to form compartments which are subsequently cut apart to make separate packages, heaters operable to seal the enwrapment at the flattened regions, and tuckers for folding in the sides of the tubular enwrapment at the regions to be flattened, said tuckers being constructed and arranged to hold the enwrapment folded while it is being sealed by said heaters.

5. A machine for making packages including in combination means for guiding a downwardly moving tubular enwrapment, apparatus for closing and sealing a portion of the tubular enwrapment while in continuous motion, extruding and cutting-off means for introducing plastic material to be packaged into the continuously moving tubular enwrapment above the sealed portion, and mechanism for operating the closing and sealing apparatus in timed relation with the means which introduces the plastic material into the tubular enwrapment so that the enwrapment is sealed above the material to be packaged after each operation of the means which introduces said plastic material into the tubular enwrapment.

6. A packaging machine comprising a downwardly extending, substantially stationary conduit along which a tubular enwrapment moves, apparatus including extruding means and cutting-off means for intermittently supplying plastic material from the end of the downwardly extending conduit into the enwrapment as it moves beyond the end of the conduit, mechanism below the end of the conduit for closing the enwrapment above the material introduced into the enwrapment by each operation of the supply means, and cutters for severing the enwrapment at its closed portions to form separate packages.

7. An ice cream packaging machine including extruding means, a conduit through which the ice cream is fed into a continuously moving tubular enwrapment, cutting-off means including a valve in the lower part of the conduit, mechanism for alternately opening and closing the valve to cause the ice cream to be supplied to the enwrapment in successive portions, means beyond the

end of the conduit for closing and sealing the enwrapment behind each portion of ice cream, and cutting apparatus constructed and arranged to cut the enwrapment at the sealed portions into separate packages.

8. A machine for packaging measured portions of semi-solid material, including in combination a pipe for conveying a continuous supply of said material to the machine, apparatus including extruding means and cutting-off means for receiving the material from said pipe and intermittently supplying definite amounts of said semi-solid material into a moving, tubular enwrapment, apparatus for closing and sealing the enwrapment behind each charge of material and ahead of the next charge, and means for cutting the enwrapment at the seals into separate packages.

9. In an ice cream packaging machine, a conduit extending into a tubular enwrapment for supplying separate charges of ice cream into the enwrapment, means maintaining a pressure on the ice cream in the conduit, a valve at the discharge end of said conduit, and mechanism alternately opening and closing said valve to cause separate portions of ice cream to be extruded into the enwrapment as said enwrapment travels past the end of said conduit.

10. A machine for packaging measured portions of semi-solid material, including in combination a pipe for conveying a continuous supply of said material to the machine, means for receiving the material from said pipe including a hollow conduit, a valve at one end of the conduit, a chamber opening into said conduit, a piston in the chamber movable to increase the capacity of the chamber when the valve is closed, means for moving the piston to force material from the chamber when the valve is open, mechanism for alternately opening and closing the valve intermittently to supply definite amounts of said material into a moving, tubular enwrapment, apparatus for closing and sealing the enwrapment behind each charge of material and ahead of the next charge, and means for cutting the enwrapment at the seals into separate packages.

11. In a machine for packaging ice cream which has been frozen under pressure and is subject to expansion after being enclosed in a package, the combination of measuring apparatus which receives the ice cream under pressure and intermittently dispenses separate portions of said ice cream into a moving tubular enwrapment, and a sealing device operated in timed relation with the dispensing apparatus to close and seal the enwrapment, between successive portions of ice cream, into compartments of larger volume than said portions as they come from the dispensing apparatus, so that the ice cream in each compartment of the enwrapment has space for subsequent expansion.

12. In a packaging machine into which is continuously fed a flexible vulcanizable material from which is continuously formed a tubular enwrapment, apparatus for closing the enwrapment at spaced sections to enclose the material in separate compartments, a heater for forming a vulcanized seal across its full width the upper part of each closed section of the tubular enwrapment, a cutter, and means for causing the cutter to sever each closed section of the enwrapment ahead of the full-width seal across said upper part of the closed section.

13. A machine for making packages containing individual portions of ice cream, including in

combination apparatus which dispenses separate charges of ice cream into a heat-sealing tubular enwrapment, sealing means constructed and arranged to close the enwrapment and apply heat to a portion of the closed region to vulcanize the enwrapment, a cutter, and means for causing the cutter to sever the enwrapment at its closed region and near one side of the sealed area so that the packages formed are strongly sealed at the lower end and have an easily broken seal at the upper end for convenient opening of the package.

14. In a packaging machine in which material is fed into a tubular enwrapment constructed of a flexible, heat-sealing substance, apparatus for tucking and flattening the enwrapment to close it at spaced sections and form separate compartments for the material in the enwrapment, a heater which seals each closed section across the entire width of the enwrapment for a part of the length of that section and only partially across its width for another area of said section below the full-width seal, and a cutter which severs the closed sections below the full-width seal and above at least a portion of the other sealed area of the enwrapment so that each package made by said machine is sealed across the full width of its bottom edge but only partially sealed at its upper end.

15. A packaging machine including means for continuously forming a tubular enwrapment with overlapping edges, sealing apparatus which vulcanizes the overlapping edges together at spaced points along the length of the enwrapment to make an easily openable seam, a conduit through which material is introduced into the enwrapment, other sealing apparatus which closes the enwrapment and vulcanizes a portion of the closed region across its width, a cutter, and means for operating the cutter in definite relation with the other parts of the machine to sever the enwrapment ahead of the portion sealed across its width to obtain packages which are completely closed at their lower ends and easily openable at their upper ends.

16. A packaging machine including in combination, means for progressively forming an enwrapment and feeding it downwardly through the machine, a conduit through which material to be packaged is introduced into the downwardly moving tubular enwrapment, apparatus for closing said tubular enwrapment at regions which are widely spaced in proportion to the width of the enwrapment, a cutter means which severs the enwrapment at the closed regions to form elongated packages and delivers the packages downward in the direction of their long dimensions, and a delivery table immediately below said cutter means and movable in a plane substantially normal to the direction of delivery of said packages.

17. In a packaging machine in which material is continuously formed into a tubular enwrapment of vulcanizable material, rotary means for closing the enwrapment at spaced regions and applying heat to the closed sections at said spaced regions to vulcanize the enwrapment, and other rotary means including cutters rotating in timed relation to the closing and sealing means for severing the enwrapment at the closed sections to form separate packages.

18. A machine for packaging individual portions of ice cream, including a conduit, a valve in the conduit, mechanism alternately opening and closing the valve to introduce separate portions of ice cream into a moving tubular enwrap-

ment, two rolls having concave faces conforming to the shape of the tube enwrapment and forming a roll pass through which the enwrapment travels, projections on said rolls for closing and sealing the enwrapment after each portion of ice cream has passed through the roll pass, and another roll pass having knife means on one roll which contact with the closed sections of the enwrapment and cut it into separate packages.

19. A packaging machine comprising means for feeding a continuous, flattened tubular enwrapment which has a seam extending along its length, a hollow mandrel extending in the direction of one run of said enwrapment for a distance less than said run and in such relation to the feeding means that the enwrapment fits around said mandrel, a pipe through which material to be packaged is supplied into the mandrel, said pipe extending from the mandrel on the side of the tubular enwrapment seam so that the edges of said enwrapment separate to pass the supply pipe, and means for causing the edges to come together to complete a tube by the time the enwrapment reaches the end of the hollow mandrel.

20. The method of packaging material in a machine which charges the material into a continuous tubular enwrapment which is made of flexible, heat-vulcanized substance, which method comprises moving the enwrapment continuously and applying heat to the longitudinal seam of the moving enwrapment progressively to seal said seam, periodically tucking and flattening the enwrapment and applying heat and pressure across the full width of the flattened regions to vulcanize the enwrapment, charging a given quantity of material from the mandrel into the enwrapment between cross-sealing operations, and thereafter cutting the continuously moving enwrapment at the cross-sealed regions to make separate packages.

21. The method of packaging individual portions of ice cream comprising intermittently extruding into a tubular enwrapment charges of ice cream under pressure, flattening and sealing the tubular enwrapment at regions spaced lengthwise of the enwrapment, timing the sealing and the ice cream supply so that the enwrapment is sealed behind each charge, and proportioning the spacing between the seals with respect to the volume of the charges so that each charge is enclosed in a compartment of greater volume than the charge, cutting the compartment at the seals to form separate packages, and delivering the packages from the cutter in the direction of their long dimensions and with that dimension at a slight angle to the vertical so that the packages will stand substantially upright but leaning against another row of adjacent packages.

22. In the packaging of material by intermittently charging the material into a tubular enwrapment which is sealed after each charge to form separate compartments and the enwrapment cut apart at the sealed regions to make separate packages, the improvement of sealing a part of the closed portion of the enwrapment over an area extending for the full width of the enwrapment and a part of the closed portion over an area not as wide as the enwrapment, and cutting the compartments apart along a line so located that the full-width seal is on one side of the line and at least a portion of the narrower sealed area is on the other side of said line.

23. In the packaging of material by intermittently charging the material into a tubular enwrapment, flattening the tubular enwrapment behind each charge to form separate compartments, and cutting the enwrapment at the flattened regions into separate packages, the improvement of heat sealing the flattened regions of the enwrapment over an area at least a portion of which extends for the full width of said flattened region, and cutting the enwrapment apart near the lower limit of the sealed area so that the packages formed are strongly sealed across their lower edges but closed at their upper ends by a seal which is of relatively small area and therefore easily breakable to open the package.

24. A machine for packaging plastic material which comprises a chamber, means for intermittently extruding a charge of the plastic material from the chamber under pressure into a tubular enwrapment, apparatus for expanding the volume of the chamber during the time that no material is being extruded so that a continuous supply of material can be fed into the chamber, and devices constructed and arranged to flatten and seal the enwrapment behind each charge and during the time between charging operations, said apparatus including means for decreasing the volume of the chamber during each charging operation by approximately the same amount that the volume was increased since the preceding charging operation.

25. The method of packaging plastic material in an enwrapment of "Pliofilm" or the like, which method comprises supplying a charge of the plastic material from the end of a mandrel, causing a tubular "Pliofilm" enwrapment to surround the lower end of the mandrel and move past the end of the mandrel with continuous motion while maintaining the mandrel stationary, blocking the lower end of the mandrel for a period after each charge of plastic material so that a length of enwrapment runs beyond the end of the mandrel without contacting with material from the mandrel, tucking and flattening this uncontaminated length of "Pliofilm" to close the enwrapment, and sealing the "Pliofilm" at the flattened portions by the application of heat and pressure.

26. The method of packaging plastic material in an enwrapment of "Pliofilm" or the like which comprises simultaneously supplying under pressure successive charges of the plastic material and continuously forming a tubular "Pliofilm" enwrapment, causing continuous movement of said enwrapment to envelop said successive charges, tucking and flattening said enwrapment between the successive charges, and sealing said enwrapment at the flattened portions by the application of heat and pressure.

27. The method of packaging plastic material in an enwrapment of "Pliofilm" or the like which comprises simultaneously forming a continuous moving tubular envelope and successive charges of plastic material, intermittently feeding said charges of material into said continuous moving envelope, coordinating the speeds of said charge feeding and envelope forming to provide unfilled portions of predetermined volume in the latter, tucking and flattening said unfilled portions, and sealing said flattened portions by the application of heat and pressure.

CLARENCE W. VOGT.