

Jan. 3, 1939.

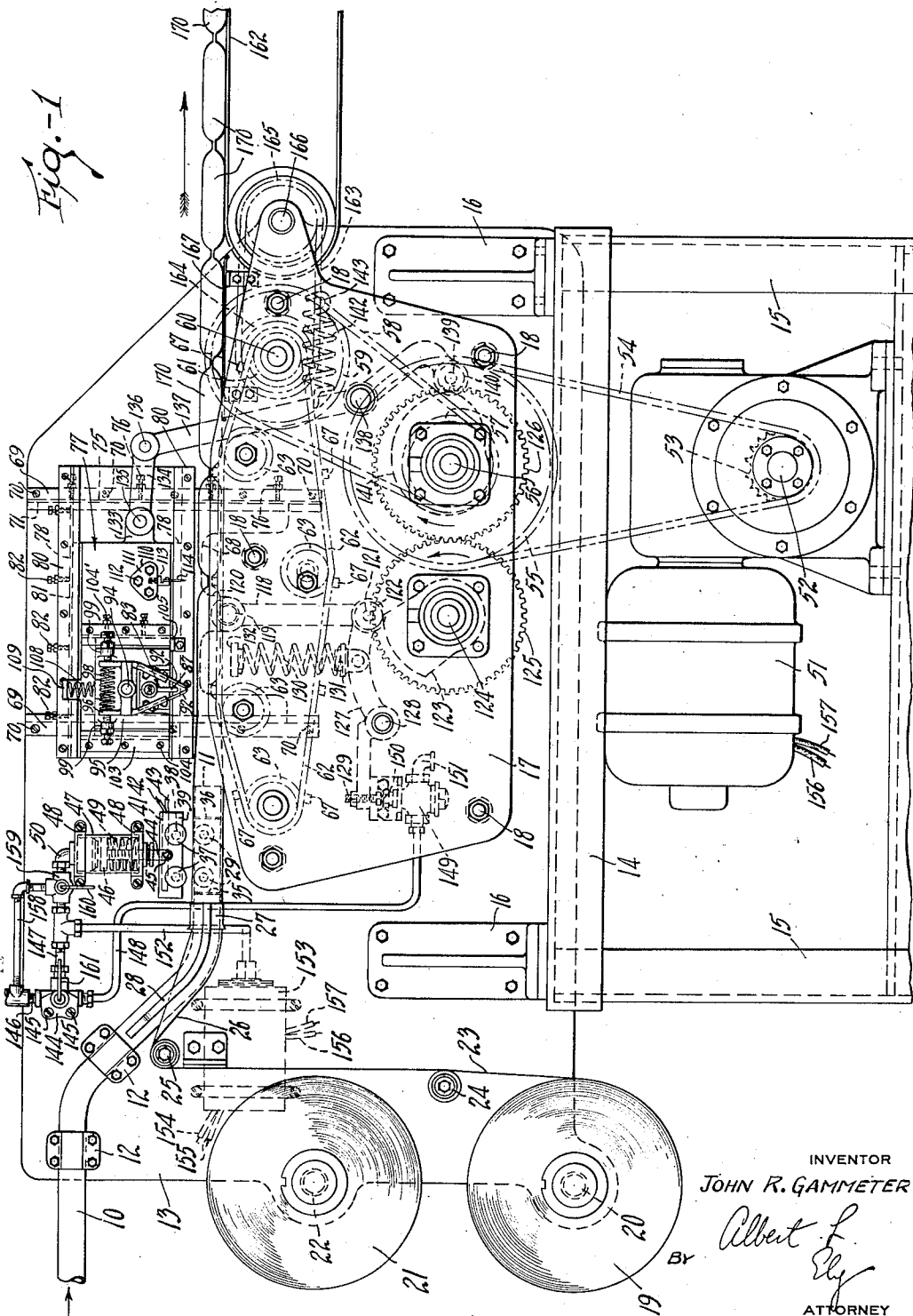
J. R. GAMMETER

2,142,505

METHOD AND APPARATUS FOR PACKAGING FLUID AND SEMIFLUID MATERIALS

Filed Oct. 15, 1936

5 Sheets-Sheet 1



Jan. 3, 1939.

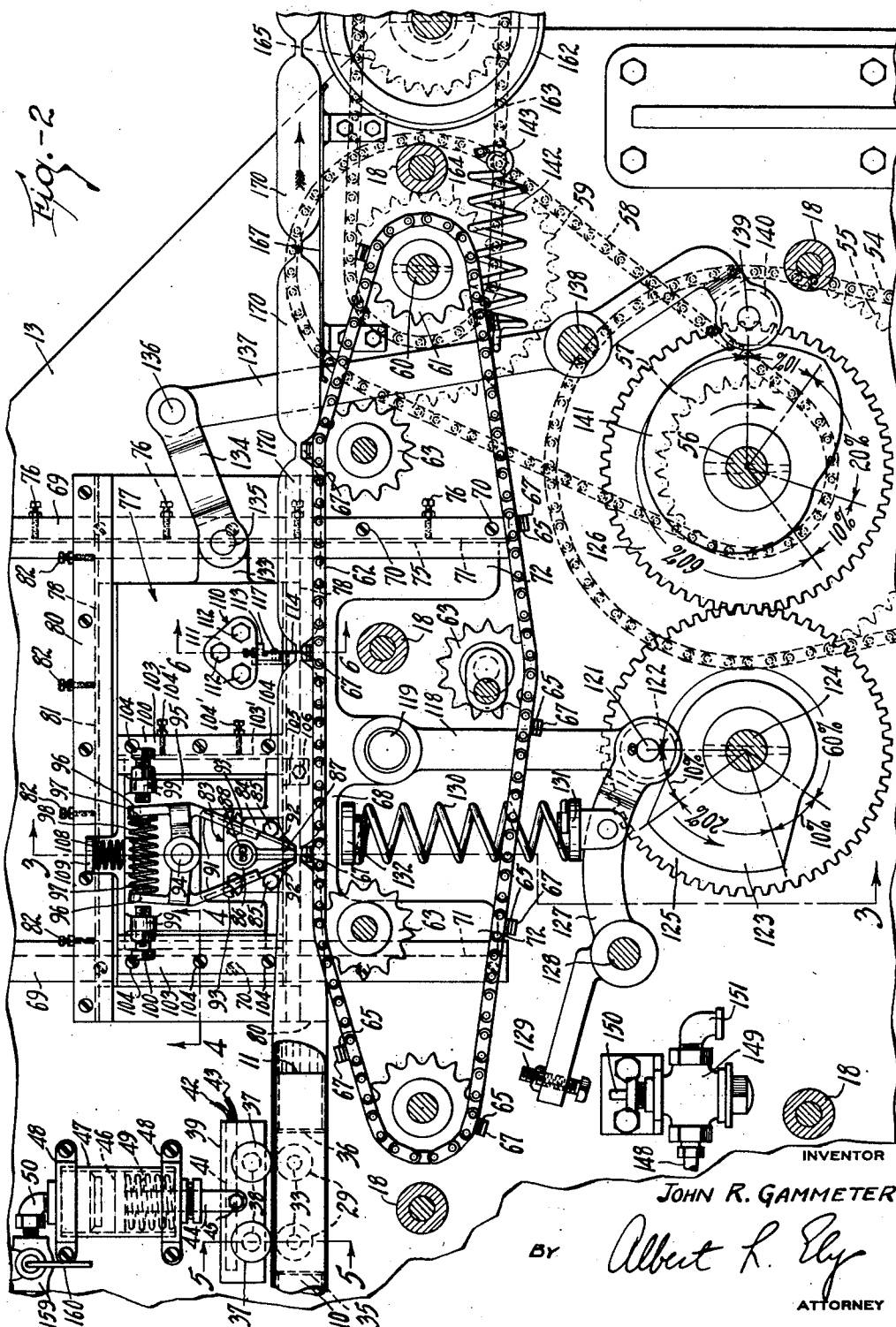
J. R. GAMMETER

2,142,505

METHOD AND APPARATUS FOR PACKAGING FLUID AND SEMIFLUID MATERIALS

Filed Oct. 15, 1936

5 Sheets-Sheet 2



Jan. 3, 1939.

J. R. GAMMETER

2,142,505

METHOD AND APPARATUS FOR PACKAGING FLUID AND SEMIFLUID MATERIALS

Filed Oct. 15, 1936

5 Sheets-Sheet 3

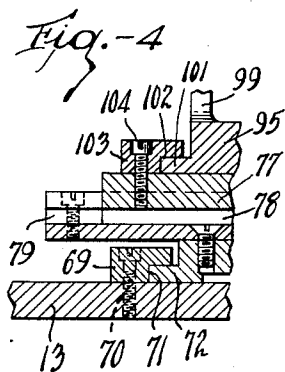
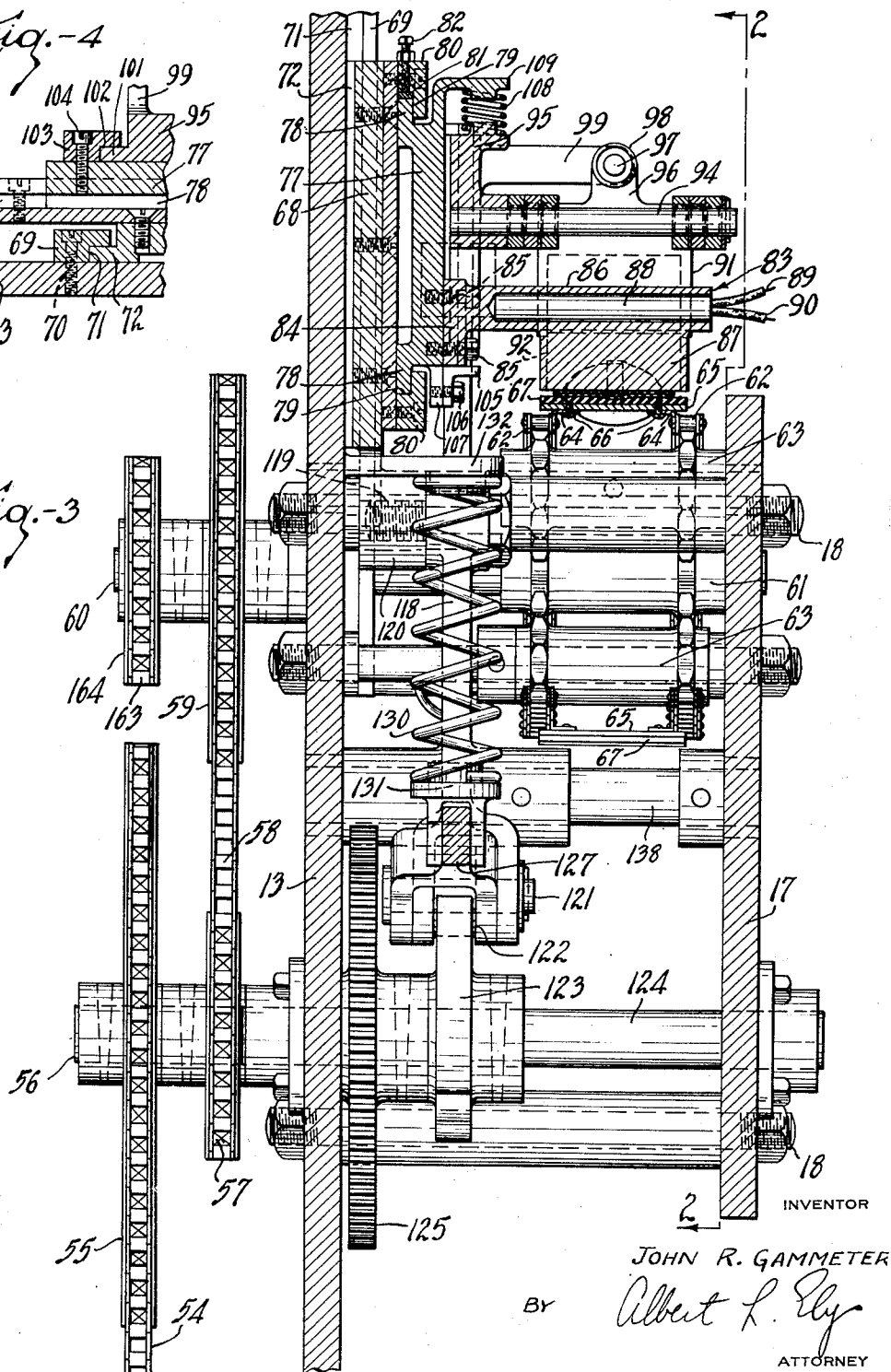


Fig. -3



INVENTOR

JOHN R. GAMMETER

BY

Albert L. Ely

ATTORNEY

Jan. 3, 1939.

J. R. GAMMETER

2,142,505

METHOD AND APPARATUS FOR PACKAGING FLUID AND SEMIFLUID MATERIALS

Filed Oct. 15, 1936

5 Sheets-Sheet 4

Fig.-5

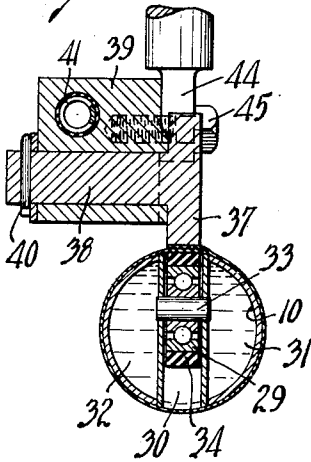


Fig.-6

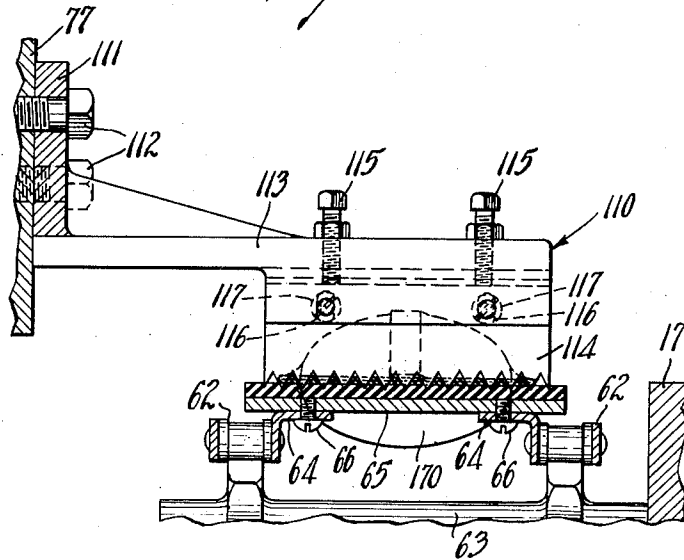


Fig.-7

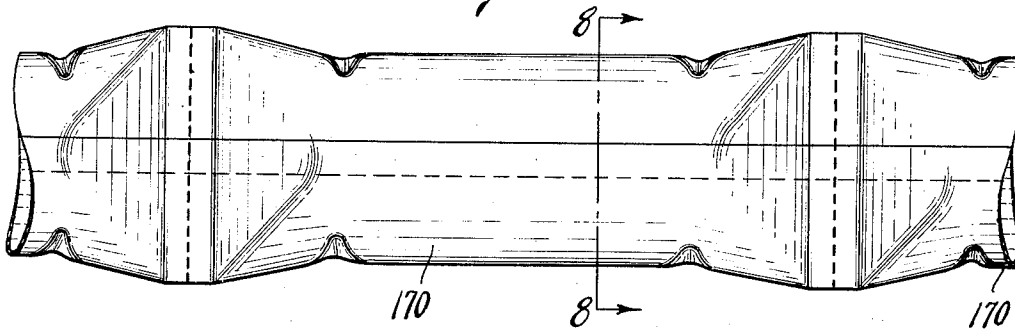
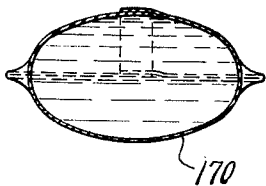


Fig.-8



BY

INVENTOR
JOHN R. GAMMETER
Albert L. Ely

ATTORNEY

Jan. 3, 1939.

J. R. GAMMETER

2,142,505

METHOD AND APPARATUS FOR PACKAGING FLUID AND SEMIFLUID MATERIALS

Filed Oct. 15, 1936

5 Sheets-Sheet 5

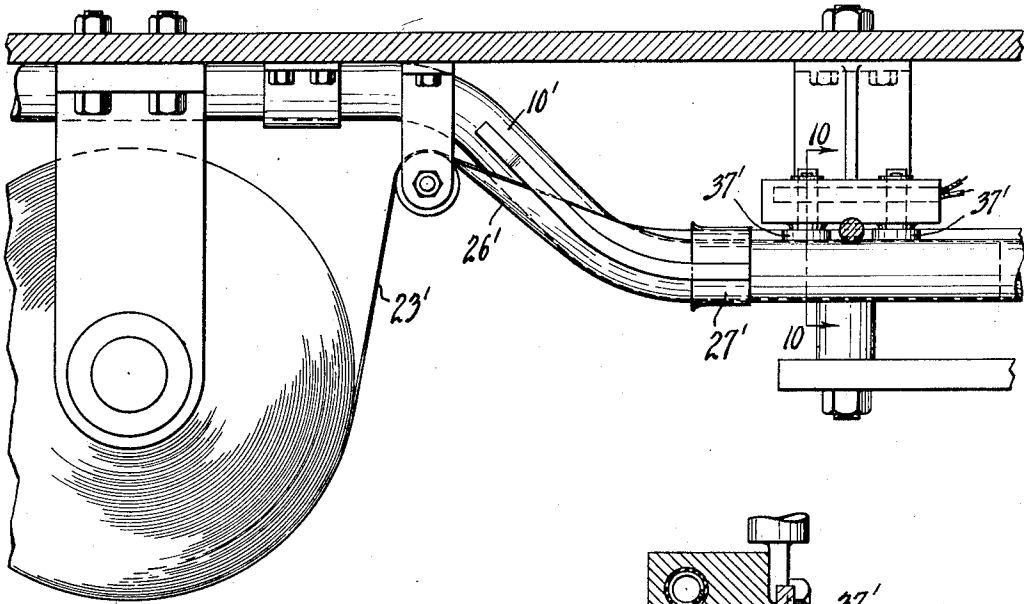


Fig.-9

Fig.-10

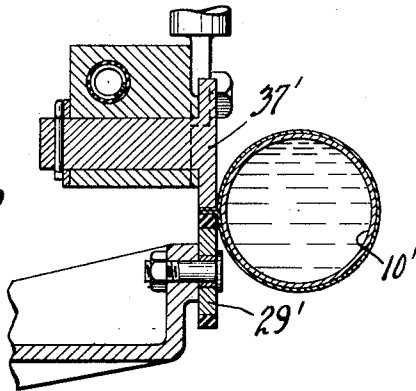


Fig.-11

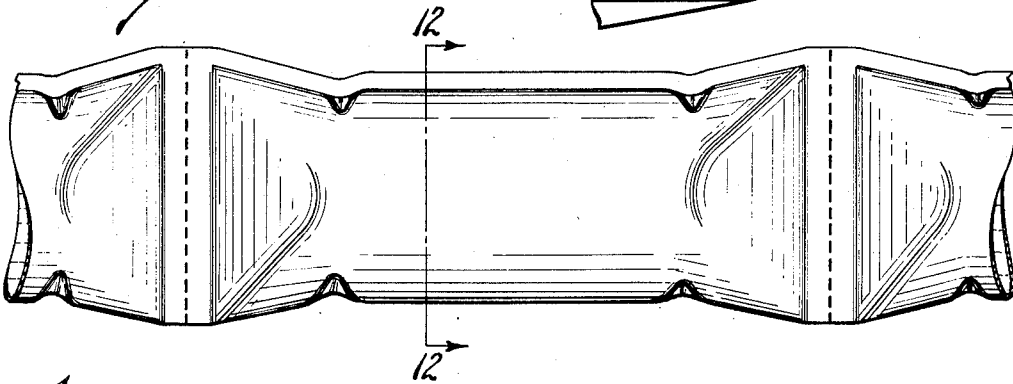


Fig.-12



BY

INVENTOR
JOHN R. GAMMETER
Albert L. Ely
ATTORNEY

UNITED STATES PATENT OFFICE

2,142,505

METHOD AND APPARATUS FOR PACKAGING
FLUID AND SEMIFLUID MATERIALS

John R. Gammeter, Akron, Ohio

Application October 15, 1936, Serial No. 105,750

23 Claims. (Cl. 93—3)

This invention relates to a method and apparatus for packaging ice cream, butter, lard and other products of a fluid or semi-fluid nature. More particularly it relates to the continuous packaging of such products in a plurality of individual packages which are arranged in a continuous chain from which one package or a group of packages may be quickly and easily separated.

It is an object of this invention to provide a method of and apparatus for packaging fluid and semi-fluid products whereby a tube-like structure of a heat-sealable material, such as rubber hydrohalide film or the like, may receive the product and be sealed at a plurality of spaced points to provide a plurality of packages joined together at the sealed points in a chain-like arrangement.

Another object is to provide a method and apparatus wherein a quantity of material to be packaged is received and confined within one portion of a flexible, tube-like structure, additional quantities of said material being similarly received and confined until a chain-like structure of packaged material is provided.

A further object is to provide an apparatus for receiving material to be packaged, for forming the package which is to receive such material, for continuously passing the packaged material through a predetermined path, for sealing the packaged material at predetermined points, for perforating the sealed points and for conveying the finished packages out of the apparatus.

A further object is to provide means for synchronizing the various operations of the apparatus to insure continuous passage therethrough of the packaged material.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings.

In the drawings,

Fig. 1 is a side elevation of the apparatus;

Fig. 2 is an enlarged section taken substantially on line 2—2 of Fig. 3;

Fig. 3 is an enlarged section taken substantially on line 3—3 of Fig. 2;

Fig. 4 is an enlarged section of a portion of the apparatus taken substantially on line 4—4 of Fig. 2;

Fig. 5 is a similar section taken substantially on line 5—5 of Fig. 2;

Fig. 6 is a similar section taken substantially on line 6—6 of Fig. 2;

Fig. 7 is an enlarged plan view of a portion of the finished packages;

Fig. 8 is a section taken on line 8—8 of Fig. 7;

Fig. 9 is a plan view, partly in section, of a por-

tion of a modified form of the package forming and sealing device;

Fig. 10 is a section taken substantially on line 10—10 of Fig. 9;

Fig. 11 is a plan view of a portion of the finished packages when formed in accordance with the devices shown in Figs. 9 and 10; and

Fig. 12 is a section taken substantially on line 12—12 of Fig. 11.

In practicing my invention, ice cream, butter, lard or any other material, preferably in a fluid or semi-fluid state so as to flow readily, is adapted to be fed through a pipe 10 from any suitable source of supply (not shown). Pipe 10 has a downwardly directed portion, as shown in Fig. 1, and terminates at 11, being secured by brackets 12 to a vertically arranged plate 13, hereinafter termed the rear plate. This plate is supported by a table 14 or the like having legs 15, brackets 16 being utilized to secure the plate rigidly to the table. The legs 15 may be suitably anchored to a base, such as a floor (not shown). A second plate 17, termed the front plate, which preferably is considerably smaller than the rear plate, is secured in spaced relation to the rear plate, as clearly shown in Fig. 3. A plurality of spaced bolts, nuts and spacers, indicated collectively by the numeral 18, are used to properly secure and space the front plate with respect to the rear plate, as will be understood.

Adjacent the lower left-hand corner of the rear plate as viewed in Fig. 1, a roll of flexible, paper-like material 19 is mounted for rotation on stub shaft 20 carried by the rear plate, and a reserve roll 21 is similarly mounted on stub shaft 22. This flexible material preferably is a rubber hydrohalide film made in accordance with the United States patent to Calvert, No. 1,989,632, and which is known to the trade as "Pliofilm," such material being transparent, moisture-proof and readily sealable by the application of heat and pressure, thereby being ideally suited for use as wrapping and packaging material. Of course, other material having the characteristics of this rubber hydrohalide film, except possibly transparency which is not so important, could also be utilized. When roll 19 is used the film 23 passes upwardly in contact with an idler roller 24, mounted on the rear plate, and over idler roller 25 similarly mounted, and is directed around pipe 10 as indicated at 26, being passed through a conventional folding device 27 which causes the edges of the film to overlap substantially as shown in Fig. 5, thereby forming a tube around pipe 10. The folding device may be held in place by a suitable

bracket 28 secured to pipe 10. When roll 21 is used the film need only pass over roller 25, as will be apparent.

After leaving the folding device the overlapped portions of the film pass over rollers 29 which are arranged in a chamber 30 formed in pipe 10. The arrangement of rollers 29 will best be understood from Figs. 1, 2 and 5, particularly the latter, wherein pipe 10 is shown divided into two passageways 31 and 32, between which passageways chamber 30 is formed. The rollers 29 are rotatably mounted in this chamber on pins 33 secured in the inner walls of passageways 31 and 32, and the outer portion of each roller is preferably formed of a relatively hard rubber compound 34. Pipe 10 is divided into two passageways from the point 35, indicated by broken lines on Figs. 1 and 2, to point 36 similarly indicated, and elsewhere has but a single passageway therethrough.

As the film passes over rollers 29 it is contacted by heated rollers 37 which are adapted to be forced downwardly and held in contact with the overlapping portions of the film to seal such portions longitudinally. The rollers 37 (Fig. 5) are formed of steel or other suitable heat conducting material and preferably are integral with shafts 38 which are mounted for rotation in a block 39 preferably formed of copper or other material adapted to retain heat, pins 40 being utilized to hold the shafts 38 in place. An electric heating element 41 extends into block 39 and has conductors 42 and 43 leading therefrom to a source of electric current (not shown). In order to force the rollers 37 downwardly one end of a connecting rod 44 is rigidly secured to block 39 as at 45, the other end being secured to a piston 46 operable in the upper portion of a cylinder 47 which is secured to the rear plate by brackets 48. Piston 46 is urged downwardly by air admitted into the upper end of the cylinder, and upwardly by a coil spring 49 in the customary manner. A conduit 50 for supplying air to the cylinder will be referred to later.

By thus passing the overlapping portion of the film between rollers 29 and 37 and by applying heat and pressure thereto I am able to provide a continuous tube of film which will be completely sealed longitudinally and which extends completely around pipe 10 adjacent its outlet end. The tube of film now passes beyond the end of pipe 10 and is adapted to receive the material flowing out of this pipe which is to be packaged.

Means are provided for conveying the filled tube under a heat sealing device which seals the tube at predetermined spaced intervals whereby a plurality of linked packages are provided, and each sealed portion of the tube is perforated as it passes a predetermined distance beyond the heat sealing device. As shown in Fig. 1, a motor 51 is suitably supported between legs 15 and through the medium of gearing (not shown) is adapted to drive a shaft 52 having a sprocket wheel 53 which receives a drive chain 54 for driving sprocket wheel 55 mounted for rotation with a shaft 56. Shaft 56 carries a second sprocket 57 which drives a chain 58, the latter being trained about a sprocket 59 to drive a shaft 60 which carries sprocket 59. As clearly shown in Fig. 3, the sprockets and chains referred to are located outwardly of rear plate 13 and the shafts 56 and 60 extend between plates 13 and 17 being suitably journaled in these plates.

Intermediate plates 13 and 17, shaft 60 carries a double sprocket 61 which drives a pair of

parallel spaced chains 62 that are trained over a plurality of spaced idler double sprockets 63. As shown, four of the idler sprockets are employed, but any desired number may be utilized whereby a substantial portion of the parallel chains 62 will be arranged in the path of travel of the packaged material. Fig. 3 shows two of the idler sprockets 63 and sprocket 61 is identical with one of the sprockets 63 except that it is driven, and one of the sprockets 63 may be adjustably mounted to take up slack in the chains. At predetermined spaced intervals the parallel chains 62 are provided with inwardly extending projections or flanges 64 which receive cross members 65 and are secured thereto by bolts 66, each member 65 having an upper rubber portion 67. This arrangement provides a plurality of spaced lugs spanning the parallel chains and arranged to contact and convey the filled tube whereby it may be subjected to additional operations.

The heat sealing and perforating mechanisms are preferably carried in a rectangular frame 68 which is mounted for vertical sliding movement on the back plate 13. One expedient for mounting the frame 68 is best shown in Figs. 1, 2 and 4, wherein plate 13 has a pair of substantially L-shaped vertical members 69 secured thereto by bolts 70, the arrangement providing channels 71 which slidably receive projections 72 formed on frame 68. In Figs. 1 and 2, a gib 75 is shown arranged in the right-hand channel 71, and a plurality of regulating screws 76 engage this gib at spaced intervals to provide for proper adjustment of projections 72 within channels 71.

The heat sealing and perforating mechanisms are also mounted for horizontal movement with a panel 77, which, as best shown in Fig. 3, has projections 78 slidably mounted in channels 79 formed between the horizontal portions of frame 68 and a pair of oppositely disposed, substantially L-shaped, horizontal members 80 secured to the latter frame portions. A gib 81 is arranged in the upper channel 79 and is adapted to be engaged by a plurality of spaced regulating screws 82 to provide for proper adjustment of the members slidably in channels 79.

The panel 77 rigidly carries the heat sealing mechanism which is indicated as a whole by the numeral 83. As more clearly shown in Fig. 3, the heat sealing device comprises a vertical portion 84 rigidly secured to panel 77 as by means of bolts 85, a tubular portion 86 preferably formed integral with portion 84 and extending outwardly therefrom, and a vertical portion 87 depending from said tubular portion for movement into and out of the path of travel of the filled tube. The tubular portion 86 receives a heating element 88 therein, and conductors 89 and 90 lead from this heating element to a source of current (not shown), the portion of the device heated by the element 88 being formed of some heat-retaining material, which will quickly conduct heat to the lower surface of portion 87.

Cooperating with the heat sealing mechanism is a pair of pivotally mounted fingers 91 depending on opposite sides of the vertical portion 87 and converging whereby non-heat conducting extensions 92, preferably formed of wood or other suitable material and secured to fingers 91 by screws 93 or the like, will meet at a point below the lower surface of portion 87 when the latter is in the position shown in Figure 1. Fingers 91 are pivoted about a pin 94 projecting from and rigidly secured in a vertically slidable frame member 95, said fingers having vertical exten-

sions 96 carrying bosses 97 which receive the ends of a coil spring 98 tending to force the meeting ends of the fingers into engagement at all times. Lugs 99 extending from frame member 95 threadably receive bolts 100 which bear against extensions 96 and adjustably limit the outward movement of these extensions. Frame member 95 may partake of limited vertical sliding movement by virtue of projections 101 formed thereon (Fig. 4) which are slidably received in channels 102 formed between panel 77 and a pair of spaced substantially L-shaped vertical members 103 secured to panel 77 as by bolts or screws 104. The right hand channel 102 has a gib 103' engaged by a plurality of spaced regulating screws 104' for the same purpose as the regulating screws previously referred to.

Downward sliding movement of frame member 95 is limited by a stop member 105 which is arranged to close the lower end of one of the channels 102, being secured by a bolt 106 to a lug 107 depending from panel 77. Upward sliding movement of member 95 is opposed by a coil spring 108, tending constantly to urge the member downwardly, arranged between the upper surface of member 95 and a horizontal projection 109 formed on panel 77. This limited relative movement of member 95 will again be referred to during the explanation of the operation of the apparatus.

The perforating mechanism, referred to as a whole by the numeral 110, is also rigidly secured to panel 77, at a predetermined distance from the heat sealing means. As shown in Figs. 1, 2 and 6, the perforating mechanism comprises a vertical portion 111 rigidly secured to panel 77 as by means of bolts 112, a horizontal portion 113 preferably formed integral with portion 111 and providing a holder adjustably to receive a serrated knife blade 114 depending into the path of travel of the filled packages of material. Adjustment of blade 114 is provided for by bolts 115 threaded through portion 113 into contact with the upper edge of the knife blade, the latter having elongated slots 116 which receive set screws 117 adapted to be threaded into the holder. With this arrangement vertical adjustments of the knife blade may be quickly and easily made.

Means are provided for imparting vertical movement to the frame member 68 and parts carried thereby, whereby the heat sealing mechanism and the perforating mechanism may be moved into and out of the path of travel of the packaged material. This is accomplished by a rod 118, the upper end of which is pivotally connected as at 119 to a lug 120 depending from frame 68. The lower end of rod 118 engages a pin 121 carrying a roller 122 which engages a cam 123 mounted for rotation with a shaft 124 journaled between the plates 13 and 17. Shaft 124 rotatably carries a gear 125 which meshes with a gear 126 mounted for rotation with shaft 56. Since shaft 56 is rotated when motor 51 is in operation, it will be apparent that shaft 124 will also be rotated by this motor. Pin 121 also receives one end of a lever 127 pivoted intermediate its ends to a pin 128 arranged between plates 13 and 17, the other end of said lever carrying an adjustable bolt 129 for a purpose to be described. A coil spring 130 has its lower end bearing against lever 127 as at 131, while the upper end of this spring bears against a horizontal projection 132 formed on rear plate 13. Coil spring 130 tends to hold roller 122 in contact with cam 123 at all times.

Means are also provided for imparting horizontal movement to panel 77 and parts carried thereby. As shown, one end of this panel has a lug 133 formed thereon and one end of a link 134 is pivoted to this lug as at 135. The other end of link 134 is pivoted as at 136 to one end of a lever 137 pivoted intermediate its ends to a pin 138 supported between plates 13 and 17. The other end of lever 137 carries a pin 139 on which a roller 140 is rotatably mounted, said roller engaging a cam 141 rotatable with shaft 56. To hold roller 140 in constant engagement with cam 141, a coil spring 142 has one end secured to lever 137 on the opposite of its pivot from roller 140, the other end of said spring being secured to a pin 143 projecting from back plate 13.

In Fig. 1 I have shown a three-way valve 144 secured to plate 13 by bolts 145. One port of this valve receives a conduit 146 leading to a suitable source of compressed air (not shown). Another port has a conduit 147 leading therefrom to conduit 50 which supplies air to cylinder 47, and the third port has a bleeding conduit 148 leading to a valve 149 which is controlled by a spring pressed pin 150. Valve 149 is closed when pin 150 is in its upper position as shown in Fig. 2, and open to exhaust air through outlet 151 when this pin is down. The adjustable bolt 129 on lever 127 is adapted to engage this pin and open valve 149 under certain conditions to be described.

A conduit 152 is arranged between conduit 147 and a conventional diaphragm switch 153 which is suitably secured to plate 13. The switch 153 has conductors 154 and 155 adapted to lead to the machine (not shown) which feeds material through pipe 10, whereby when switch 153 is closed material will be constantly fed through said pipe. To synchronize the operation of the apparatus shown herein with the feeding machine, conductors 156 and 157 lead from switch 153 to motor 51, whereby when the switch is closed this motor will be in operation.

Another conduit 158 is connected between supply conduit 146 and a valve 159 having ports communicating with conduits 50 and 147, an operating lever 160 being arranged to control passage of air through this valve. A second operating lever 161 is adapted to control the passage of air through valve 144.

At the extreme right of Figs. 1 and 2 I have shown a portion of a conveyor 162 which is adapted to be driven by a chain 163 arranged between sprocket 164 rotatable with shaft 60 and a sprocket 165 rotatable with a shaft 166 journaled between plates 13 and 17. Adjacent the forward end of conveyor 162 I have arranged a shelf 167, suitably carried on plate 13, the upper surface of this shelf being in substantially the same horizontal plane as the upper surface of the conveyor whereby the packaged material may readily be conveyed across this shelf on the conveyor.

Before starting the apparatus in motion, I manually conduct the film material through the folding device and arrange a portion of the overlapping margins to be engaged by the heated rollers 37. Now, assuming air pressure to be present in conduit 146 and valves 144 and 159 to be closed against this air, I manually operate lever 160 to admit air into cylinder 47 and to close the port of valve 159 leading to conduits 147 and 152. This initial operation will move the heated rollers 37 downwardly into contact with the overlapped film material surrounding the outer end of pipe 10 without affecting the op-

eration of other parts of the apparatus. The film, which is in tubular form as soon as it is sealed longitudinally by rollers 37, is now manually pulled across the parallel chains 62 until the film reaches a point where it will not become tangled with the mechanism. Preferably it is drawn across shelf 167 and longitudinally across conveyor 162 and it will then remain substantially straight without any appreciable sagging.

The apparatus is now ready to function and levers 160 and 161 are preferably simultaneously operated. By operating lever 160, the port in valve 159 communicating with conduit 158 is closed while the port communicating with conduit 147 is opened whereby air may pass through the latter conduit into cylinder 47. By operating lever 161 air is permitted to enter valve 144 through conduit 146 and to pass out of this valve through conduit 147, the port leading to conduit 148 being closed. Since the operation of levers 160 and 161 is substantially simultaneous, rollers 37 will still be maintained in contact with the film by air through conduit 147. Even if the rollers 37 should rise slightly when lever 160 is operated, they will immediately move down again when lever 161 is operated and they will not be out of contact with the film for any appreciable length of time.

As air flows through conduit 152 the diaphragm switch 153 will be closed and motor 51 will start the mechanical parts of the apparatus in motion, while material to be packaged will begin to flow through pipe 10 from the feeding machine. The starting position of the parts is shown in Fig. 1, and the parallel chains 62 with lugs 67 will be moved around sprockets 63 by the driving connections previously referred to. As lugs 67 move into the path of travel of the filled tube of material they will successively reach a position directly beneath the heat sealing device 87 and will extend up into the tube as shown in Figs. 1 and 2, pushing the fluid or semi-fluid material in the tube out of the way until the stated position is reached. Of course, as soon as a lug 67 engages the filled tube it tends to force its way up into the tube, without breaking the film, and will convey the tube to the point where the lug is beneath the heat sealing device.

Cam 123 controls the vertical movement of frame 68 to which the heat sealing and perforating devices are secured, and when roller 122 is at the point shown in Fig. 1, frame 68 and the elements carried thereby are in their uppermost positions. When cam 123 is rotated in a counter-clockwise direction, roller 122 moves down the surface of the cam to the position shown in Fig. 2, approximately 10% of a revolution of the cam, thus lowering the heat sealing and perforating devices to the position shown in the latter figure. As the heat sealing mechanism moves downwardly, the extensions 92 on fingers 91 engage the filled tube of material in advance of member 87 and force the tube downwardly, squeezing the material out of the way, until a portion of the film is tightly held between these finger extensions and one of the lugs 67. It will be recalled that these fingers are mounted for vertical movement relative to the member 87 and they can move downwardly only as far as lug 67 will permit. As soon as they reach the extent of this downward movement they remain in contact with the film, but member 87 continues to travel downwardly until it reaches the position shown in Fig. 2, spreading the finger extensions apart, and effecting a wiping action of the exten-

sions against the film, until the hot surface of member 87 is pressed into contact with the film.

The downward movement of the heat sealing and perforating mechanism has not been directly vertical, because panel 77 has been subjected to some horizontal movement as will be noted by comparing the relative positions of roller 140 with respect to cam 141 in Figs. 1 and 2. Starting from the point shown in Fig. 1, cam 141 has been rotated in a clockwise direction approximately 10% of one revolution, causing roller 140 to move a short distance toward shaft 56 so that spring 142 will have moved panel 77 a slight distance horizontally.

Roller 122, having reached its lowest position on cam 123, remains in this position while the cam rotates substantially 60% of one revolution, as indicated in Fig. 2, and during this travel of the cam the heat sealing and perforating mechanisms remain in their lowermost position in contact with the film. By thus maintaining pressure and heating the film I am enabled thoroughly and effectively to seal the film transversely at this point, since any moisture originally between the film surfaces will have been taken care of by the continuous application of heat.

While cam 123 has been rotated through 60% of a revolution as explained, cam 141 will have rotated a similar distance through the space indicated 60% on Fig. 2, and panel 77 will then have moved horizontally a substantial distance. Travel of chains 62 and lugs 67 is timed to equal travel toward the right of panel 77, and accordingly the lug 67 beneath member 87 will cooperate with the latter and with finger extensions 92 in conveying the filled tube toward conveyor 162 during movement of cam 141 as stated.

When cam 123 has rotated approximately 70% of a revolution, roller 122 begins to rise and continues upwardly for approximately 10% of a revolution, until it reaches its highest point, at which time the frame 68 and elements carried thereby will move to their uppermost position. During this upward movement of roller 122, cam 141 continues to rotate whereby panel 77 continues its horizontal movement to the right, the cam rotating an additional 10% of a revolution, bringing it to the point where it is ready to return panel 77 to its starting position. It is desirable to have frame 68 and the elements carried thereby entirely free of the packaged material before returning them to their initial position, hence, forward movement of panel 77 is continued as aforesaid while the frame is being moved upwardly.

Each of the cams 123 and 141 still has to rotate about 20% of a revolution in order to complete the first revolution, and during this last 20%, roller 122 is maintained at its highest point, see Fig. 2, until it reaches its initial position, from which position it is ready again to move downwardly. Thus, frame 68 and elements carried thereby remain at their uppermost position during this last 20% of a revolution. Roller 140, however, begins to move in the opposite direction whereby panel 77 is returned to its initial position while cam 141 completes the last 20% of its revolution. It will be noted, therefore, that panel 77 moves back in about 20% of a revolution while its forward movement requires about 80% of a 70 revolution.

This quick return of panel 77 is necessary to permit the perforating knife 114 to be in a position to engage the portion of the film which has just been sealed by member 87 during the next 75

revolution of the cams. After member 87 and the finger extensions have been moved upwardly out of contact with the film, the lug 67 continues by itself to convey the packaged material. As chains 62 continue their travel and the sealed portion of the film is moving forward at a definite rate of speed, the necessity for quickly returning panel 77 to its initial position will be apparent, and the action of cam 141 is such that the sealed portion of the film will be in proper position to be engaged by blade 114 when the latter moves downwardly during the next revolution of cam 123.

Thus, it will be seen that during the initial revolution of the cams a definite portion of the film will be sealed transversely and any fluid material, as well as film, which is not between this sealed portion and the outlet end of pipe 10 will be wasted. On the second revolution, however, since the initially sealed portion has been advanced whereby it will be engaged by blade 114 and perforated thereby, and another portion of the film will be sealed transversely through the action of member 87, there will be no further waste, and as the machine continues in operation it will seal a portion of the film and perforate a previously sealed portion during each revolution of the cams. Accordingly, continued operation of the apparatus will provide a plurality of packages 170 of material linked together as shown in Figs. 1 and 2. As the packages are formed, they will be conveyed by lugs 67 to the end of chains 62 from which point they are manually directed across shelf 167 onto conveyor 162, and the latter may lead to any desired point such as a freezing unit or storage chamber. By virtue of the perforations between the packages they may be easily handled individually or in selected units by breaking the perforations at any desired points in the chain of packages. The perforations are of the type known as pin perforations wherein the film structure is incised, but no material is removed therefrom.

Referring now to the valve 149 and the mechanism associated therewith, this valve is adapted to bleed the air from conduits 147 and 152 when the apparatus is stopped. To stop the apparatus lever 161 is operated whereby the port in valve 144 communicating with the supply line 146 is closed, the port communicating with conduit 147 remains open and the port leading to conduit 148 is opened. The air in conduits 147 and 152 will then back up into conduit 148 and if valve 149 is open so that the air may be bled therefrom the sealing mechanism 39 will rise and switch 153 will be opened, thus cutting off the motor 51 as well as the machine which is supplying material to pipe 10. However, the valve 149 may not always be open at the time lever 161 is operated to shut down the apparatus. It will be remembered that pin 150 must be depressed to open valve 149 and this pin is only depressed while roller 122 is in contact with the surface of cam 123 included within the portion indicated at 20% in Fig. 2. When roller 122 is in contact with the other portions of this cam lever 127 will be pivoted about pin 128 whereby bolt 129 will not be depressing pin 150. Hence, if roller 122 is not in engagement with the portion of the cam 123 indicated at 20%, air will not be exhausted from conduit 148 and sufficient pressure will remain in the various conduits to keep the heat sealing mechanism 39 down and to keep switch 153 closed until the cam rotates to the point where roller 122 reaches the portion indicated at 20%. Of

course, if roller 122 is in contact with the latter portion of the cam then lever 161 is operated to shut down the apparatus, and the latter will stop substantially instantly because valve 149 will be open to permit instant bleeding of the conduits.

In Figs. 9 and 10 I have shown portions of a modified form of apparatus wherein the film material is folded to produce a lateral longitudinal seam instead of an overlapping seam. This may be accomplished by passing film 23' around pipe 10', as shown at 26', through a conventional folding device 27' to form a tube around pipe 10' with the margins of the film extending laterally of the tube, as clearly shown in Fig. 10. With this arrangement the heat sealing rollers 37', as well as the supporting rollers 28', must be arranged at the side of pipe 10', as is clearly illustrated. Except for the lateral seam, this tube of film is identical with the first tube described and passes through the apparatus in the same manner as the first tube.

It is believed to be apparent that I have disclosed a novel method and apparatus for packaging fluid and semi-fluid materials. Not only is the invention useful in packaging materials which are to be subsequently frozen, such as ice cream, butter and lard, but other materials such as oil, or even milk and other liquids can be satisfactorily packaged. In fact, any material that can readily be forced into the tube of film and will permit sealing of the latter at spaced intervals may be easily packaged with my invention.

While I have illustrated and described the preferred forms of my apparatus and the preferred manner of carrying out my method, it is to be understood that the invention is not so limited, but that various modifications may be made therein without departing from the spirit of the invention or from the scope of the subjoined claims.

What is claimed is:

1. A method of continuously packaging material which comprises forming a tube of flexible material, sealing one end of said tube, filling a portion of said tube adjacent said sealed end with the material to be packaged, heat sealing said tube while continuously moving said tube to confine the packaged material within said portion, thereafter perforating the tube through the latter seal while continuously moving said tube, and continuing the filling, sealing and perforating operations until a chain of packaged material with perforations between each package is provided.

2. A method of packaging material which comprises filling a flexible, tube-like container with material to be packaged, heat sealing the container at spaced points while continuously moving the container to divide said container into a plurality of smaller containers joined together by the sealed portions of said original container, and thereafter perforating said sealed portions while continuously moving the container.

3. A method of packaging material which comprises filling a flexible, heat-sealable, tube-like container with material to be packaged, applying heat and pressure to the container while continuously moving the container to seal the latter at spaced points to divide said container into a plurality of smaller containers joined together by the sealed portions of said original container, and thereafter perforating said sealed portions while continuously moving said original container.

4. A method of packaging material which comprises continuously forming a flexible, tube-like container, continuously filling said container with material to be packaged after it is so formed, sealing the container at spaced points while continuously moving the container to divide said container into a plurality of smaller containers joined together by the sealed portions of said original container, and thereafter perforating said sealed portions while continuously moving said smaller containers.

5. Apparatus for packaging material comprising means for forming a tube of flexible material, means for filling said tube with material to be packaged, mechanism for transversely sealing said filled tube at a plurality of spaced points thereby to provide a plurality of packages of material in chain-like formation, means removed from the sealing means for perforating the chain of packages at one or more of the sealed points, a common means for operating said sealing mechanism and said perforating means, and a driven conveyor chain for moving said packages through the apparatus, said chain having a plurality of spaced lugs extending into the plane of said packages, each lug cooperating with said sealing mechanism to convey said packages through the apparatus.

6. Apparatus for packaging material comprising means for forming a tube of flexible material, means for filling said tube with material to be packaged, mechanism for transversely sealing said filled tube, mechanism in spaced relation to said sealing mechanism for perforating the sealed portion of said tube, and means for conveying said filled tube successively into the path of travel of each of said mechanisms, said conveying means comprising a driven chain having a plurality of spaced lugs extending into the plane of said tube, each lug cooperating with said sealing and perforating mechanisms to engage said tube.

7. Apparatus for packaging material comprising means for forming a tube of flexible material, means for filling said tube with material to be packaged, mechanism for transversely sealing said filled tube, mechanism in spaced relation to said sealing mechanism for perforating the sealed portion of said tube, and means for conveying said filled tube successively into the path of travel of each of said mechanisms, said conveying means comprising a driven chain having a plurality of spaced lugs extending into the plane of said tube, each lug cooperating with said sealing and perforating mechanisms to engage said tube, said sealing mechanism and said perforating mechanism being movable a predetermined distance with said tube.

8. Apparatus for packaging material comprising means for forming a tube of flexible, heat-sealable material, means for filling said tube with material to be packaged, means for conveying the filled tube to a point remote from said filling means, heated sealing mechanism movable into the path of travel of said tube to seal the latter at one or more predetermined points, and perforating mechanism spaced longitudinally of the tube from said sealing mechanism and movable into the path of travel of said tube to perforate one or more sealed portions of the tube, said conveying means comprising a driven chain having a plurality of spaced lugs extending into the plane of said tube, each lug cooperating with said

sealing and perforating mechanisms to engage said tube.

9. Apparatus for packaging material comprising means for feeding material to be packaged, means for passing a container whereby it continuously receives said material and for conveying the filled container to a remote point, means for sealing the filled container at predetermined points, means spaced from the sealing means for perforating the sealed points, and means for synchronizing the operation of all of said means, said conveying means comprising a driven chain having a plurality of spaced lugs extending into the plane of said container, each lug cooperating with said sealing and perforating means to engage said container.

10. In an apparatus for packaging material, the subcombination of means for sealing the package, means spaced from said sealing means for perforating the sealed portion of the package, and a common means for simultaneously operating said sealing and perforating means.

11. In an apparatus for packaging material, the subcombination of means for sealing the package, means spaced from said sealing means for perforating the sealed portion of the package, and means for conveying the package whereby both of said other means operate successively thereon, said conveying means comprising a driven chain having a plurality of spaced lugs extending into the plane of said package, each lug cooperating with said sealing and perforating means to engage said package.

12. In an apparatus for packaging material, the subcombination of means for sealing the package, means spaced from said sealing means for perforating the sealed portion of the package, and a common means for simultaneously moving both of said means into and out of engagement with said package.

13. In an apparatus for packaging material, the subcombination of means for sealing the package, means spaced from said sealing means for perforating the sealed portion of the package, a common means for simultaneously moving both of said means into and out of engagement with said package, and a separate means for moving both the sealing and perforating means a predetermined distance while in engagement with the package.

14. In an apparatus for packaging material wherein a flexible, heat-sealable container for the material is utilized, the sub-combination of heated means for sealing the container, means spaced from said sealing means for perforating the sealed portions of the container, and means for conveying the container whereby both of said other means operate successively thereon, said conveying means comprising a driven chain having a plurality of spaced lugs extending into the plane of said container, each lug cooperating with said sealing and perforating means to engage said container.

15. In an apparatus for packaging material wherein a flexible, heat-sealable container for the material is utilized, the sub-combination of heated means for sealing the container, means for perforating the sealed portions of the container, means for moving both of said means into and out of engagement with said container, and a separate means for moving both the sealing and perforating means a predetermined distance while in engagement with the container.

16. In an apparatus for packaging material,

the combination of a conduit for feeding material to be packaged, means for folding a flexible, heat-sealable material around the outlet end of said conduit to provide a container adapted to be continuously passed by the outlet end of said conduit for reception of material to be packaged, heated sealing means for sealing the container longitudinally as it is formed around said conduit and prior to the introduction thereof into the material to be packaged, additional heated sealing means for sealing the container transversely after it has passed a predetermined distance from the outlet end of said conduit, and a driven conveyor chain for moving said container through the apparatus, said chain having a plurality of spaced lugs extending into the plane of said container, each lug cooperating with said last-mentioned sealing means to convey said container through the apparatus.

17. In an apparatus for packing material, the combination of a conduit for feeding material to be packaged, means for folding a flexible, heat-sealable material around the outlet end of said conduit to provide a container adapted to be continuously passed by the outlet end of said conduit for reception of material to be packaged, heated sealing means for sealing the container longitudinally as it is formed around said conduit and prior to the introduction thereof into the material to be packaged, additional heated sealing means for sealing the container transversely after it has passed a predetermined distance from the outlet end of said conduit, means for perforating the transversely sealed portions of the container, and a driven conveyor chain for moving said container through the apparatus, said chain having a plurality of spaced lugs extending into the plane of said container, each lug cooperating with said last-mentioned sealing means and with said perforating means to convey said container through the apparatus.

18. In an apparatus for packaging material, the combination of means for continuously forming a flexible tube for receiving said material, means for feeding said material into said tube after it is so formed, a member extending into the plane of the filled tube to convey the latter through the apparatus, heat sealing means movable into the plane of said filled tube on the opposite side from said member and cooperating with said member to seal said tube, and pressure members movable into the plane of said filled tube in advance of said heat sealing means to press the tube into engagement with said first mentioned member.

19. An apparatus as recited in claim 18 wherein said pressure members comprise a pair of fingers which are spread apart after they engage said tube by said heat sealing means to effect a wiping action of the fingers against the tube.

20. In an apparatus for packaging material the combination of means for continuously forming a flexible tube for receiving said material, means for feeding material into said tube after it is so formed, a conveyor chain having lugs extending into the plane of the filled tube to convey the latter through the apparatus, heat sealing means movable into the plane of said filled tube on the opposite side from said lugs and cooperating with said lugs to seal said tube, and pressure members movable into the plane of said filled tube in advance of said heat sealing means to press the tube into engagement with said lugs.

21. An apparatus as recited in claim 20 wherein said pressure members comprise a pair of fingers which are spread apart after they engage said tube by said heat sealing means to effect a wiping action of the fingers against the tube.

22. In an apparatus for packaging material, the combination of means for continuously forming a flexible, movable tube for receiving said material, mechanism for feeding said material into said tube, means for heat sealing said tube, means for perforating the sealed portion of said tube, a common member carrying said heat sealing means and said perforating means in predetermined spaced relation, and mechanism for operating said common member to first move said heat sealing means and said perforating means simultaneously into engagement with said tube, then to move said means a predetermined distance with the tube, then to move said means simultaneously out of engagement with said tube, and then to return said means to their initial positions.

23. An apparatus as recited in claim 22 wherein said tube is movable in a horizontal plane, said heat sealing means and said perforating means being carried by a horizontally movable panel, a vertically movable frame in which said panel is slidably mounted, and cam means for controlling in timed relation the movements of said panel and frame.

JOHN R. GAMMETER.