

[54] **EQUIPMENT FOR CONDITIONING AND PACKAGING A PRODUCT**

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Related U.S. Application Data

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[52] U.S. Cl. **99/516, 53/30**

[51] Int. Cl. **A23n 1/00**

[58] Field of Search..... 99/475, 516, 194, 99/517, 477, 478, 4, 444, 443

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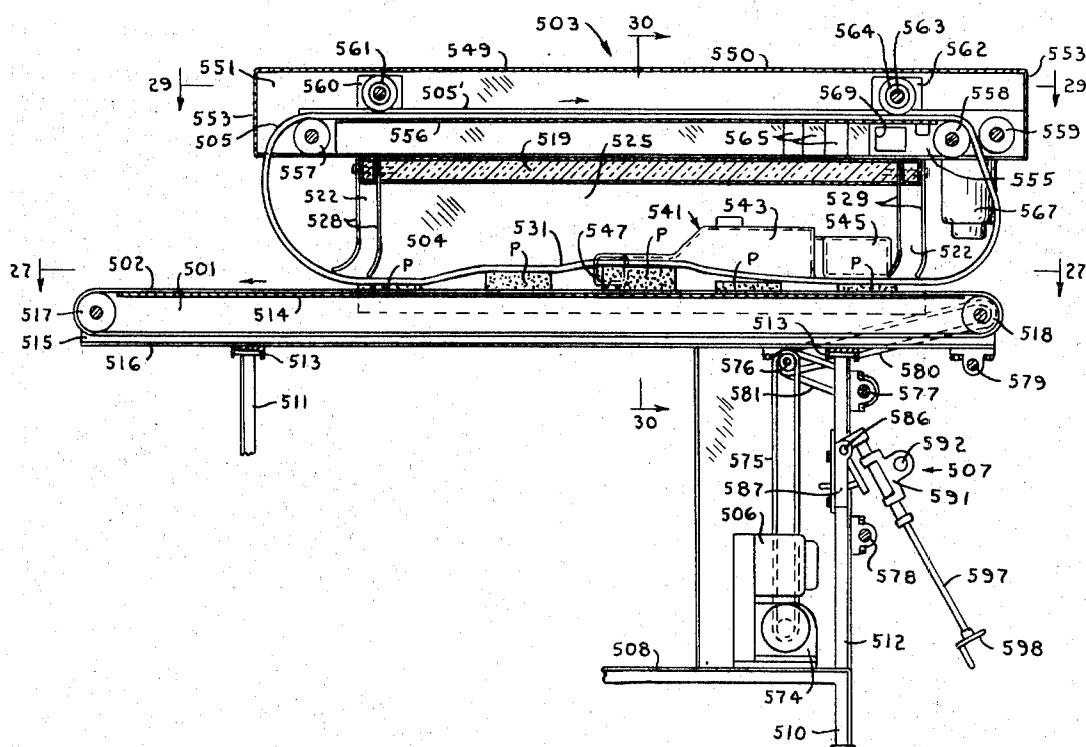
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[57] **ABSTRACT**

The invention is directed to a system whereby a product is sealed in a fusible plastic wrapper by shriveling and fusing portions of the latter and the product is conditioned or treated prior to packaging or wrapping.

7 Claims, 41 Drawing Figures



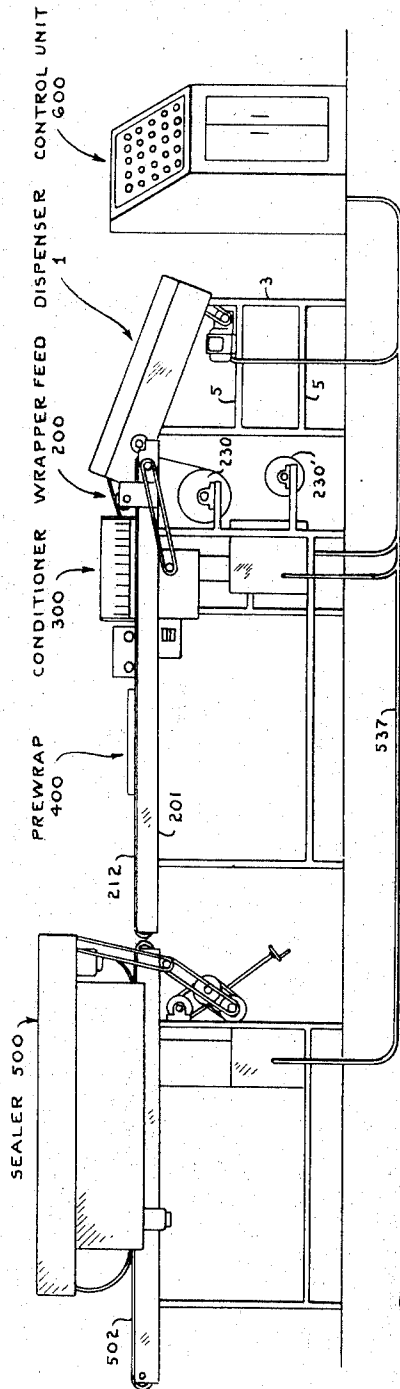


Fig. 1

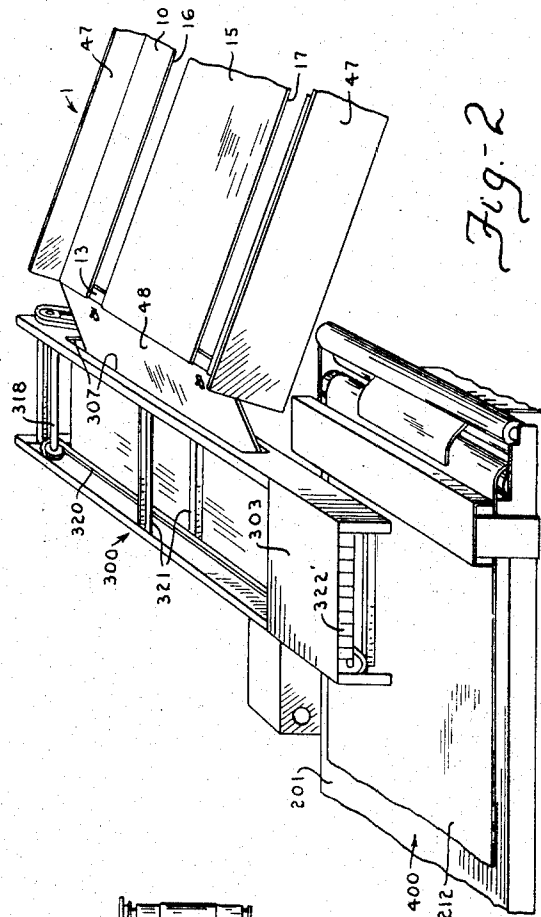


Fig. 2

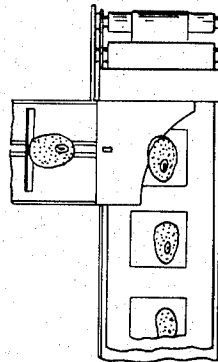


Fig. 8

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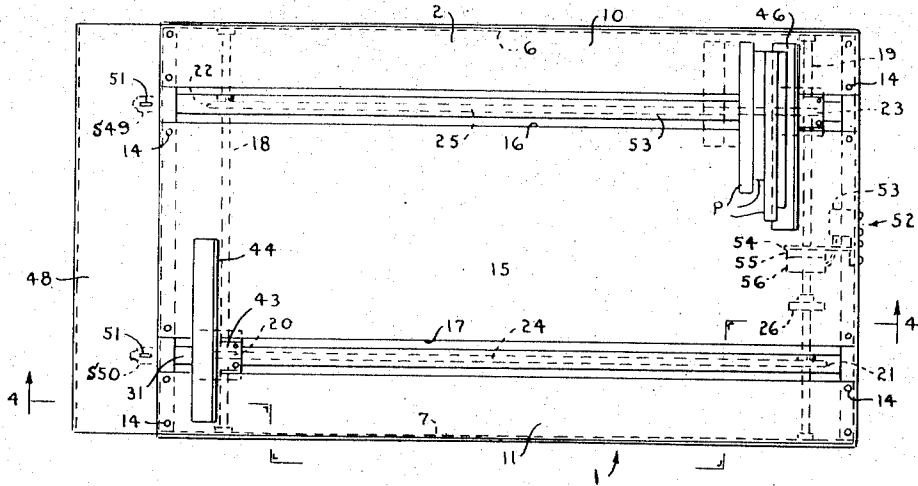


Fig-3

Fig-6

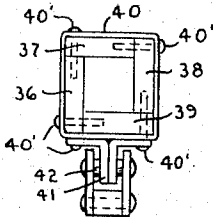
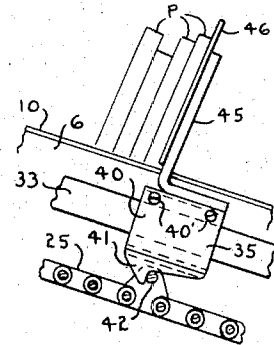


Fig-7

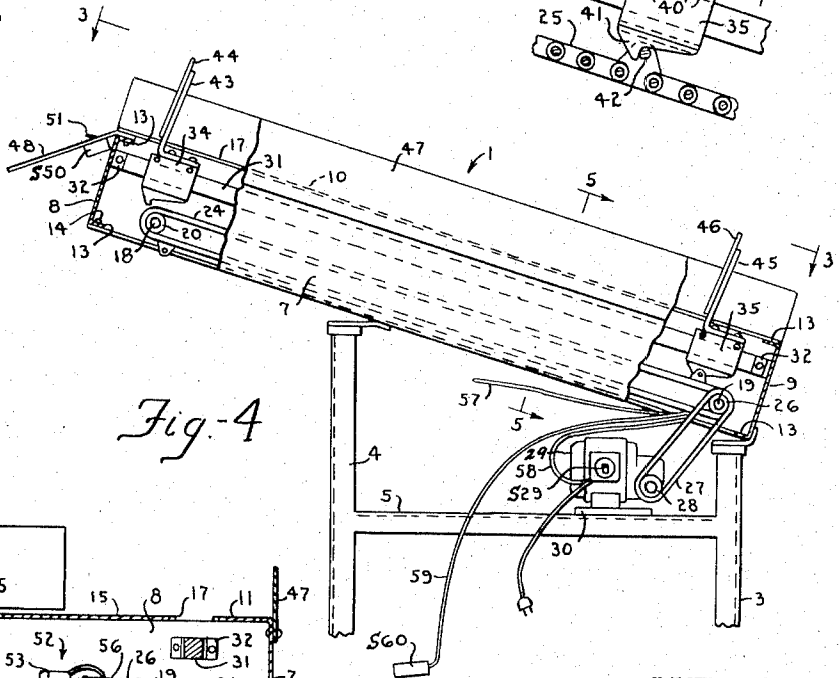


Fig-4

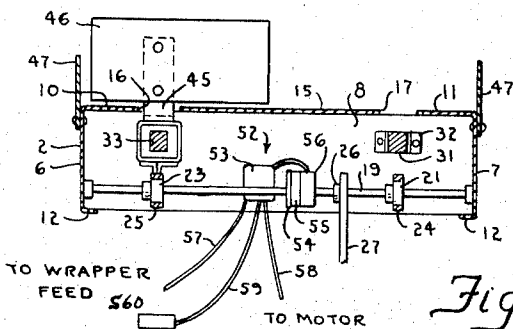
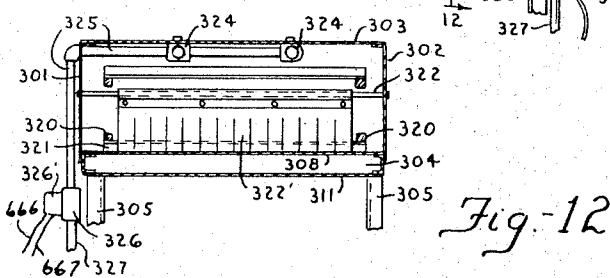
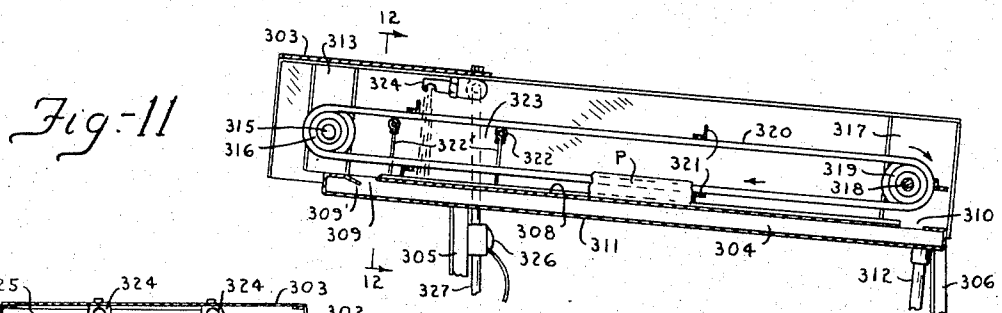
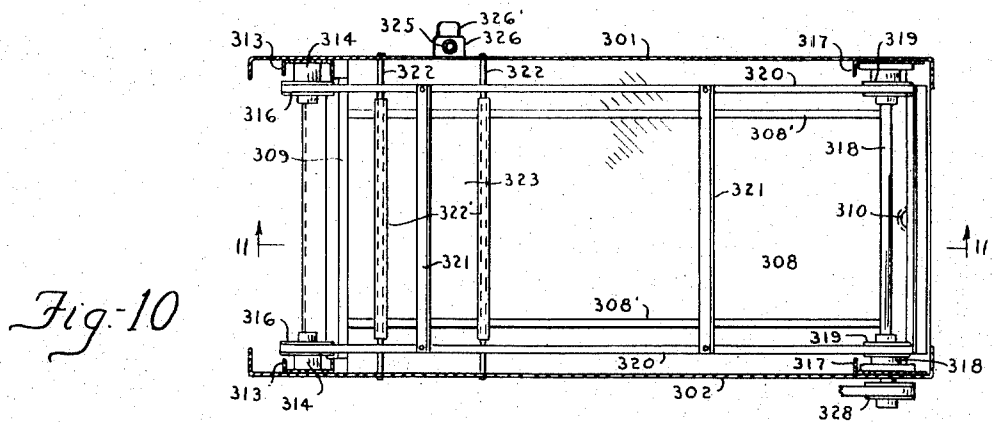
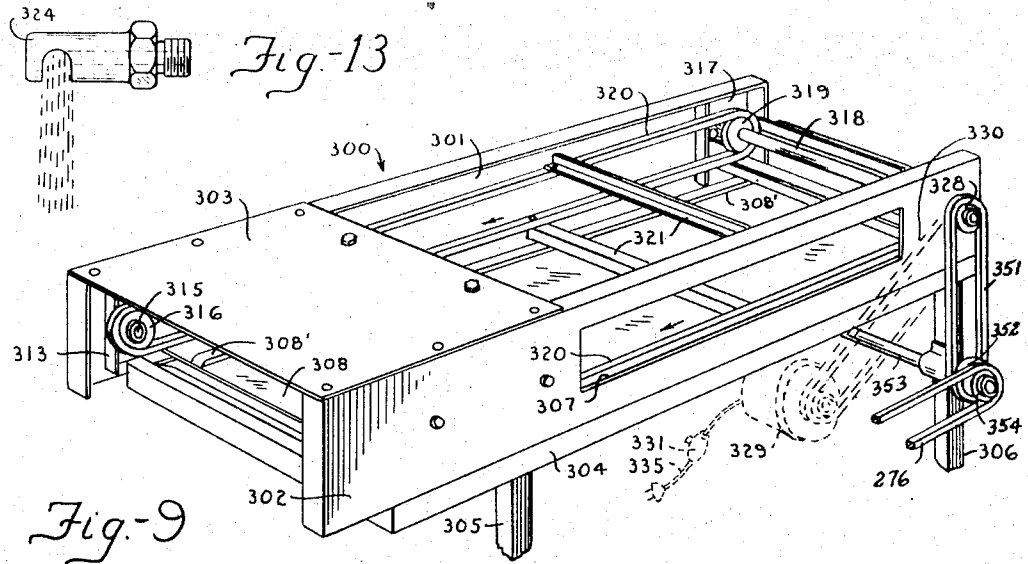


Fig-5

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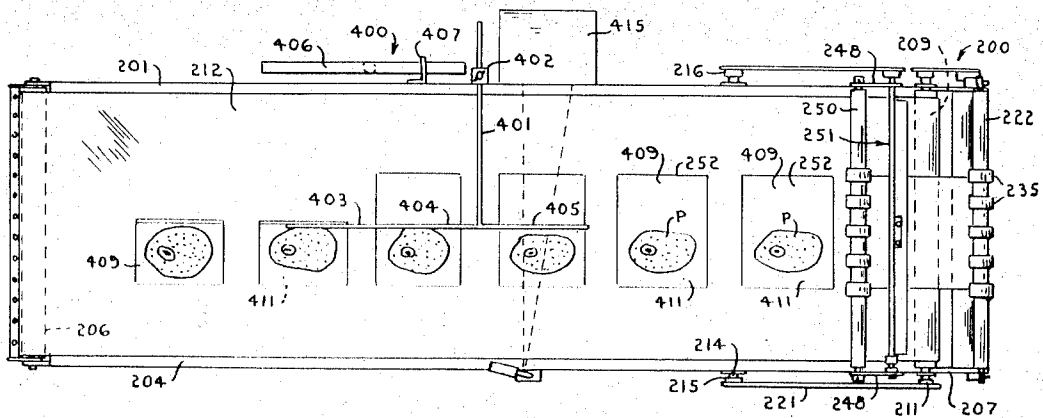


Fig. 14

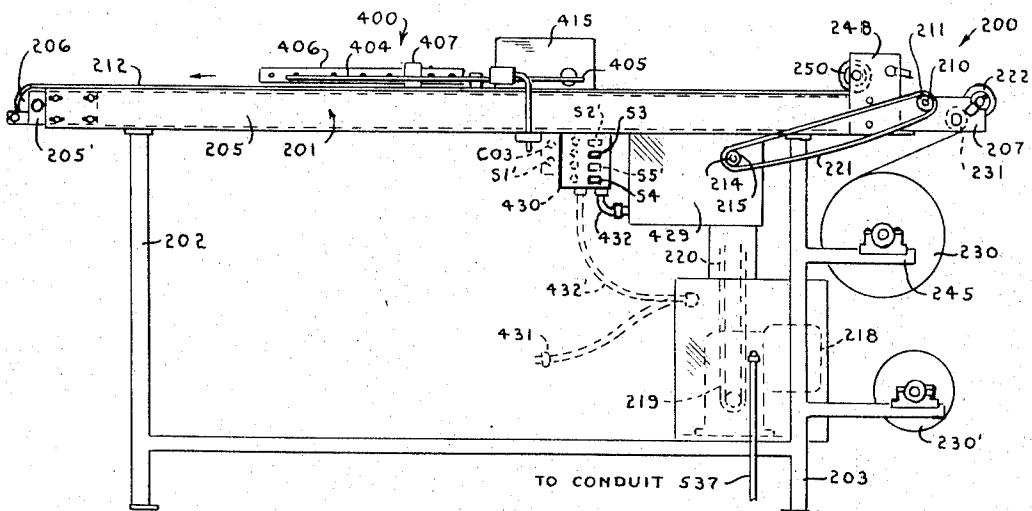


Fig. 15

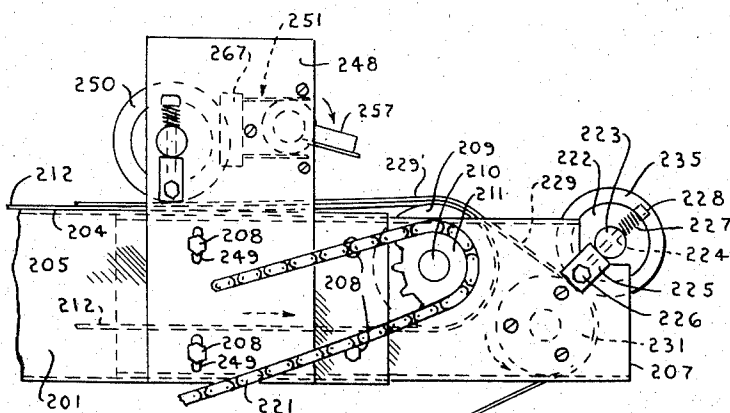


Fig. 16

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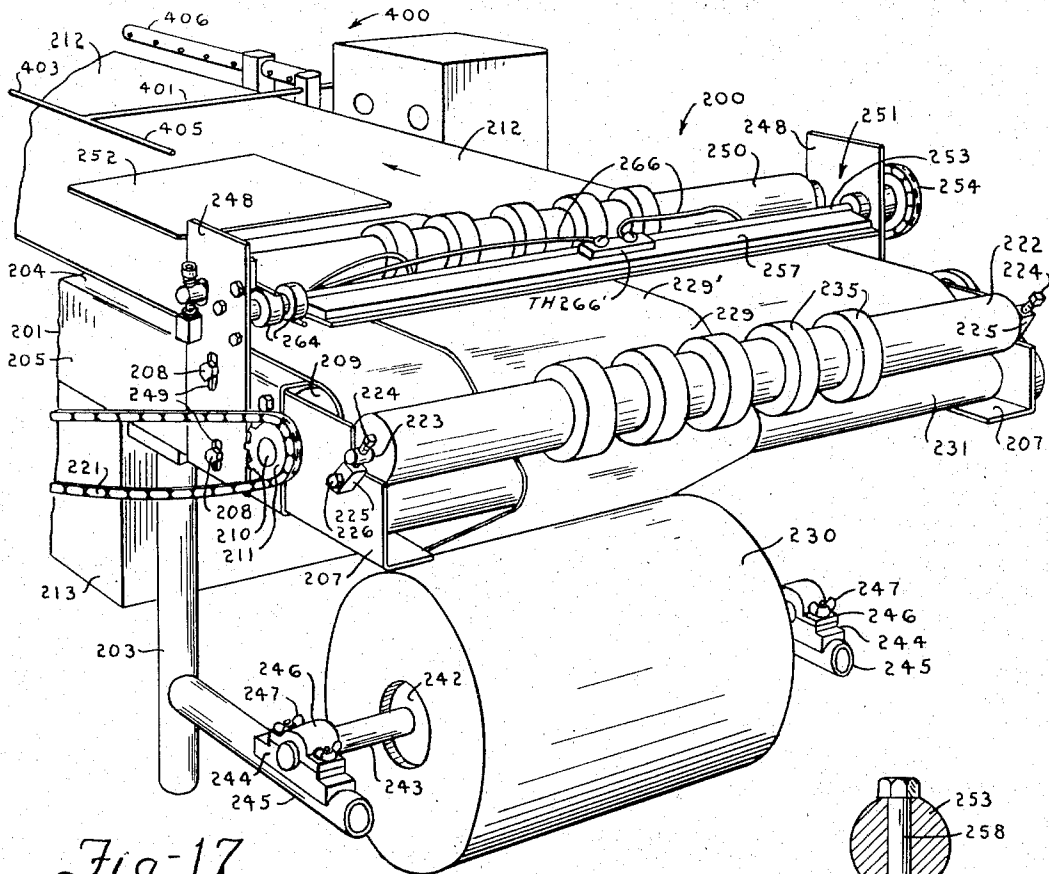


Fig. 17

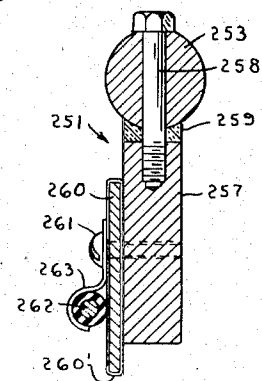


Fig. 19

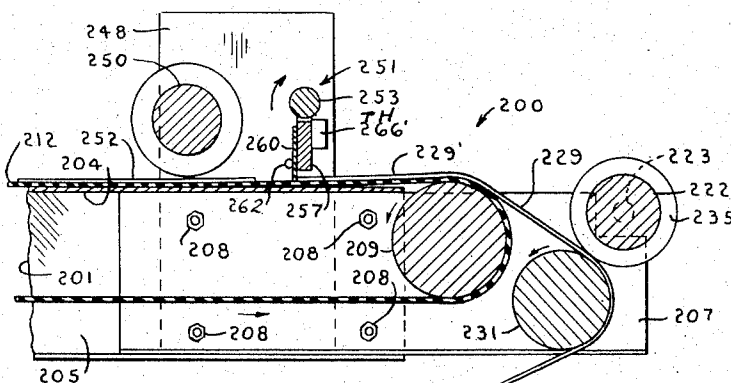
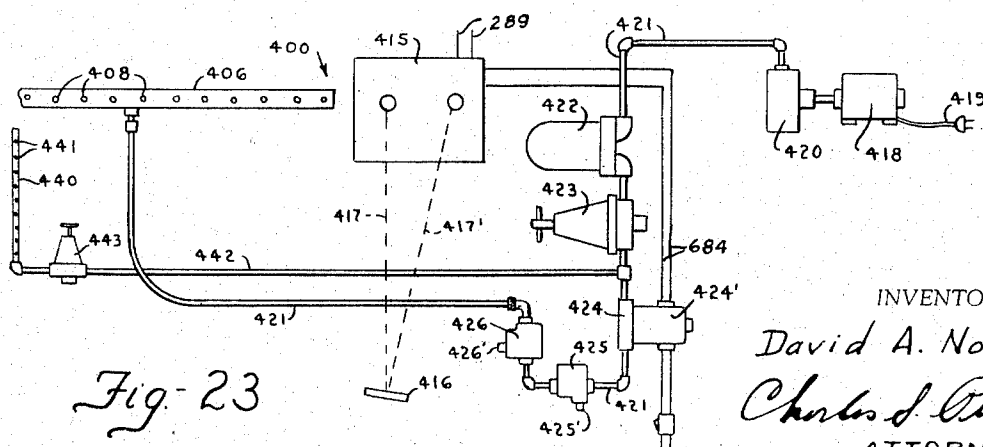
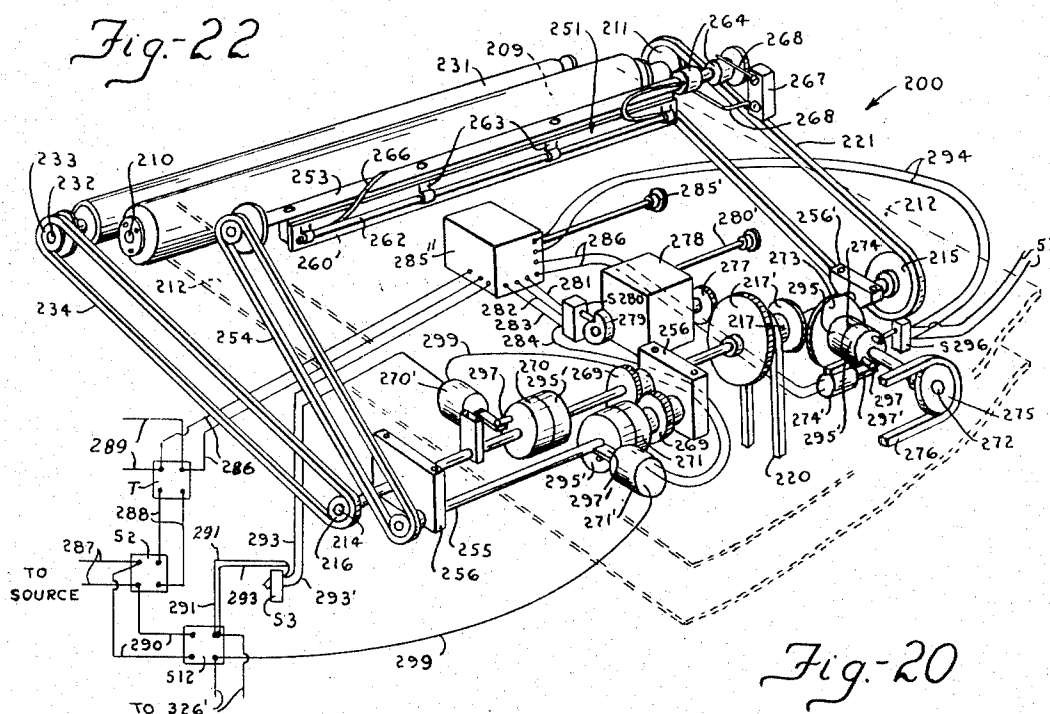
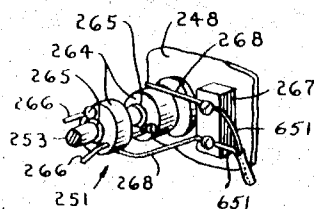
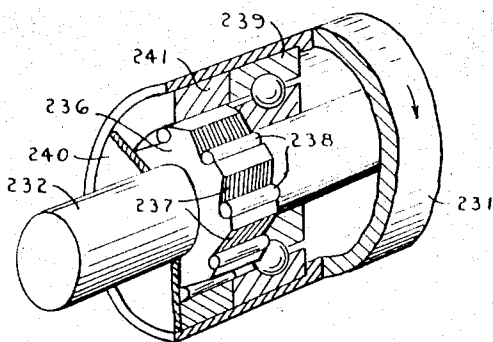


Fig. 18

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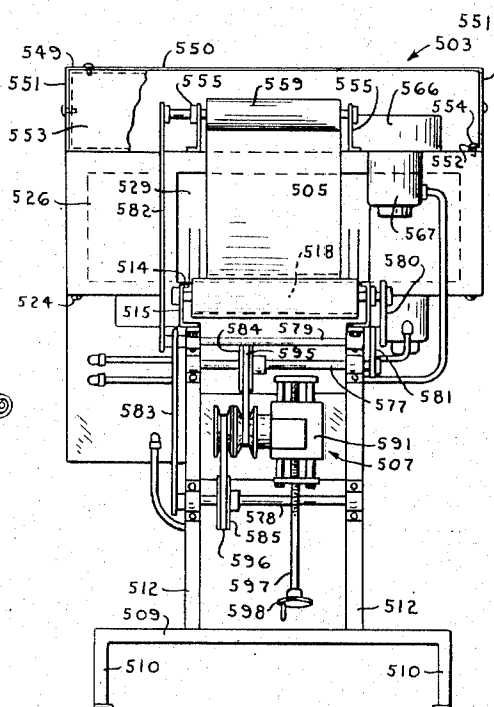
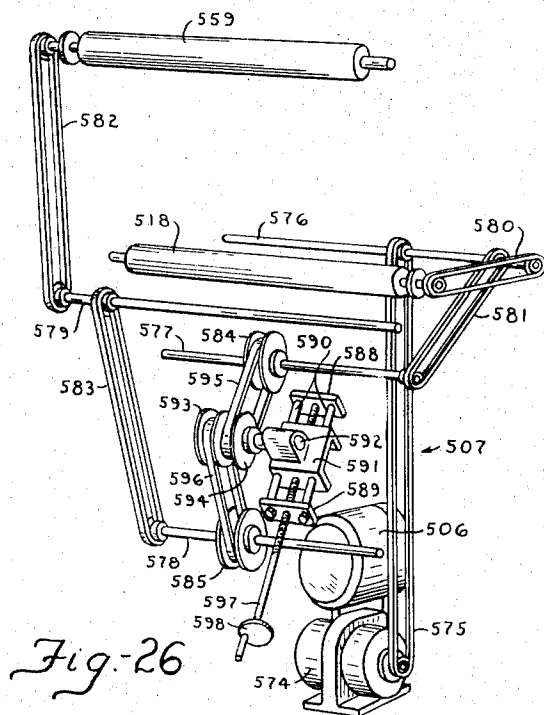
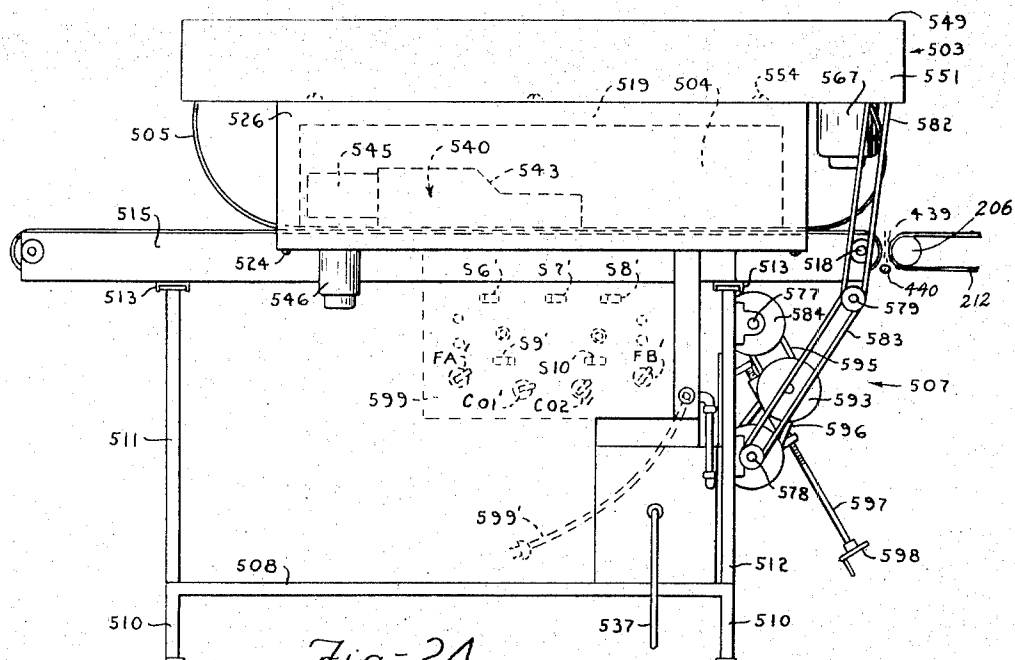


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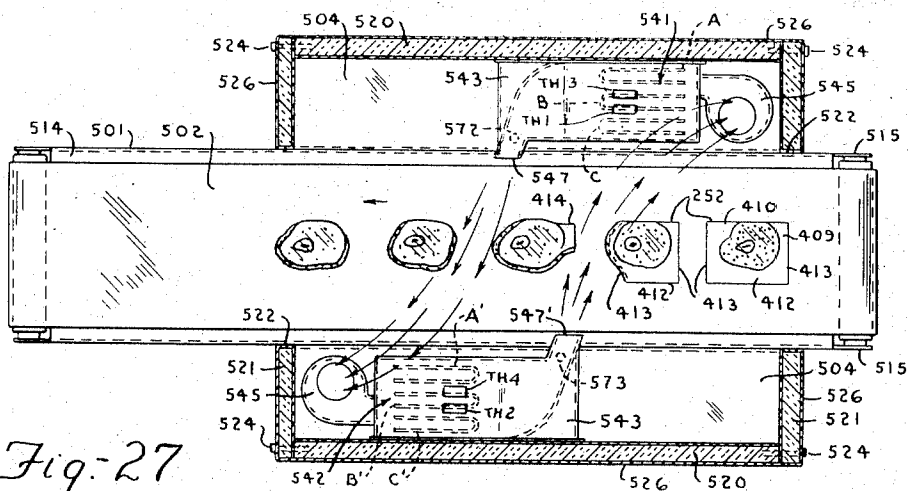


Fig.-27

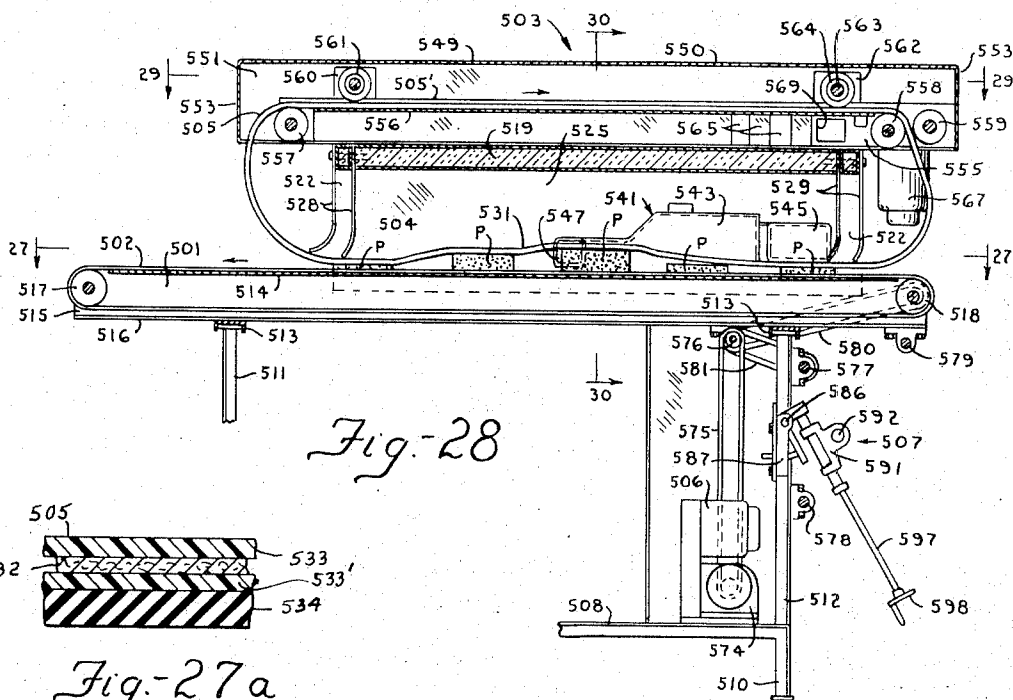


Fig.-28



Fig.-27a

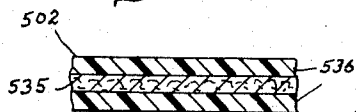


Fig.-27b

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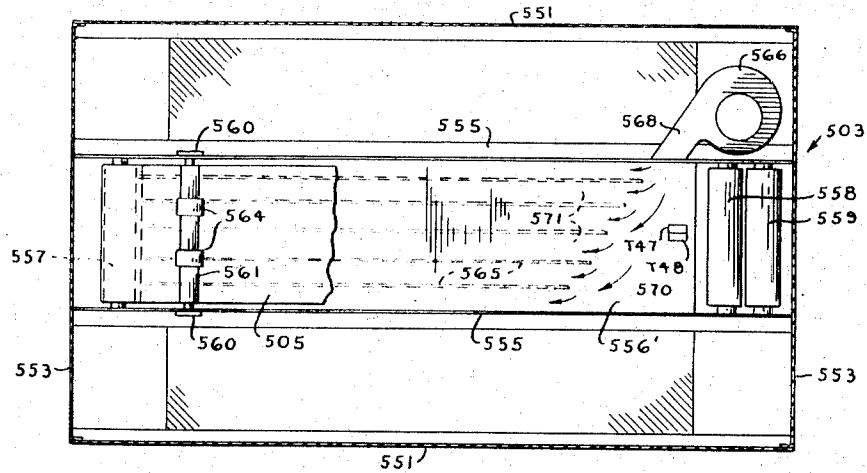


Fig.-29

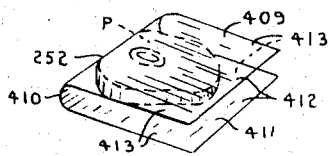


Fig.-31

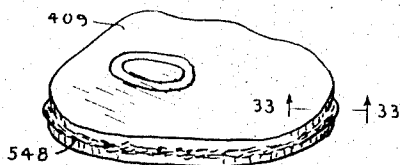


Fig.-32

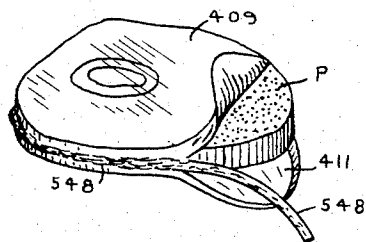


Fig.-34

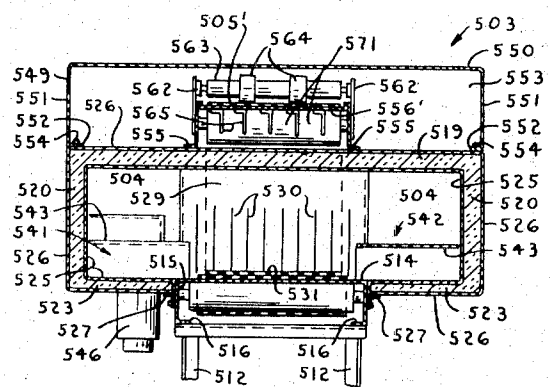


Fig.-30

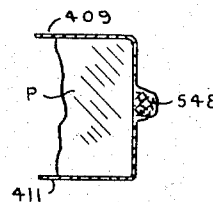


Fig.-33

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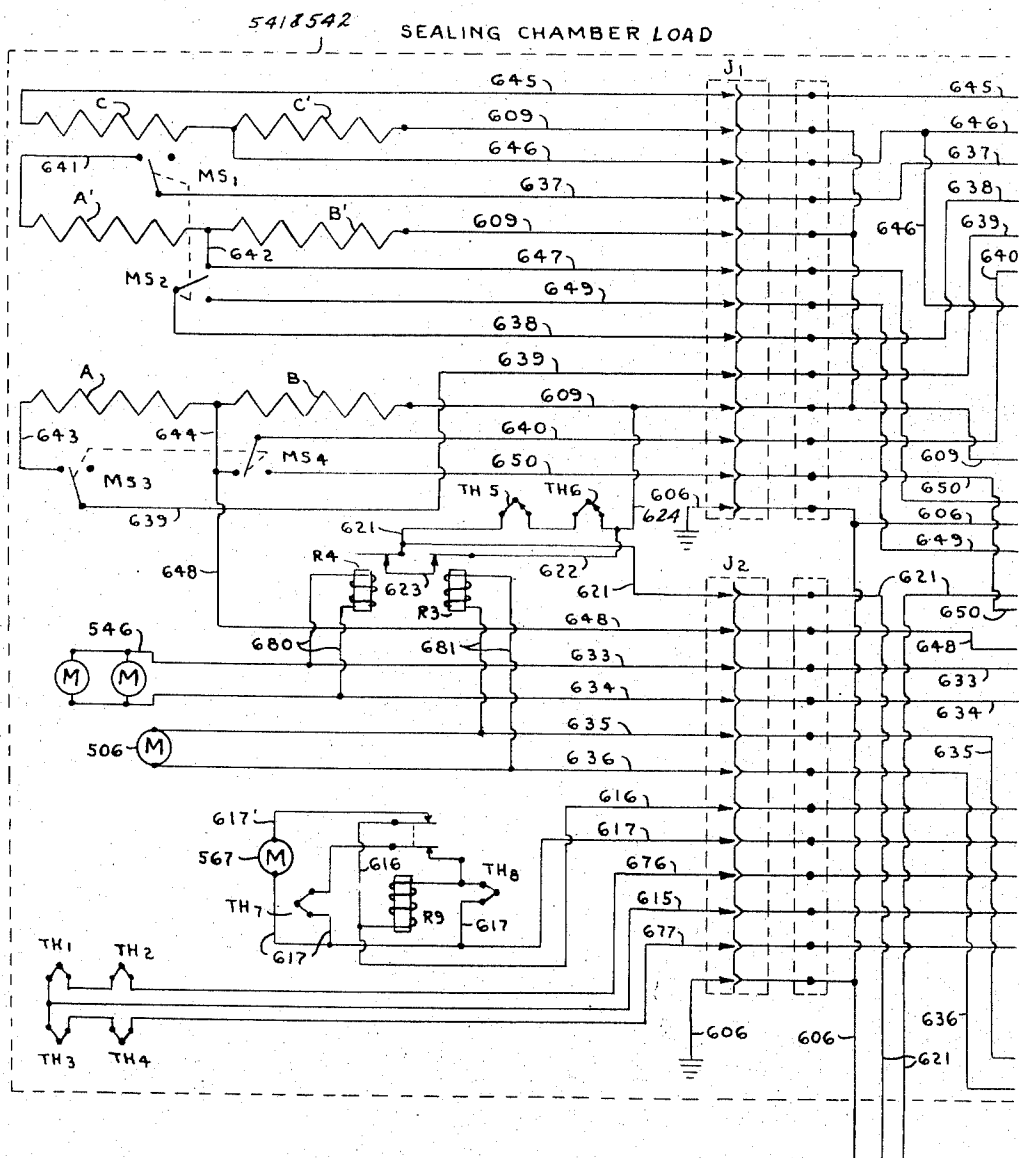


Fig.-35

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Fig.-36a

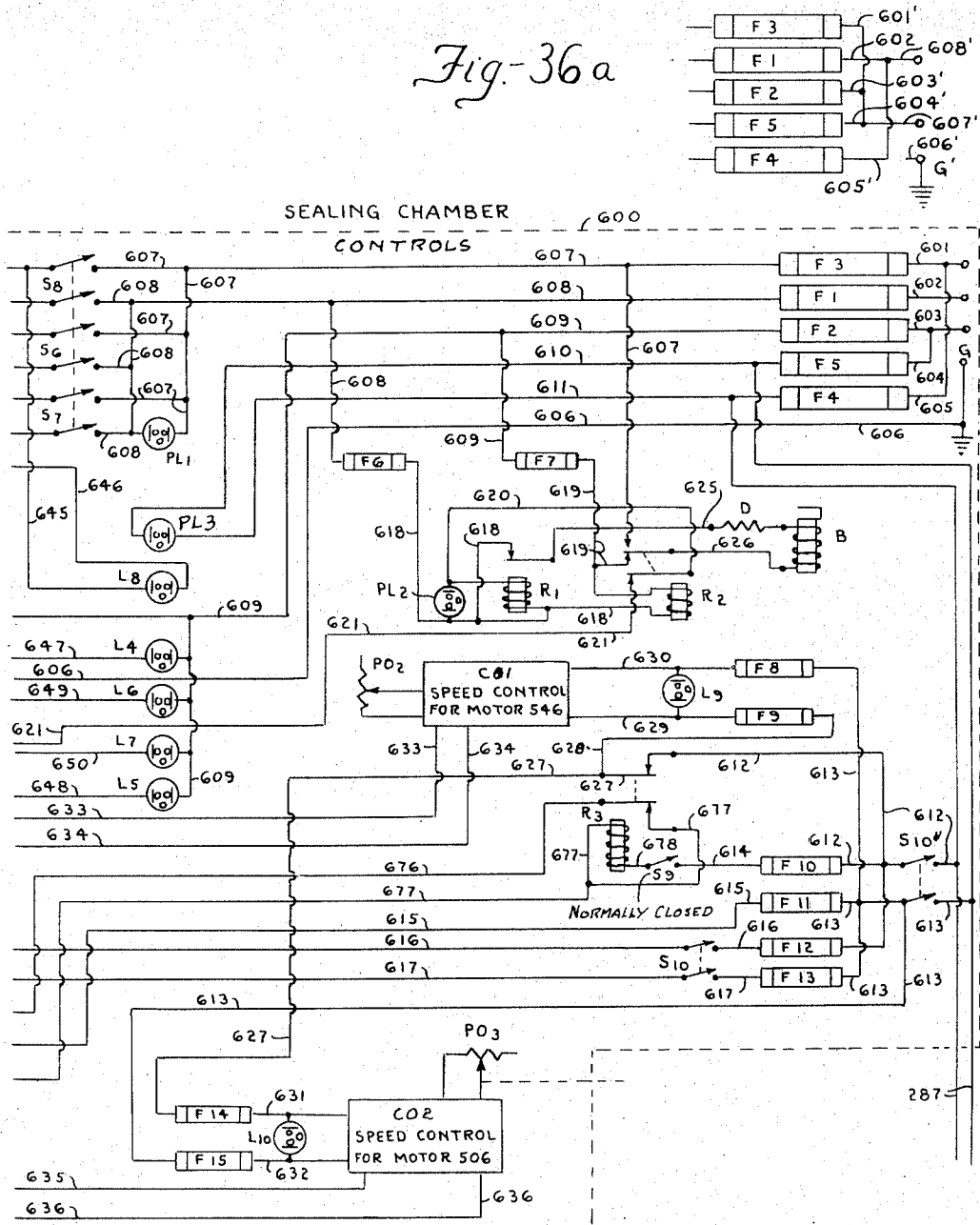
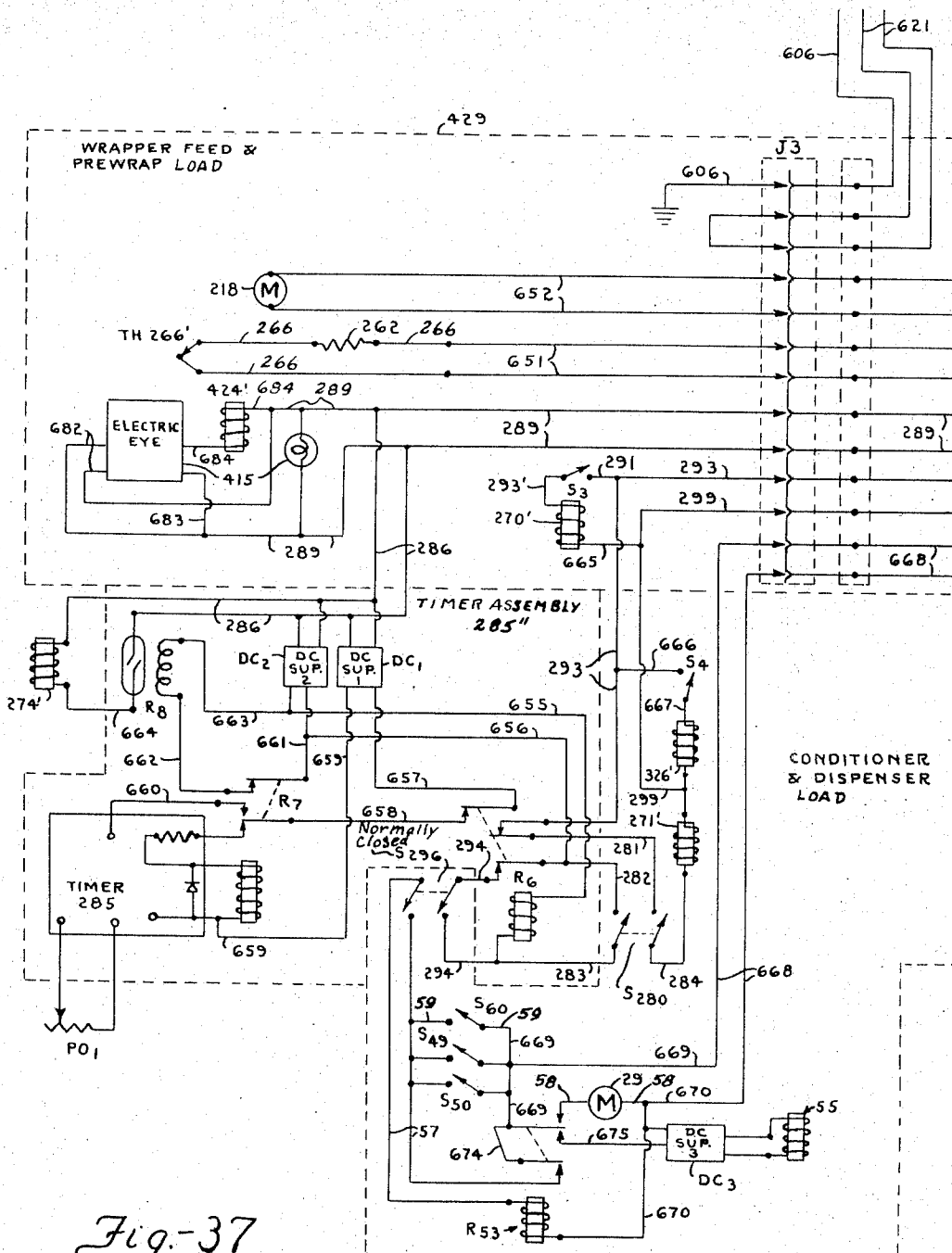


Fig.-36

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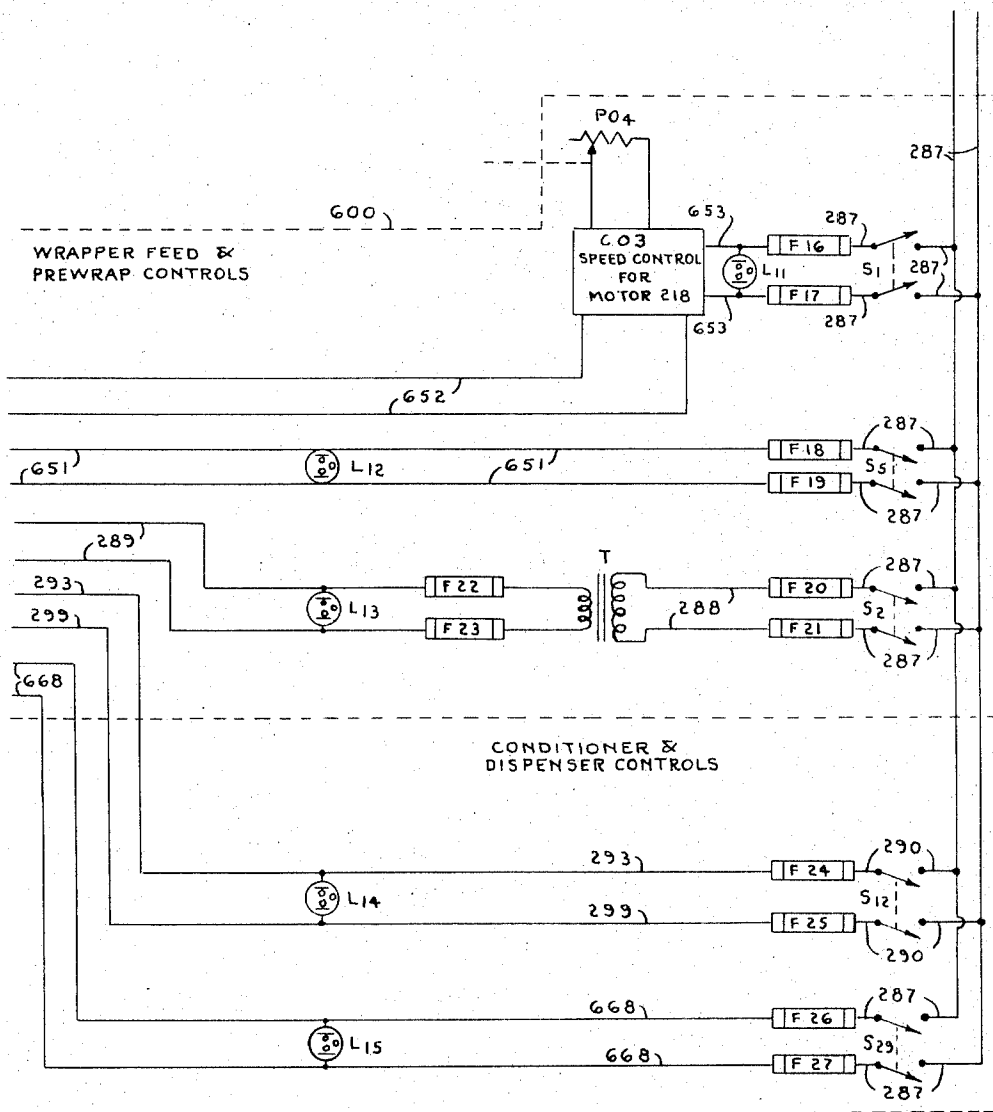


Fig.-38

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EQUIPMENT FOR CONDITIONING AND PACKAGING A PRODUCT

This application is a division of application Ser. No. 797,134 filed Feb. 6, 1969, now U.S. Pat. No. 3,712,020.

The invention, among other things, relates generally to wrapping products, such as frost coated sliced meat products, in plastic wrappers, and more particularly, is directed to a system or apparatus which preferably includes an elongated conveyor, wrapper feed assembly for feeding wrappers onto the conveyor, a dispenser for feeding the products to a conditioner which removes the frost and selectively places the products upon the wrappers, an assembly or means for effecting a partial wrapping or prewrap of the products while the products are transported by the conveyor, and a sealer through which the partially wrapped products travel for the purpose of changing the structural characteristics of the wrapper by shriveling and shrinking portions thereof whereby to provide a rib for sealing each product in a wrapper and which may be easily ripped or pulled away to facilitate removal of the wrapper when the product is ready for use.

One of the significant objects of the invention is to provide a wrapper feed assembly which is preferably operable in conjunction with the elongated conveyor above referred to for feeding a roll of plastic material thereto in such a manner that a free end portion thereof will be continuously directed onto a slightly inclined suspended area of the conveyor and an electrically heated movable cutter device will successively engage the material while on such area as it unwinds for the purpose of severing or cutting the material into wrappers for deposit at predetermined longitudinally spaced positions on the conveyor.

Another object of the invention is to provide the wrapper feed assembly with a plurality of controls for synchronizing the operation of the conditioner with other components of the system.

A further object of the invention is to provide a system in which the prewrap assembly thereof is associated with the conveyor and wrapper feed assembly in a manner whereby after the product is freed of frost by the conditioner the latter will deposit each product substantially centrally on substantially one-half portion of each wrapper so that a blast or current of air from the prewrap assembly will direct the other half portion of the wrapper against and over a former onto an upper moistened surface of each product for adherence thereto. The size of the wrappers are preferably predetermined so that the halves or opposed portions thereof will extend or project laterally from edge portions of the product in order to provide sufficient excess material which may be shrunk and shriveled when the wrapped products are subjected to heat in an oven or chamber constituting a component of the sealer above referred to.

Another object of the invention is to provide a conditioner which is operatively associated with the dispenser whereby the latter will readily accommodate one or a plurality of rows of products of variable sizes without prior manual adjustment of any of its components and wherein provision is made for maintaining the products in each row in a tilted back stacked relation while the products are fed or pushed off inclined ways to a high point or location thereon where they se-

lectively slide backwardly down an apron and discharge to the conditioner, or if so desired, directly onto the wrappers in the event that the conditioner is not utilized as a component of the system.

A particularly significant object of the invention is to provide a conditioner assembly which serves to condition frozen products such as frost coated slices of meat by removing the frost and cleansing the product by applying a film or thin layer of liquid to the surface of the products so that when the products are refrozen in a wrapper, the film of moisture will set to bond the wrapper to the product to obtain a frost-free package whereby the material or true characteristics of the product will be clearly presented to customers for purchase. The film or layer of liquid is preferably sprayed onto the upper face and edges of each product as it is conveyed up an inclined surface for eventual deposit onto a wrapper previously fed to and located on the conveyor by the wrapper feed assembly and cutter device.

Another object of the invention is to provide a conditioner of the character above described in which an upper wall of the sump constitutes the inclined surface and any surplus liquid sprayed onto the product will lubricate the inclined surface to promote travel of the product thereon and apply a film of liquid to a bottom face or surface of the product and then drain off into the sump.

The apparatus or system offers other advantages with respect to efficiency, continuity in the operation of the various components thereof, capacity of output, durability and uniformity in the resultant product.

Additional objects and advantages of the invention or inventions above referred to will become apparent after the description hereinafter set forth is considered in conjunction with the drawings annexed hereto. In the drawings:

FIG. 1 is a side elevational view of the apparatus or system;

FIG. 2 is an enlarged partial perspective view showing the operative relationship between a dispenser, conditioner, and a prewrap assembly of the system;

FIGS. 3 through 7 are directed to the dispenser and FIG. 3 is a top plan view thereof looking in the direction of the arrows 3—3 of FIG. 4;

FIG. 4 is a side elevational view taken substantially on line 4—4 of FIG. 3, with portions broken away for purposes of illustrating certain structure;

FIG. 5 is a transverse section taken substantially on line 5—5 of FIG. 4;

FIG. 6 is an enlarged partial section showing more in detail the mode of conveying the products through the dispenser;

FIG. 7 is an enlarged transverse section showing details of a guide constituting a component of the dispenser;

FIG. 8 is a modified arrangement showing the dispenser arranged for delivering the products directly to the prewrap assembly without utilizing the conditioner;

FIGS. 9 through 13 are directed to the conditioner and FIG. 9 is a perspective view thereof;

FIG. 10 is a top plan view of the conditioner, with portions in section for the purpose of illustrating details of construction;

FIG. 11 is a longitudinal vertical section taken substantially on line 11—11 of FIG. 10;

FIG. 12 is a transverse vertical section taken substantially on line 12—12 of FIG. 11;

FIG. 13 is a side view of one of the spray nozzles utilized in the conditioner;

FIGS. 14 through 22 are directed to a wrapper feed assembly and cutter device and FIG. 14 is a top plan view thereof;

FIG. 15 is a side elevational view of the structure shown in FIG. 14;

FIG. 16 is an enlarged partial side elevational view of a portion of the wrapper feed assembly shown in FIGS. 14 and 15;

FIG. 17 is an enlarged perspective view of a portion of the wrapper feed assembly showing the operative relationship of certain of the movable components thereof;

FIG. 18 is a partial vertical longitudinal view taken through the structure shown in FIG. 16 for the purpose of showing details of the structure;

FIG. 19 is an enlarged transverse section taken through the cutter device showing details of its construction;

FIG. 20 is an enlarged perspective view which shows, among other things, the operative relationship and purposes of certain controls of the system or apparatus;

FIG. 21 is an enlarged partial perspective view of a portion of the cutter device;

FIG. 22 is an enlarged partial perspective view, with portions in section, of one of the rollers utilized in conjunction with the wrapper feed;

FIG. 23 is a layout of the prewrap assembly which is utilized in conjunction with the conditioner and wrapper feed;

FIGS. 24, 25, 26, 27, 27a, 27b, 28, 29, and 30 are directed to the sealer assembly or structure and FIG. 24 is a side elevational view thereof;

FIG. 25 is an end elevational view of the assembly shown in FIG. 24;

FIG. 26 is a perspective view showing a speed reducer operatively associated with the structure for synchronizing the movement of conveyor belts constituting components of the assembly;

FIG. 27 is a horizontal section taken substantially on line 27—27 of FIG. 28;

FIG. 27a is an enlarged transverse section taken through the upper belt of the assembly;

FIG. 27b is an enlarged transverse section through the lower belt of the assembly;

FIG. 28 is a vertical section taken through the assembly shown in FIG. 24;

FIG. 29 is a horizontal section taken substantially on line 29—29 of FIG. 28;

FIG. 30 is a transverse section taken substantially on line 30—30 of FIG. 28;

FIG. 31 is a perspective view showing one of the products prewrapped or partially wrapped for travel through the sealer;

FIG. 32 is a perspective view of the product showing its resultant sealed state or condition after having passed through the sealer;

FIG. 33 is an enlarged transverse section taken substantially on line 33—33 of FIG. 32 showing the shriveled or shrunk laterally extending portions of the wrapper which form the sealing rib or joint about the major portion of the resultant product;

FIG. 34 is a perspective showing whereby the seal may be ripped or torn away to facilitate access to the wrapped product when ready for use;

FIG. 36a is a modified electrical input side of the electrical system; and

FIGS. 35 through 38 are directed to the electrical circuitry.

The system or apparatus, may be modified in various respects as will be explained more in detail subsequently but as exemplified in FIG. 1, the system preferably includes: a dispenser generally designated 1 for selectively conveying products such as frost coated meat to a conditioner 300 which serves to remove the frost from the product and convey the defrosted products for deposit onto wrappers of fusible sheet material previously deposited on the elongated conveyor by a wrapper feed assembly 200; a prewrap assembly 400 which serves to fold or move a portion of the wrapper against or about the product to partially wrap the same; a sealer assembly 500 which receives the partially wrapped product and serves to fuse portions of each wrapper to seal a product therein; and a cabinet 600 provided with suitable controls for controlling the operation of the various components or assemblies of the system which will now be described hereinafter. It should be noted that the dispenser is provided with conveyor means for transporting the frost coated products to the conditioner; that the conditioner is provided with conveyor means for transporting the defrosted products to the elongated conveyor; that the sealer is provided with conveyor means; and that the elongated conveyor transfers the partially wrapped products to the conveyor means of the conditioner for conduction through the heat chamber thereof.

The claims in the subject application are primarily directed to the conditioner and its operative relationship with adjacent components of the system.

DISPENSER - 1

The dispenser may be designed and constructed in various ways and as illustrated in FIGS. 1 through 7, serves to successively feed a pair of rows or stacks of products P to the conditioner assembly 300, above referred to, or if desired, the conditioner assembly may be omitted, in which event the product may be fed directly to the prewrap assembly 400 as exemplified in FIG. 8.

It should be observed that the dispenser as shown in disposed transversely with respect to the conditioner and that if utilized as in FIG. 8, it would extend transversely of the prewrap 400. The dispenser may be used independently of or in conjunction with the system or apparatus shown or with equipment not disclosed.

Referring more particularly to FIGS. 3 through 7, the dispenser, designated 1, comprises a rectangular box-like frame 2 which is supported in an inclined position by a pair of short legs 3 and a pair of long legs 4 (only one of each of the legs are shown). The pairs of legs 3 and 4 are jointed by side braces 5 and by end braces not shown. The frame 2 may be designed and constructed in various ways, but as illustrated, it is preferably open at the bottom and includes a pair of parallel side walls 6 and 7 and a pair of end walls 8 and 9.

The side walls 6 and 7 are respectively provided with upper intumed continuations providing planar ways or tracks 10 and 11 and with lower intumed flanges 12. The end walls 8 and 9 are provided with intumed upper

and lower flanges 13 which engage the inner surfaces of the lower flanges 12 and the ways 10 and 11. The side walls 6 and 7 and end walls 8 and 9 may be secured together by any mode desired such as by screws or bolts 14.

The frame also includes a rectangular planar plate providing a center way 15 or track which is common to and located between the ways 10 and 11. More specifically in this respect, the ways 10, 11, and 15 are located in the same plane and the center way 15 is larger than the ways 10 and 11 and is spaced therefrom by a pair of longitudinal openings or slots 16 and 17.

A pair of transverse shafts 18 and 19 are rotatably mounted on the side walls 6 and 7 of the frame. A first pair of aligned sprockets 20 and 21 and a second pair of aligned sprockets 22 and 23 are respectively carried by the shafts 18 and 19. A belt in the form of a chain 24 is carried by sprockets 20 and 21 and a belt in the form of a chain 25 is carried by the sprockets 22 and 23. A sprocket 26 is also carried by the shaft 19 and a belt 27 connects the sprockets 26 with a sprocket 28 carried by a speed reducer associated with an electric motor 29 provided with a switch S29. This motor is mounted on a platform 30 carried by a pair of the upper braces 5 as shown in FIG. 4.

An elongated bar or rail 31 is supported by suitable end fittings 32 carried by the end walls 8 and 9 of the frame 2 for supporting the bar directly below and in spaced relation to the longitudinal opening or slot 17. A second bar 33 corresponding to the bar 31 is similarly supported below the opening or slot 16. The bars 31 and 33 are preferably square in cross-section and slides 34 and 35 are respectively mounted thereon.

The slides may be designed and constructed in various ways but as shown in FIGS. 6 and 7, each preferably comprises four planar bearing members 36, 37, 38, and 39 of Nylon which are secured together in a square tube 40 by four screws 40' to provide a square formation which smoothly slidably receives one of the bars without the necessity of lubrication. The bearing members may be constructed of material other than Nylon. Each of the slides is provided with an abutment preferably in the form of a hook 41 which is adapted to periodically engage or receive an abutment in the form of a cross-pin 42 carried by a chain. The hook may be constructed of a pair of angled members which are preferably secured in abutting relation by screws or equivalent means and the cross-pin is secured to upstanding portions of a pair of special side links of a chain.

The slide 34 on the bar 31 is preferably provided with an upstanding L-shaped bracket 43 which extends through the slot 17 and is provided with a planar plate constituting a mover or pusher 44. The other slide 35 on the bar 33 is similarly provided with a bracket 45 and a mover 46. It should be observed that the mover 44 and chain 24 constitute one conveyor; that the mover 46 and chain 25 constitute another conveyor; and that the movers or pushers are disposed at oblique angles of preferably 10° with reference to the plane formed by the ways 10, 11, and 15 as shown in FIGS. 4 and 6 so that, for example, a plurality of products P of fairly generally uniform cross-dimensions or sizes may be stacked to lean back or tilt to the right against the mover or plate 46 and with their lower edges or portions engaging the ways so that such edges or portions will be the first to leave the ways as the products

slide off high points of the ways. The mover or pusher plate 44 overlies the ways 11 and 15 and the mover or plate 46 overlies the ways 10 and 15. The side walls 6 and 7 of the frame 2 are preferably provided with upwardly extending elongated continuations 47 which assist in preventing accidental lateral discharge of the stacked products while they are being conveyed upwardly and forwardly on the ways.

The upper left extremity of the frame is preferably provided with a downturned inclined apron 48 which is connected to the end wall 8 of the frame for the purpose of successively delivering the products to the conditioner 300. The apron is of a width substantially corresponding to the width of the frame and is provided with a pair of independently operable switches S49 and S50, each having an inclined actuator 51 which extends upwardly through an opening provided therefor in the apron so that, for example, each of the products P in the row shown in FIG. 3, on reaching the high point on the ways 10 and 15, will fall back and slide down the apron to cause the lower edge of the product to engage the actuator to operate the switch S49 and then slide flatwise therebeyond and through a side opening 307 in the conditioner. The switches S49 and S50 are connected to the switch S29 of the motor 29 and to a control box generally designated 53 which will be later described.

The switches S49 and S50 are connected in parallel and in series with the instrumentalities in the control box 53 and constitute components of the electrical circuitry exemplified in FIGS. 35 through 38. The electrical circuitry is such that any desired number of products preferably within a range of sizes may be stacked against either or both of the movers or pushers 44 and 46 so that, for example, after one row has been completely dispensed, the other row will automatically take over and continue to direct products to the conditioner. The movers are manually selectively retractible and products may be manually placed or loaded into the dispenser against either one of the movers while the other is conveying.

The dispenser is preferably provided with a brake device, generally designated 52, for the purpose of preventing over-run of either of the conveyors. More specifically, the brake device serves to control the operation of the shaft 19 which is driven by the motor 29. This device is primarily supported on the end wall 9 of the frame 2 and among other things, includes the control box 53 above referred to which contains relays (shown in the electrical circuitry), a stationary arm 54 which carries a fixed electrically operable magnetic component 55 and a movable magnetic component 56 which is keyed to the shaft 19 and which when energized serves to forcibly engage the stationary component 55 and prevent rotation of the shaft and when de-energized permits free rotation of the shaft. As illustrated in FIGS. 4 and 5, a pair of conductors 57 connect the control box 53 with a switch S296, the latter of which forms part of a control system of the wrapper feed assembly 200 as shown in FIG. 20. The box is also connected to the motor 29 by a pair of conductors 58 and to a footswitch S60 by a pair of conductors 59. The organization is preferably such that manual closing of the switch S29 will operate the motor 29 to cause simultaneous rotation of the shafts 18 and 19 to impart motion to the conveyor chains 24 and 25, which selectively operate the movers or pushers 44 and 46. When

the actuator 51 of the switch S49 is depressed by a product to close this switch, the motor 29 is stopped and the brake 52 is operated to also prevent rotation of the shaft 19. During these non-operative periods of the motor and shaft 19, the foremost product in a row previously fed to the conditioner will be transported or conveyed therefrom onto one of a plurality of wrappers 252 being moved forwardly on the elongated conveyor which is designated as component 212 of the wrapper feed assembly 200. The switch S296 of the wrapper feed control system is connected to the control box 53 and when opened serves to restart the motor 29 and deactivate the electric brake 52. The footswitch S60 actually serves as an emergency switch which when closed immediately stops the operation of the dispenser. The organization is preferably such that the switches S49 and S50 serve to respectively independently control the step-by-step movement of the movers of the dispenser. This operative relationship between the dispenser and the control system of the wrapper feed 200 is preferably such that the control system serves to place the dispenser either in an operative condition whereby actuation of the switches S49 and S50 will operate the movers or in an inoperative condition. The motor 29 may be turned "on" or "off" by a switch S29 on the control unit 600, by a switch S2' on a panel 430 of the control assembly of the wrapper feed or by plugging the extension cord shown in FIG. 4 directly into an electrical source, all of which will be described more in detail subsequently in connection with the electrical circuitry.

WRAPPER FEED - 200

The wrapper feed assembly 200 may be utilized as a component of the system as shown in FIG. 1 or, if desired, as an independent unit, or in conjunction with other equipment not shown.

More particularly, certain of the wrapper feed structure, as depicted in FIGS. 14 through 22, is common to the prewrap assembly 400. The wrapper feed includes an elongated rectangular inverted channel 201 supported horizontally by a frame including two pairs of legs 202 and 203. The channel has a top planar wall or platen 204 and a pair of parallel side walls 205 having lower intumed flanges. The left ends of the side walls 205 preferably support adjustable side plates or members 205', which in turn rotatably carry an idler roller 206. Extensions 207 are preferably detachably secured to the right ends of the side walls by bolts 208 and support a drive roller 209 having a shaft 210 rotatably carried by the extensions. A sprocket 211 is fixed on the shaft 210 and an endless conveyor or belt 212 is supported on the idler roller 206 and the drive roller 209 so that an upper portion of the belt will ride on the platen 204 of the channel. The plates 205' at the output end of the conveyor may be adjusted to control the tautness of the belt 212. A housing 213 is supported directly under the frame 201 and a split primary shaft 214 is journaled therein and has end sections respectively carrying sprockets 215 and 216, with a member on one section having a sprocket 217 and large and small gears 217' on opposite sides of the sprocket 217 as depicted in FIG. 20. An electric motor 218, as shown in FIG. 15, is supported on the frame and a speed reducer 219 driven by the motor is connected to the sprocket 217 on shaft 214 by a chain or belt 220 for imparting rotation to the right section of this shaft. A

chain or belt 211 connects the sprockets 211 and 215 respectively fixed on the shaft 210 and on a section of the primary shaft 214 so that rotation of the latter will also impart rotation to the drive roller 209 to cause the belt 212 to travel in the direction indicated by the arrows in FIGS. 14 through 18.

The wrapper feed 200 is operatively associated with the input end of the conveyor belt 212 and related structure, and includes an idler roller 222 for the wrapping material and is rotatable on a shaft 223, the latter, as best shown in FIG. 16, having apertured ends through which threaded elements 224 extend and connect with a pair of fittings 225. Each of the fittings is detachably and pivotally supported on an extension 207 by a screw or bolt 226 and a helical spring 227 is carried by each of the elements 224 for disposition between a fitting and a head 228 of an element for biasing or resiliently urging the roller 222 against an unwound end portion 229 of a roll 230 of plastic wrapper material. A driven roller 231 for the wrapper material has a shaft 232 which is also journaled on the extensions 207. A sprocket 233 is fixed on the shaft 232 and a chain 234 connects sprocket 233 with the sprocket 216 on a left section of the shaft 214. The pivotal positioning and biasing adjustment of the roller 222 may be readily controlled by manipulating the screws 226 and the elements 224. The roller 222 is preferably provided with a plurality of axially spaced annular resilient members 235 for effectively engaging and stabilizing the wrapper material as it is being fed to the conveyor 212. As shown in FIG. 15, a roll 230' of wrapper material of a greater or lesser width than the roll 230 may be utilized in lieu of the latter.

Attention is directed to the fact that an anti-reverse mechanism is preferably embodied in the driven roller 231 for the strip of wrapper material. This mechanism may be designed and constructed in any mode desired, but as shown in FIG. 22, includes an annular member 236 which is fixed on the shaft 232 and provided with circumferentially spaced peripheral notches 237 which respectively loosely receive brake or clutch members in the form of rollers 238. A ball bearing assembly 239 is carried by the shaft 232 and is housed in the roller 231. This roller is also provided with an end wall 240 and a ring element 241 which is fixedly secured in the roller and has an internal annular braking surface which may be engaged by the members 238 whereby to permit free-wheeling or rotation of the roller in one direction as indicated by the arrows in FIGS. 16, 17, and 18, and prevents reverse rotation of the roller 231 in an opposite direction and backrunning of the wrapper roll 230.

The roll 230 of wrapper material has an insert 242 through which a shaft 243 extends. This shaft has ends which are journaled in bearings 244 mounted on parallel arms 245 extending outwardly from the legs 203 of the frame. The bearings are preferably of a split character so that upper parts 246 thereof may be selectively adjusted and clamped against the ends of the shaft by manipulating wing nuts 247 for controlling the friction between the shaft and bearings whereby the outflow of the material may be regulated to prevent overrunning thereof.

The right ends of the side walls 205 of the channel 201 are also preferably provided with a pair of parallel uprights 248 which are preferably vertically and detachably adjustable in a vertical plane by a pair of

screws or bolts 208 having shanks which extend through slots 249 in the uprights and connect with the side walls 205 of the channel 201 as shown in FIGS. 15 and 16.

The idler roller 250, above referred to, is similar to the idler roller 222 and has ends extending through vertical slots in the uprights 248 for support in the same manner as the ends of the idler roller 222 for adjustably biasing the roller 250 downwardly so that annular resilient members thereon will engage the end portion 229 of the wrapper material and the latter against an upper portion of the endless conveyor belt 212. Thus, the wrapper material, as it unwinds from the roll 230, is resiliently supported between the idler roller 222 and the driven roller 231 and also between the idler roller 250 and the belt 212. This unique arrangement, among other things, serves to effectively stabilize and move the material forwardly on the belt 212 and maintain a portion of the material between the idler rollers 222 and 250 relatively taut and particularly on intervening area 229' in an inclined condition for severance or cutting by a cutter device generally designated 251. It should be observed that the drive roller 209 is so mounted that a portion of the belt 212 carried thereby is supported in an elevated or inclined position relative to the platen 204 between the roller 209 and idler roller 250 and serves as a resilient support or cushion for the area 229' of the wrapper material and thereby facilitate cutting of the material by the cutter device.

Attention is directed to the important fact that the speed of the idler roller 250 induced by the forward motion of the belt 212 is greater than that of the driven roller 231 and idler roller driven thereby and this difference in speed is what causes the spacing between the wrappers or sheets resulting from the periodic cutting of the strip material by the cutter device. More specifically, the diameter of the idler roller 250 and speed of the conveyor 212 is greater than the diameter and speed of the driven roller 231 and this accounts for the spacing between the wrappers, which spacings correspond in number to the number of revolutions of the cutter device. The rollers 222 and 231 constitute the means for feeding the strip to the conveyor and the conveyor and idler roller 250 constitute the means for advancing the wrappers on the conveyor. The cutter device 251 preferably employed for severing or cutting the wrapper material into wrappers, pieces or sheets 252 of predetermined rectangular size may be designed and constructed in various ways. As depicted in FIGS. 15 through 19, more specifically, the device preferably includes a solid stainless steel shaft 253 having extremities which are rotatably supported on the uprights 248. This shaft is operatively connected by a chain 254 to a split or sectionalized shaft 255 which is rotatably mounted in a pair of supports 256 which in combination a support 256' also support the sections of shaft 214 above referred to. The cutter device 251 also preferably includes a relatively heavy bar 257 of rectangular cross-section which is secured to the shaft 253 by screws 258 which extend diametrically through the shaft and into the bar as depicted in FIG. 19. The bar is generally referred to in the trade as a "heat sink" and is made of aluminum for heat retention. Insulating means, such as a mass or layer of asbestos 259 is interposed between the shaft and bar. An elongated strip 260 of material, preferably of steel and rectangular in cross-section, is detachably secured by screws 261, or

equivalent means, to the left side of the bar 257 as viewed in FIG. 19. This strip or straight edge constitutes a cutting blade which extends a predetermined distance below a lower edge of the bar and is preferably coated with Teflon so that at least an edge 260' is covered thereby. An insulated electric heating element 262 is preferably secured lengthwise against an outer or left face of the strip 260 by clips 263 and screws 261 which extend through the clips and strip and into the bar. This element serves to impart heat to the strip and its retention and stabilization in the bar 257.

As best illustrated in FIGS. 20 and 21, a pair of axially spaced annular commutators 264 are fixedly secured to one end of the shaft 253 and insulated therefrom by insulator sleeves 265. A pair of insulated conductors 266 are respectively secured to the ends of the heating element 262 and to the commutators 264. One of the conductors is preferably comprised of two pieces which are connected to a thermostatic switch TH266' secured to the back of the bar 257, as shown in FIG. 17, for controlling the current to the heating element and maintaining the bar at a substantially uniform temperature. A block 267 of insulation is secured to one of the uprights 248 and a pair of yieldable contacts 268 are carried thereby and respectively engage the commutators. These contacts are connectible with a source of electricity through conductors 651 and a switch S5 on a panel of the control unit 600 for operating the heating element 262.

The cutter device 251, during each revolution in the clockwise direction depicted in FIG. 16, causes the edge 260' to intermittently transversely engage the strip of wrapper material 229 at the inclined area 229' as it is uncoiled upon the belt 212 and thereby cut the material by melting to provide the wrappers 252 which are of corresponding size. When the edge 260' of the blade 260 engages the wrapper material the inclined portion of the belt 212 thereunder may slightly yield so as to promote the cutting of the material. The temperature of the blade or strip 260 and bar 257 is preferably such that the material will be instantaneously melted or disintegrated when the edge 260' of the strip touches the material.

As alluded to above, the speed of the belt 212 is somewhat greater than that of the speed of the material advanced by the rollers 231 and 222 so that the wrappers as cut will be caused to successively advance at a sufficient rate or speed to effect a substantially equal spacing therebetween and locate them on the belt for successively receiving the products as they are directed substantially onto one half, of the areas of the wrappers as shown in FIG. 14. It is important that the products be centered or placed at predetermined locations on the wrapper so that when the latter is folded, sufficient portions thereof will extend laterally of the product for shrinking and completely sealing each of the products in a wrapper as evidenced in FIG. 32.

Referring further to the control system depicted in FIG. 20, the split shafts 214 and 255, above referred to, are connected by gears 269 and the shaft 214 is provided with a clutch 270 operable by a solenoid 270' and the shaft 255 with a clutch 271 operable by a solenoid 271'. A split shaft 272 is rotatably supported in a position transverse to the shaft 214 and has a gear 273 which engages the smaller of the gears 217' on the shaft 214. The shaft 272 is also provided with a clutch 274 operable by a solenoid 274' and with a sprocket 275

which is adapted for connection by a chain or belt 276 with a drive shaft 328 of the conditioner 300 as depicted in FIG. 9. The larger gear 217' on the shaft 214 is connected to a gear 277 of a variable speed drive or changer 278. This changer is provided with a cam 279 which actuates a switch S280 and has a control 280' for manually adjusting the changer. The cam 279 associated with the changer 278 is operated by an output shaft of the latter. The output speed is manually controllable by the control 280' so that the periodicity of the operation of the cutter device 251 determines the required size or length of the wrappers. The switch S280 is connected by three conductors 281, 282 and 283 to a timer assembly 285'' and to the solenoid 271' by a conductor 284. The timer assembly, which may be regulated by a manual control 285' through timer 285, is also connected to the solenoid 274' by a pair of conductors 286 and to a switch S296 by conductors 294. The switch S296 is connected to the control box 53 of the dispenser by the conductors 57. A pair of primary or input conductors 287 from a source of electricity are connected to a switch S2 on the control unit 600. This switch is connected by conductors 288 to a transformer T and conductors 286 connect this transformer to the timer assembly 285''. The switch S2 is also connected by conductors 290 to a switch S12 and the latter is connected to the switch S3 by a conductor 293 and 291 and to the solenoid 271' by a conductor 299. The switch S3 is connected to the solenoid 270' by a conductor 293'. The timer 285 enclosed in timer assembly 285'' serves to control the amount of delay between the time the switch S280 is energized and the clutch 274 is activated so that the product being discharged from the conditioner 300 will be correctly located or centered on a predetermined area of the wrapper 252.

The timer 285 is manually adjustable by the control 285' to provide a range of 0.5 to 5 second delay between the time that the switch S280 is closed and the time that the solenoid 274' is energized. This adjustment offers a unique setup whereby each product is caused to fall substantially in the center of one-half of each wrapper irrespective of the size of the wrapper or product. As the clutch 274 is completing its cycle or revolution, the pin 297 on the movable component 295' of the clutch 274 will close the switch S296 to restart the motor 29 of the dispenser, only when the conditioner is inoperative or at rest, to cause another one of the products in the row backed by the mover 46 to travel forwardly and down the apron 48 until the dispenser is again stopped by actuation of the switch S49.

Each of the clutches 270, 271 and 274, above referred to, is preferably of a single revolution type in which one component 295 of each clutch is fixed to a section of each of the split shafts and its other component 295' is rotatable with respect to the fixed component and provided with a pin or abutment 297 for periodically engaging an actuator 297' of each solenoid for controlling its operation.

As alluded to above, the dispenser causes the products to travel step-by-step to the conditioner 300 and as each of the products, for example, in a row backed by the mover 46 slides down the apron 48, it actuates the switch S49 which stops the motor 29 and actuates the electric brake device 52 associated with the shaft 19 of the dispenser as depicted in FIG. 4 to stop rotation of this shaft and movement of both of the convey-

ors of the dispenser 1. As each of the products is deposited in the conditioner 300 while the conveyor of the latter is motionless, the switch S280 of the control system shown in FIG. 20 is actuated by the cam 279 to energize the solenoid 271' to operate the clutch 271 to effect a single revolution of the cutter device 251. Actuation of the switch S280 also starts the timer 285 and which, after a preset delay thereof, will actuate the solenoid 274' to operate the clutch 274 to cause the conveyor of the conditioner to move forward one step or a predetermined distance so that each of the products will be correctly deposited and centered on one-half of the wrapper 252 being moved forwardly on the conveyor 212 as depicted in FIG. 14.

Summarizing and elucidating further respecting the operation of the control system of the wrapper feed as exemplified in FIG. 20 and certain related components, the power source therefor is obtained from the motor 218 which drives the split shaft 214 through the agency of the belt 220 to rotate the driven shaft 232 or roller 231 to feed or advance the wrapper material to the conveyor 212. The motor 218 is controlled by a switch S1 on the control unit 600. The clutch 270 is associated with the shaft 214 and its solenoid 270' is operable by the switch S3 located on panel 430 to control the operation of the clutch. The shaft 214 is connected by the belt 221 to the roller 209 for operating the conveyor 212 and by the gears 269 to the split shaft 255 for driving the latter. The clutch 271 associated with the shaft 255 and its solenoid 271' is operable by the switch S12 for controlling the operation of the clutch 271 to control rotation of the cutter device 251 which in turn is connected by the belt 254 to the shaft 255. The split shaft 272 is connected by gears 217' and 273 to the shaft 214 and has a clutch 274 associated therewith so that its solenoid 274' is operable through the timer 285 and switch S280 whereby to control the step-by-step movement of either of the conveyors of the dispenser 1, the shaft 353 of the conditioner being connected to the shaft 272 by the belt 276.

As stated above, the switch S1 on the control unit 600 controls the motor or power means 218 and the switch S12 controls the operation of a solenoid 270' and 271' to control feeding of the wrapper material to the conveyor 212 and rotation of the cutter device 251. The switch S2 controls the flow of current to the transformer T, to the timer 285 and an electric eye device 415 of the prewrap, the switch S4 controls the operation of the solenoid 326' of the valve 326 of the conditioner 300 for controlling the supply of fluid to the conditioner, while switch S5 controls the operation of the heating element 262 of the cutter device. The switches may be successively actuated in any order desired but are preferably actuated in the order of S5, S1, S2, S12, S3 and S4.

CONDITIONER - 300

The conditioner generally designated 300 is depicted in FIGS. 1, 2, and 9 through 13 and as pointed out above, primarily serves to remove the coat or layer of frost and the white look of a frozen product, as well as cleanse particularly substantially parallel flat surfaces thereof by applying a film or layer of moisture thereto so that when the product is refrozen, the film of frozen moisture will bond the wrapper to the product and thereby enhance and clarify the overall natural or true

appearance or structural characteristics of the product for display so that customers are better able to determine the extent of their interest to purchase. The conditioner may be located as illustrated in FIGS. 1 and 2 of the drawing, or if so desired, it may be omitted, in which event, the dispenser 1 may be used to feed the product directly to the prewrap 400 as depicted in FIG. 8. Also, the conditioner may be utilized in conjunction with other equipment not illustrated in the subject application.

The conditioner is preferably positioned as shown in FIGS. 1 and 2 and its operation is controlled and synchronized with that of the wrapper feed 200 above described. More particularly, the conditioner comprises, among other things, a generally rectangular boxlike framework having a pair of elongated parallel side walls 301 and 302, a detachable cover 303 and bottom wall structure preferably in the form of a sump 304 which is secured to and between the side walls 301 and 302. The framework is preferably supported in an inclined position by a pair of relatively long legs 305 and a pair of short legs 306.

The side wall 302 is provided with a relatively large rectangular opening 307, the purpose of which is to receive a portion of the apron 48 of the dispenser 1 as best shown in FIG. 2. It is important that the conditioner be located in a predetermined transverse relationship with respect to the dispenser and the wrapper feed 200 and prewrap 400 so that it will correctly successively feed the product received from the dispenser to the wrapper feed and prewrap. It should be noted that a portion of the dispenser overlaps a portion of the conditioner and that a portion of the latter overlaps the conveyor of the wrapper feed and prewrap structure. The size of the side opening 307 is preferably such that either row of the products in the dispenser can be conveyed therethrough without shifting either the dispenser or conditioner or resetting of any controls.

The sump 304 includes an upper inclined planar surface or wall 308 provided with an upper transverse inlet or slot 309 having an inclined lip 309' and a lower transverse inlet or slot 310 and a bottom wall 311 provided with a lower drain 312. The upper planar wall 308 of the sump is preferably provided with parallel longitudinally extending anti-friction areas 308', preferably of Teflon on which cross-members of a conveyor of the conditioner may freely slide.

The left extremity of the framework of the conditioner is preferably provided with a pair of internal channels 313 which are secured to the side walls 301 and 302, as shown in FIGS. 9, 10, and 11 and carry bearings 314 which respectively rotatably support a pair of stub shafts 315 having sprockets 316 rotatable thereon. The right extremity of the frame is provided with a pair of internal members 317 having bearings which rotatably support a shaft 318 which carries a pair of sprockets 319. A pair of endless chains 320 are mounted in parallel relation on the sprockets.

The chains move in unison in a clockwise direction as indicated by the arrow in FIGS. 9 and 11 and the chains are transversely connected by a plurality of five equally spaced apart corresponding cross-members 321 which serve to selectively engage and move the products P with an intermittent motion such that the product will move forwardly only one space at a time as they are successively received through the side opening 307 for transport upwardly along the upper inclined

planar surface 308 of the sump 304 for discharge onto the wrappers 252 shown in FIG. 14. The chains 320 and cross-members 321 constitute the conveyor structure of the conditioner.

The conditioner also preferably includes a pair of parallel cross-rods 322 which are secured to the side walls 301 and 302 of the framework and respectively carry a pair of resiliently flexible depending curtains 322' which define, in combination with the side walls 301 and 302, top wall 303, and sump 304, a chamber 323 through which the products pass for conditioning or treatment by sprays of clean water from a pair of nozzles 324 located directly under the cover 303 as depicted in FIGS. 11 and 13. The rods 322 may pivot and/or the curtains may pivot relative to the rods to facilitate movement of the curtains by the products. The lower portions of the curtains 322' are preferably slitted to promote their flexibility and impart a wiping motion to remove any excess water from the product. The nozzles 324 are connected by piping 325 to a valve 326 which in turn is connected to a source of supply 327 so that water under conventional tap pressure may be utilized to direct the sprays against the product. The valve 326 is operable by a solenoid 326' which is connected by conductors 666 and 667 to the switch S4 located on panel 430. As each product is subjected to the spray within the confines of the chamber, any excess liquid may drain into the inlet 309 or find its way downwardly on the inclined planar surface 308 to the inlet 310 for eventual flow in the drain 312. The lip 309' serves to prevent the products from catching on any fore sharp marginal edge of the opening 309.

Any means suitable for the purpose may be utilized to drive the chains 320. As shown in FIG. 9, the shaft 318 is provided with a sprocket 328 which is connected by a belt 351 to a sprocket 352 on an idler shaft 353 journaled on the conditioner frame. This idler shaft 353 also carries a sprocket 354 to which the belt 276 is connected for driving the conveyor of the conditioner.

If found desirable, the conditioner, as alluded to above, may be omitted from the present apparatus or system and be utilized independently, in which event, the conditioner may be provided with an electric motor 329 and a chain 330 for connection with the sprocket 328 as shown by the dotted line in FIG. 9. Also shown in dotted lines is a manually operable switch 331, interposed in an extension cord 335, which is adapted to control the flow of current from a source to the motor 329.

In view of the foregoing, it will be manifest that when the product is delivered through the side opening 307 of the conditioner by the dispenser, the product due, at least to some extent, to the incline of the apron 48 will be directed onto the inclined top wall 308 of the sump and between a pair of the cross-members 321 and in the majority of instances against the chain 320 on the far side of the conditioner where it is engaged and carried forwardly by the rearmost cross-member into the chamber 323 where the product is subjected to the sprays of the nozzles 324 and then carried therebeyond onto a wrapper 252. The sprays also serve to lubricate the top wall 308 and facilitate movement of the products thereon and any surplus water may enter the sump through the inlets 309 and 310 for final discharge into the drain 312. With such an organization, a film or thin layer of liquid is applied to the upper and lower faces

or surfaces and edges of the products as they are intermittently conveyed for deposit on the wrappers and the internal structure of the conditioner is maintained in a clean state or condition. This application of liquid to a product, such as frozen sliced raw meat, serves to remove from its external surfaces the frost and white look as alluded to above, and also removes any bone dust, blood, and undesirable particles of fat and meat therefrom.

Attention is also directed to the fact that when the conditioner is utilized as a component of the system as depicted in FIGS. 1 and 2, the sprocket 328 of the conditioner is operatively connected by the chain 276 to the sprocket 275 on the shaft 272 of the control system of the wrapper feed assembly 200 as shown in FIG. 20 whereby to impart motion to the conveyor comprising the chains 320 and cross-members 321 through the agency of the shaft 318 so that the products may be selectively transported between the cross-members 321 upwardly and forwardly on the inclined surface 308 of the sump 304. As pointed out above, if the conditioner is to be employed as an independent unit then the motor 329 is connected by the extension cord 335 to a source of current for rotating the conveyor.

Attention is further directed to the fact that when the conditioner is a component of the system its operation is under the control of the control system of the wrapper feed assembly 200. More specifically, the initial operation of the conditioner is established when the switch S280 of the wrapper feed control is actuated and this actuation operates the timer 283 which (after its preset cycle) energizes the solenoid 274' to operate the clutch 274, which in turn starts rotation of the shaft 272 which, as alluded to above, is operatively connected to the shaft 353 of the conditioner by the chain 276. The clutch 274 is of a conventional single revolution type and remains disengaged until the solenoid 274' is reactivated to restrict or prevent rotation of the shaft 272. The relationship between the sprocket 275 and the sprocket 328 is preferably such that one revolution of the shaft 272 causes the conveyor of the conditioner to move forwardly one step or advance one-fifth of the linear length of the conveyor. In this respect, it should be observed that there are five cross-members 321 which divide the linear length of the conveyor into five spaces into which the products from the dispenser are selectively or individually delivered. In the setup disclosed, no more than three products can be simultaneously carried by the conditioner at one time but this depends on the number of products available for transport from the dispenser. It should be observed that the major upper part of the conditioner is open so as to afford convenient access to its interior to facilitate cleansing thereof and to the products while they are being conveyed and manual or mechanical top feeding of the products to the conditioner, particularly when the latter is employed as a separate unit. Attention is further directed to the fact that, if found desirable, the size of the spray chamber shown may be enlarged; that that spray pressure may be greater than tap pressure; that a greater or lesser number of the cross-members 321 shown may be used; and that the length of the conditioner may be appreciably longer than that shown. It is to be understood that a fluid, such as hot air, in lieu of water, may be applied to the product for removing frost.

PREWRAP - 400

The prewrap structure 400 as illustrated in FIGS. 14, 15, 17, and 23 is associated or common with the wrapper feed 200 and interposed between the conditioner 300 and the sealer 500 for imparting a fold to a portion of each of the wrappers 252 which have been severed from the roll 230 by the cutting device 251. The prewrap may be utilized as a component of the system or apparatus as shown in FIG. 1 or if desired, it may be omitted, in which event, a portion or portions of each wrapper may be manually folded or formed about the product prior to passage through the sealer 500. It is to be understood that the prewrap assembly may also be utilized as an individual unit.

As best depicted in FIG. 14, the prewrap preferably includes a generally T-shaped former having a transverse arm or portion 401 which is adjustably connected to a fitting 402 affixed to one side of the channel 201 which supports the rollers 206 and 209 carrying the conveyor belt 212 and a longitudinally extending member 403, preferably circular in cross-section, having a long portion 404 and a short portion 405 which respectively extend to the left and right of the arm to which they are connected. The former may be adjusted transversely of the conveyor 212 for runs of products and wrappers of different generally uniform ranges of sizes and is located in a predetermined overhead relatively close parallel relation to the belt 212 so that the member 403 will be substantially centered over the wrappers as they travel thereunder. The prewrap also includes an air manifold 406 mounted on a fitting 407 affixed to the channel 201 adjacent to the fitting 402 which carries the former. This manifold extends alongside the conveyor and is preferably provided with a row of longitudinally spaced ports 408 through which a blast, streams or a horizontal layer of air flows transversely across the conveyor to blow a face, upper or half portion 409 of each of the wrappers 252 upwardly, against and over the long portion 404 of the former to obtain a fold or connecting portion 410 and locate the portion 409 upon the product and above a lower or half portion 411 of the wrapper as shown in FIG. 14 and particularly in FIG. 31. When the wrapper is thus prewrapped, as evidenced in FIG. 31, the fold 410 will be caused to engage a rear edge portion of the product depending on its shape and the upper portion 409 will engage an upper surface of the product and corresponding side edge portions 412 and end edge portions 413 of the upper and lower halves 409 and 410 will project laterally from a front edge and end edges of the product. It is to be understood that use of "side", "end", and "edge" are merely relative in view of the fact that the geometrical or physical shapes of the products may vary. The aforesaid portions of the wrapper will be referred to subsequently in conjunction with FIGS. 32, 33, and 34 in describing the sealer 500.

Attention is directed to the fact that the product and wrappers are carried by the conveyor 212 in a path whereby products successively travel in relatively close relation to the member 403 and that the cross-sectional dimension of this member is somewhat less than the thickness of the product so that the upper portions of the wrappers will more efficiently conform to the product and the portions of the wrapper engaging the product will adhere thereto due to the inherent dampness of the product and the application of a film of moisture

thereto by the conditioner. This organization is unique and of great importance because it provides a setup whereby a substantially frost-free package is obtained and the natural appearance of the product is restored so that when the packaged product is on display, a prospective customer will be in a better position to appraise or evaluate the same for purchase. It should be noted the long portion 404 of the former is the one that the wrapper is folded over. The other and shorter portion 405 may be eliminated insofar as the complete system is concerned, but if the prewrap is employed as a separate unit, the shorter portion is preferably used as a guide whereby to facilitate placing and alignment of the products manually onto the wrappers.

The prewrap also preferably includes an electric-eye device 415 preferably located at one side of the conveyor 212 and with a mirror 416 at its opposite side so that converging beams 417 and 417' will extend across the conveyor to the right side of the arm 401 of the former for cooperation with the mirror in a conventional manner. The prewrap further includes a motor 418 which is connectible by conductors 419 to a source of electricity for operating the motor and a pump 420, the latter of which is connected to the manifold 406 by a conduit means or line 421. Interposed in this line is a filter 422, a regulator 423 for varying the pressure, a valve 424 operable by a solenoid 424' and a pair of timer valves 425 and 426. The switch S2 is connected to the transformer T and the latter to the electric eye 415 by a pair of conductors 289 and the solenoid 424' is connected to the eye by a pair of conductors 684. The flow of air from the pump 420 to the manifold 406 is regulated and/or controlled by the regulator 423, and valves 424, 425 and 426 and these components and the filter 422 are preferably located in a housing 429 under the conveyor 212 as depicted in FIG. 15.

The valve 424 serves to primarily control the flow of air from the pump 420 to the manifold 406 and the operation of the valves 425 and 426 is controlled by the solenoid 424' through the agency of the electric-eye 415. As each product crosses the eye-beams 417 and 417', the eye 415 is actuated to operate the solenoid 424' to close the valve 424 so that no air will flow to the manifold. In other words, each product in crossing the beams serves to close the valve 424 and after each product travels forwardly beyond the beams, the eye 415 is actuated to de-energize the solenoid 424' to open the valve 424. The valves 425 and 426 are operative only after the valve 424 has opened. The valves 425 and 426 serve to control the time or period of each blast of air flowing through the manifold and may be manually adjusted by an element 425' for varying the time and the valve 426 in conjunction with the electric eye serves to control the interval of time between the activation of the solenoid 414 and the blast and may be manually adjusted by an element 426' for varying the interval. These adjustments are significant so that the blast or layer of air emitted from the manifold will occur at the correct time when a product and wrapper reach a position alongside the long portion 403 of the former beyond the transverse arm portion 401 as indicated in FIG. 14.

When the prewrap is employed as a separate unit, the panel 430 is preferably provided with an enlargement having components which are connectible to a source of electricity by an extension cord 431 and conduits 432 and 432' which contain conductors which respec-

tively connect switches in the panel with electrical components in the housing 429 and to the motor 218. More specifically, the panel is provided with switches S1', S2', S3, S4 and S5' which serve in some capacity as the switches S1, S2 and S5 on the control unit 600. The panel 430 is also provided with a manual control C03 whereby the speed of the motor 218 may be synchronized with that of a motor 506 of the sealer assembly 500 so that the conveyor 212, which is common to the wrapper feed and prewrap, will operate in unison with that of a conveyor 502 of the sealer. It will be noted that the cord 431, conduit 432', control C03 and switches S1', S2' and S5' are shown in dotted lines.

WRAPPER AIRLIFT

As alluded to above, one of the objects of the invention is to provide a device or means whereby to prevent a portion or portions of a wrapper about a product from falling into a space or gap between adjacent ends of a pair of conveyors. More specifically, and as depicted in FIGS. 23 and 24, the conveyor 212 of the prewrap and a conveyor 502 of the sealer, which will presently be described, are disposed in an end-to-end relationship with a space or gap 439 therebetween in which a pipe or manifold 440 is located and provided with an upper row of longitudinally spaced ports 441 through which air under pressure from any desirable source is directed upwardly to lift and/or maintain portions of the wrappers over the space in a plane substantially co-extensive with the planes formed by the upper surfaces of the conveyors. This device is unique and serves to promote continuity in the flow of the products and their wrappers from the prewrap conveyor to the conveyor of the sealer to prevent displacement or falling of the wrappers into the space or gap between the conveyors.

The manifold 440, as shown in FIG. 23, is preferably connected by a line 442 to the line 421 of the prewrap assembly 400, but if desired, it may be connected to some other source not shown. In other words, it is to be understood that the air supplied to the manifold 440 does not have to be operatively associated with the air supply of the prewrap assembly. A manually operable valve 443 is preferably interposed in the line 442 for controlling the flow of air to the manifold 440.

SEALER - 500

The sealer 500 may be designed and constructed in various ways and is preferably adapted to be utilized as a component of the apparatus or system in contiguous relationship to the prewrap 400 as shown in FIG. 1 and tied in with the electrical circuitry as depicted in FIGS. 35 through 38, but if so desired, it may be employed as an independent unit or in conjunction with other equipment different from that shown.

More particularly, the sealer as illustrated in FIGS. 24 through 30 comprises, among other things, an inverted channel 501, an elongated taut endless lower belt or conveyor 502; a superstructure designated 503 having a heat retention chamber or oven 504 therein; an endless upper belt or conveyor 505 which overlies the lower conveyor and is movable in unison therewith for conducting the products P therebetween and through the heat chamber; a motor 506 for operating the conveyors; and a speed changer means 507 which serves to synchronize the movement of the belt conveyors. The sealer, when utilized as a component of the

system, is the first to be operated because it is desirable that the correct range of temperature in the heat chamber be obtained prior to the delivery of the products and wrappers thereto.

The channel 501 is mounted on a table or stand comprising a base frame of appreciable width and length and an upper narrower frame. The base frame includes a pair of parallel side rails 508 and a pair of parallel end rails 509 having legs 510. The upper frame includes pairs of legs 511 and 512 which are secured to the end rails 509 of the base frame.

The channel 501 is carried by cross-members 513 on the upper ends of the legs 511 and 512 and has a top planar wall 514 constituting a platen and a pair of depending side walls 515 having intumed flanges 516. An idler roller 517 is rotatably mounted on the side walls at the left end of the channel and a drive roller 518 is similarly mounted at the right end of the channel. These rollers support the lower conveyor or belt 502 for movement in the direction of the arrows so that an upper portion of the belt will ride on the platen 514 of the channel. A device, not shown, serves to maintain this belt in a taut condition.

The superstructure 503 is mounted on or above the channel 501 and includes a rectangular housing of appreciable width and length and has an upper wall 519, a pair of parallel side walls 520, a pair of parallel end walls 521 provided with openings 522, and a pair of spaced bottom walls 523 disposed on opposite sides of the channel 501. These walls define the heat retention chamber 504 and are relatively thick and constructed of a suitable insulating material, such as calcium silicate, which has proven satisfactory in use since it withstands a heat range between 375° and 650° Fahrenheit without deterioration. These walls may be secured together in any mode desired, such as by the screws 524. The inner faces of the walls of the housing are preferably protected by liners 525 and their outer faces by sheets 526. These sheets are preferably of stainless steel and serve to protect and reinforce the walls of insulation and the liners 525 in particular also serve to promote sanitation and cleansing of the heat chamber 504. The housing is preferably detachably secured to the side walls of the channel 501 by means of strips of angle iron 527 and screws but may be attached directly to the frame which carries the channel.

As depicted in FIG. 28, the opening 522 in the left end wall 521 of the housing is preferably normally closed by a pair of depending parallel resiliently flexible curtains 528 and the opening in the right end wall is similarly normally closed by a pair of corresponding curtains 529. These curtains are preferably constructed from suitable material, such as fiberglass treated with silicone, and primarily serve to prevent the escape of heat from the chamber. The lower extremities of the curtains are preferably provided with slits 530 to promote flexibility and normal intimate engagement with the extremities of a lower loose portion or length 531 of the upper belt 505. Attention is directed to the fact that the upper belt 505 is supported so that its lower portion will bear relatively heavy against the partially wrapped or covered products for stabilizing their respective positions while they are being transported by the belts 502 and 505 through the heat chamber 504.

The belts 502 and 505 may be designed and constructed in different ways but as shown in FIG. 27a, the

belt 505, for example, preferably includes a woven fiberglass mat 532 having a thickness of 1/16 inch, which is treated on its opposite sides with layers of silicone rubber 533 and 533', and an inner layer 534 of Dacron Butyl rubber of 3/16 inch thickness which is preferably bonded to the inner layer 533' of silicone rubber by a silastic adhesive. This inner and heavier layer serves to stabilize the relative positions of the wrappers and products as they travel through the heat chamber. The lower belt 502, as depicted in FIG. 27b, may be designed and constructed in any manner desired but preferably comprises a woven fiberglass mat or layer 535 of 1/16 inch thickness which is dipped or coated with silicone rubber to provide external layers 536. Each layer of each pair of layers of silicone rubber utilized as components of each belt preferably have a thickness of 1/64 inch. The structural characteristics of these belts have proven very efficient in use and withstand the high range of temperature required in the chamber 504, but their structural characteristics may be modified. For example, the respective thickness of the belt layers may be varied and the bonding agent may be other than a silastic adhesive. These belts are so constructed that each will withstand a high temperature, for example of 550° Fahrenheit for a period of 500 continuous hours without material deterioration under normal operating conditions of the system.

The heat for the chamber 504 is preferably obtained by a pair of units designated 541 and 542, shown in FIG. 27, which are located diagonally in the chamber on opposite sides of the channel 501 and lower portion 531 of the upper belt 505. The unit 541 includes a casing 543 containing a bank of heating coils or elements A, B and C, a fan 545, and a motor 546 for forcing hot air through a nozzle or outlet 547 provided in the casing and the unit 542 similarly includes a bank of heating elements A', B' and C', a motor 546 and outlet 547'. The elements C and C' jointly controllable by a switch S8 serve to supplement or augment the heat supplied by the elements A and B and A' and B'. The axes of the nozzles are disposed diagonally with respect to the longitudinal axis of the lower portion 531 of the belt 505 and serve to direct hot air in predetermined patterns or oblique directions across and between the opposed portions of the belts as indicated by the arrows in FIG. 27. The heat from the nozzle 547 actually flows against the partially wrapped products and to the fan 545 and the heat from the nozzle 547' also flows against the partially wrapped products and to the other fan so there is a generally rectangular flow pattern or circulation of air in the heat chamber. This organization serves to doubly insure an efficient sealing of a wrapper about a product and promote a substantially uniform or constant temperature and flow of air from opposite sides of the belt against the opposite edges of the partially wrapped products to substantially simultaneously cause the free edges of the wrappers to seal the products therein during their brief period of travel which is preferably for a period from between 5 to 10 seconds through the heat chamber. This period may be varied depending, for example, on the size of the products, temperature, and velocity of the air applied. Thus, all of the air within the confines of the heat chamber is continuously used, thereby obtaining maximum and efficient use of the air and avoiding the disadvantages inherent in one of the known conventional setups in which hot air after being forced through and out of a

heat chamber is recovered, reheated and reintroduced into the chamber. More specifically, the lower right nozzle 547' first directs hot air against the free leading edge portions 413, the side edge portions 412, and the leading portion of the fold or bend 410 of the wrapper 252 whereby to shrivel, shrink and fuse such portions, and the upper left nozzle 547 directs hot air against the fold and leading portion thereof, trailing edge portions 413 and trailing end portion of the fold whereby to additionally shrivel and shrink such portions and thereby seal the product in the wrapper as shown in FIGS. 32 and 33 for subsequent storage in a freezer or showcase. It should be noted that as each wrapper contracts and seals itself about a product, the trailing portion or a corner area 414 of the wrapper, as depicted in FIG. 27, more-or-less serves as a vent to permit air to escape from within the wrapper and is the last area that is sealed. It should be further noted that the fold 410 and the free edge portions opposite the fold of each wrapper are disposed on opposite sides of the medial line of travel on the conveyor 212 and belts 502 and 505. In other words, edges of the wrappers are foremost and not the fold. With this unique method of sealing, the major areas of the upper and lower portions of the wrapper are substantially firmly held by the belts against the upper and lower faces of the product and substantially protected from the hot air so that they will not shrivel or wrinkle when travelling through the heat chamber. During the process of applying heat or treatment to each wrapper to seal a product therein, the major unshriveled upper and lower portions of the wrapper are drawn or stretched to maintain the same in a taut condition against the faces of the product whereby to better discern the product through the wrapper. Some stretching also occurs for a relatively brief period of time after the sealed product leaves the heat chamber and continues therebeyond on the conveyor. The shrinking and shriveling also causes an external rib 548 or ridge-like band to form about the major portion of the peripheral edge of the product as shown in FIGS. 32, 33 and 34. The hot air emanating from the nozzles also assists in shaping the edge portions of the wrapper in conforming relation to the contour of the product and formation of the rib or bead. This rib preferably has a cross-dimension which is appreciably less than the thickness of the product. These factors constitute a meritorious advance in the art of wrapping and sealing. The rib may be manually cut or torn at any location or locations desired but is preferably cut or torn at one end to facilitate complete or partial severance thereof for removal of the wrapper from the product when the latter is to be prepared for use.

Attention is directed to the fact that the wrapper material utilized in conjunction with the system is preferably of a type which is in the form of a plastic film having an unstable equilibrium and which shrinks when heated to a predetermined temperature. Various films are available for such purpose and include films of rubber hydrochloride (Pliofilm), vinyl chloride polymer and copolymers, vinylidene chloride copolymers, polyethylene, mixtures of vinyl polymer and copolymer of butadiene and acrylonitrile, and the like.

Referring further to the superstructure 503 the same also includes a substantially rectangular boxlike cover 549 having an upper wall 550 and a pair of parallel vertical side walls 551 having inturned flanges 552 which bear against the top sheet 526 of the heater housing as

shown in FIG. 30. The cover also preferably includes a pair of end walls 553 which are detachably secured by screws within the confines of the ends of the cover. Any means suitable for the purpose, such as screws 554, may be extended through the flanges 552 into the upper wall 519 for detachably securing the cover to the housing.

It will be observed that the width of the cover substantially corresponds to that of the housing and that its extremities extend beyond the ends of the housing as shown in FIGS. 24 and 28. The extremities are open at the bottom and the upper belt 505 extends there-through.

As shown in FIGS. 25, 29, and 30 a pair of upstanding substantially longitudinally extending parallel members 555 are secured to the upper wall 519 of the housing and these members are bridged by a longitudinally extending channel 556 having a planar bottom wall or platen 556'. An idler roller 557 is rotatably supported by and between the left ends of the members 555 and a similar idler roller 558 and a drive roller 559 are similarly supported by and between the right ends of the members. The upper belt 505 is supported on the idler rollers and extends between the idler roller 558 and drive roller 559 whereby to cause an upper portion 505' of the belt to ride or slide on the platen 556' of the channel 556 in a generally clockwise direction as indicated by the arrows.

The members 555 are provided with a left pair of up-rights 560 which rotatably support an idler roller 561 and with a right pair of up-rights 562 which rotatably support an idler roller 563. It will be observed that each of the idler rollers 561 and 563 is preferably provided with axially spaced resilient annular portions 564 which serve to engage and assist in stabilizing the upper portion 505' of the upper belt in relation to the platen 556'.

Means are provided for cooling the upper belt 505 and this, as shown in FIGS. 28, 29, and 30, is preferably accomplished by providing a plurality of longitudinally extending parallel heat dissipating fins 565 in the space between the top wall 519 of the housing and the platen 556', a fan 566 and a motor 567. The fan includes a housing having a nozzle 568 located in an opening 569 provided in one of the upstanding members 555 for discharging air from the atmosphere to a space or manifold 570 for conduction through longitudinally extending ducts or passages 571 formed by the fins 565. The fins 565 are preferably L-shaped in cross-section and welded to the bottom wall of the channel as shown in FIG. 30. It should also be observed that the right ends of the fins terminate on a bias or at an oblique angle with reference to the longitudinal axis of the channel 556 and that the nozzle is so positioned that the air will flow in a path intersecting this angle so that the air from the fan will flow substantially directly to the passages 571 via the manifold 570. The flow of air through the passages and against the fins and platen 556' serves to dissipate the heat from the channel 556 and thereby cool the same and the upper belt as it rides clockwise on the platen. As noted above, the extremities of the cover 549 are open at the bottom and this allows air from the fan 566 to be discharged therethrough and assist in cooling the extremities of the belts as well as the rollers 557, 558, and 559.

Elucidating further with respect to the heating units, any suitable means may be utilized to maintain a substantially uniform range of temperature in the heat chamber 504 and this is preferably obtained by providing the heating unit 541 with a sensor 572 of a conventional character and the unit 542 with a sensor 573. More specifically, each of the sensors includes, among other things, a controller which is subject to pressure and regulates a temperature. These sensors are located in the throats of the nozzles as shown in FIG. 27, and each is manually settable or adjustable whereby to obtain a temperature range from between 250° F. and 650° F. Controls FA and FB are provided on the control unit 600 for selectively dialing the settings for the sensors 572 and 573. The settings will be varied, depending on the thickness of the product to be wrapped. For example, the thicker the product the lower the temperature setting because the hot air is able to circulate faster about a thicker prewrapped product and requires a lower heat temperature and/or less time in the heat chamber than a thinner prewrapped product. The controls FA and FB, for example, may be adjusted to obtain a temperature of 375° at the nozzles for treating the wrappers when a customary run of prewrapped products have a thickness of approximately one inch are caused to travel through the heat chamber. The controller for the sensor 572, for example, serves to control the operation of the coils or elements A and B of unit 541 and sensor 573 the operation of coils of A' and B' to maintain the air discharged from the nozzles at corresponding preset temperature levels. Current to the coils A and B, and sensor 572 is controlled by a switch S7 and a current to the coils A' and B' and sensor 573 by a switch S6, whereas the coils C and C' of the heating units are both controlled by a switch S8. A switch S9 controls the operation of the fan motors 546 and motor 506 for the conveyor 502 and a switch S10 controls the operation of the cooling fan motor 567. A control CO1 serves to control the speed of the fan motors 546 and a control CO2 for controlling the speed of the motor 506. The velocity of the hot air from the nozzles may be varied to suit any particular wrapping requirements by merely correctly adjusting the control CO1 and the velocity of the air from the nozzle 568 of the cooling system by adjusting the control CO2.

The unit 541 is also provided with a pair of thermostatic switches TH3 and TH1 and the unit 542 with a pair of corresponding switches TH4 and TH2. The purpose of these four switches is to promote safety by preventing overheating and damage to the heat chamber and related components in the event that the switches S6, S7 and S8 inadvertently turned on and left on which would result in overheating of the chamber when the switch S9 for controlling the fan motors 546 and the motor 506 for the conveyor 212 are "off". The switch TH3 is set for operation at a lower temperature than the switch TH1 and switch TH4 is correspondingly set at a lower temperature than switch TH2. More specifically, when the heat in the chamber, for example, attains its peak operating temperature of 650° the fan motors 546 and the motor 506 for the conveyor 212 will be caused to automatically start and continue to operate until the lower temperature setting of 575° is obtained, whereupon these motors will automatically stop. This cycling continues until the heating elements are turned "off" or the fan motors are turned "on". The high and low setting of the thermostatic switches

serve to obtain a greater periodicity in the starting and stopping of the motors.

The sensors 572 and 573 are preferably such that when the system is in operation the elements A, B, A' and B' of the heater units will be simultaneously energized and de-energized whereby to maintain the desired range of operating temperature in the heat chamber sufficient to cause deformation and fusion of the wrapper material.

As a further protection to the superstructure of the sealer and particularly to promote efficient continuous operation of the cooling system for the upper belt 502, a pair of thermostatic switches TH7 and TH8, operable at different temperatures, are preferably located in the manifold 570 and serve to automatically turn the fan motor 567 "on" and "off".

The mode of operating the belts 502 and 505 is preferably obtained by the motor 506 and the speed changer 507 above referred to. More specifically, the motor operates the speed reducer 574, which in turn is connected by a belt 575 to a shaft 576 mounted below the channel 501. The speed of the motor 506 is subject to the control CO2, above referred to, and by manipulating the control the speed of the belts 502 and 505 can be synchronized with that of the elongated conveyor belt 212. An upper shaft 577 and a lower shaft 578 are respectively rotatably mounted on the legs 512 of the upper narrow frame and a shaft 579 is rotatably mounted on the right end of the channel 501. A belt 580 connects the shaft 576 and shaft of the drive roller 518 for the lower belt 502 and a belt 581 connects the shafts 576 and 577. A belt 582 connects the shaft 579 to the shaft of the drive roller 559 for driving the upper belt 505 and a belt 583 connects the shafts 578 and 579.

The shaft 577 is provided with a drive pulley 584 and the shaft 578 with a pulley 585. The speed changer 507 has structure which is fixed at 586 to a bracket 587 on the legs 512 and includes a pair of end plates 588 and 589 which are fixed in parallel relation by a pair of rods 590 which slidably support a carriage 591 which has a shaft 592 with a pair of pulleys 593 and 594 affixed thereto. The pulleys 584 and 585 are of the split-sheave type. The pulleys 584 and 594 are connected by a belt 595 and the pulleys 585 and 593 by a belt 596. The belts 595 and 596 are of the same length. The structure also includes an elongated threaded element 597 which is connected to the end plates 588 and 589 and the carriage 591 in a manner whereby a crank 598 on the element may be manually operated to cause the carriage to move in either of two directions for sitting on the rods 590 for the purpose of synchronizing and obtaining uniformity in the speeds of the upper and lower belts 502 and 505 and particularly, the speed of the upper belt with that of the lower belt so that the wrappers and specifically their overlapping portions will be respectively stabilized in relation to the products. Otherwise expressed, it is desirable that the prewrapped portions of the wrappers be maintained in place by uniform motion so that the flow patterns of the heat in the chamber 504 can effectively condition the wrappers to produce the shrinking and shriveling for the purpose of sealing in the products during their travel between the belts and through the heat chamber 504 to obtain the resultant packaged product as evidenced in FIG. 32.

Attention is directed to the fact that when the sealer constitutes a component or sub-assembly of the system

shown in FIG. 1 all of the switches S6 through S10 and the controls CO1, CO2, FA and FB are provided on the panel of the control unit 600 and are operatively connected to the sealer and other components of the system by a plurality of conductors or lines extending through the conduit 537 and branches thereof. However, when the sealer is utilized as an independent unit or assembly the same is preferably provided with a housing or equipment designated 599 and a cable 599' containing conductors for connection with a source of electricity. The equipment 599 includes a panel which is provided with switches S6', S7', S8', S9' and S10' and with controls CO1', CO2', FA' and FB' which respectively correspond and perform the same functions as the switches and controls which are provided on the control unit 600. It should be noted that the equipment 599 and cable 599' are shown in dotted lines in FIG. 24 of the drawing. More specifically, when the sealer is utilized as a separate component the circuitry disclosed in FIG. 35 and 36 is carried by the sealer and when the wrapper feed or prewrap are employed as a composite structure the circuitry shown in FIG. 37 and 38 is carried in unit 600.

CONTROL UNIT - 600 ELECTRICAL CIRCUITRY

The control unit and the electrical circuitry operatively connecting the same with the various assemblies and interconnections between the latter is clearly exemplified in FIGS. 35, 36, 37 and 38. The operation of the apparatus has been adequately disclosed above and the electrical circuitry hereinafter described provides a more comprehensive disclosure of the electrical system.

In order to obtain a better understanding of the relationship between the FIGURES of the circuitry, the pair of FIGS. 35 and 36 and the pair 37 and 38 should be placed side-by-side to promote continuity. More specifically in this regard, the circuitry in FIG. 35 is directed to the load side of the sealer 500 and is substantially contained in the units 541 and 542 and areas adjacent, shown in dotted lines, and FIG. 36 is primarily directed to the control side of the circuitry in the control unit 600, shown in dotted lines, for controlling the load side shown in FIG. 35. FIG. 37 depicts the load side of the circuitry for the conditioner, dispenser and prewrap which is primarily disposed in the housing 429, shown in dotted lines, and FIG. 38 illustrates the control side of the circuitry contained in the control 600 for controlling the load sides.

Further, in order to facilitate reference to the components of the electrical system, the switches and controls of the assemblies are respectively prefixed by the letters S and CO; a buzzer by a letter B; a resistor by D; fuses by F; ground by G; jacks or receptacles by J; pilot lights by L; motors by M; potentiometers by PO; panel lamps by PL on the main panel of the control 600; microswitches by MS; rectifiers by DC; relays by R; a transformer by T; and thermostatic switches by TH.

Referring now more particularly to the input side of the circuitry as exemplified in FIG. 36 there is disclosed a three phase system which includes, among other things, three primary input lines 601, 602 and 603 which are adapted to be detachably connected by a main switch to a source of electricity in a conventional manner fuses F3, F1 and F2 which are respectively interposed in the lines 601, 602 and 603, a branch line

or conductor 604 connecting the line 603 with a fuse F5 and a branch line 605 which connects line 601 with a fuse F4, and a line 606 and branches thereof which serve to connect the equipment to ground G to promote safety.

The control unit 600 is operatively connected to the system by the cable 537 and branches thereof as shown in FIG. 1, each containing a plurality of conductors, lines or wires which are connectible to their respective jacks or receptacles J1, J2 and J3 disposed directly below units 541 and 542 of the sealer, with the cable from the latter being connected to the receptacle J3 of the wrapper feed and prewrap.

With respect to the application of power or flow of current, when a main switch, not shown, is closed to connect lines 601, 602 and 603 with a source, power will be applied to the circuits by way of lines 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 624, 287, 290 and switch S10 of the control panel 600, which will cause illumination of a panel light PL1 across lines 608 and 607. Power will also excite an alarm relay R1 and the alarm relay R2, which will deactivate the alarm circuit by interrupting line 625 through R1. Current will also flow through a panel light PL2 across lines 608 and 609 via lines 618 and 620, an alarm relay R2, line 621, thermostatic switches TH5 and TH6, lines 624 and 609 to illuminate PL2, and a panel light PL3 across lines 610 and 611 is also illuminated. A switch S10'' is shown but it, assumed to be closed, is not on the panel of 600 and is utilized solely for testing or the repairing of circuits.

Referring to FIGS. 35 and 36 in connection with the operation of the sealer 500, when the normally closed switch S9 is open, an upper terminal of a relay R3 will close and apply a potential across the blower motors 546 through lines 633 and 634, control CO1, lines 630 and 629, 628 and 613 and a potential across the conveyor motor 506 through lines 635 and 636, control CO2, lines 631 and 632, 627 and 613 and a pair of pilot lights L9 and L10 will be illuminated. The speed of the blower motors 546 is controlled by the speed control CO1 of a conventional character through a potentiometer PO2 and the speed of the conveyor motor 506 is controlled by the motor speed control CO2 through a potentiometer PO3.

When the switch S6 is closed a potential is applied across the heater element A' of unit 542 through line 637, microswitch MS1, lines 641 and 642, microswitch MS2, and a line 638. A potential is also applied across an element B' of unit 542 through line 638, microswitch MS2, and lines 642 and 609. When the switch S7 is closed a potential is applied across element A of 541, through line 639, microswitch MS3, lines 643 and 644, microswitch MS4, line 640. A potential is also applied across an element B of unit 541 through line 640, microswitch MS4 and lines 644 and 609. The power is applied to these heater elements through the aforementioned microswitches which are activated mechanically by conventional capillary heat sensors of the heater control units 541 and 542. The power also turns on or illuminates pilot light L4 through lines 647 and 609 and a light L5 through lines 648 and 609 which indicate that the aforementioned heating elements are "on" and heating. When the elements reach a preset or predetermined temperature, the four microswitches throw over to another position, which removes power from the elements and lights L4 and L5, and activates a light L6

through lines 649 and 609 and a light L7 through lines 650 and 609 which indicate that the heat chamber 504 is at the desired preset temperature. If at any time during the operation, the temperature in the heat chamber 504 drops below the preset temperature of the heater control units, the elements A' and B' of unit 542 and A and B of unit 541 are automatically turned back on through the microswitches MS1, MS2, MS3 and MS4, turning off lights L6 and L7 and turning on lights L4 and L5. This operation is repetitive.

Closing of the switch S8 will apply a potential across heating element C of unit 541 through lines 646 and 645 and across the element C' of 542 through lines 646 and 609 causing illumination of a light L8 across lines 645 and 646 indicating that these elements are in operation. The heating elements C and C' constitutes booster or supplements the heat obtained by elements A and B and A' and B'.

Referring to FIGS. 37 and 38, when the switch S5 is closed, a potential is applied to the heater 262 of the cutter device and the thermostatic switch TH266' through lines 651, 266 and a light L12 is activated. The thermostatic switch TH266' controls the temperature of the heater 262 of the wrapper feed assembly 200.

When the switch S1 is closed, a potential is applied to the prewrap conveyor motor 218 through lines 652, control CO3, lines 653 and a light L11 will be activated. The speed of this motor is controlled by the control CO3 through a potentiometer PO4. When the switch S2 is closed, power is made available for operation of the solenoid 424' of the valve 424, to a photo-cell of the electric eye 415, the solenoid 274' of clutch 274, rectifiers DC1 and DC2 through lines 286, 682, 683, 684, 289, a transformer T, and lines 288. The transformer T is included in the circuit only when a 120 V. rather than a 240 V. source is needed to power the foregoing.

When the cam 279 of the speed changer 278 rotates, the switch S280 will be closed to apply a potential across the coil of a relay R6 through lines 283, 282, 656 and 655. When this relay is latched, a potential will be applied across the timer 285 through a timer relay R7, a line 657, the relay R6, lines 658, 660 and 659 to start and operate the timer, and also deactivate the solenoid 271' of clutch 271 through a center leg 281 of R6 which overrides any further activation of this solenoid. When the timing cycle of timer 285 is completed, the relay R7 is latched thereby breaking the power applied to the timer by interrupting the line 660, and applying a potential across a reed relay R8 through lines 661, 662 and 663, which in turn supplies power to activate the solenoid 274' through lines 664 and 286.

With respect to resetting the timer, after one revolution of the clutch 274 which controls the operation of the conditioner, the relay R6 is automatically reset through the normally closed S296 by opening lines 294, thereby making power once again available for activation of the solenoid 271' through a center leg 281 of R6, and resetting the relay R7 by interrupting lines 657 and 658, thereby, deactivating the solenoid 274' through the relay R8. The duration for the timer 285 is controlled by adjusting a potentiometer PO1. These relays and each of the others referred to herein, excluding reed relay R8, include an armature which is movable to engage one or more upper or one or more lower contacts. When the armature of any relay is engaging one or more of the upper contacts, this relay is deacti-

vated and when it is engaging one or more of the lower contacts the relay is activated. If the relay remains activated after the switch that caused that activation is opened, the relay is latched. Reed relay R8 acts as a normally open, single pole, single throw switch, which closes when a potential is applied across its coil.

As to the electric eye 415, when a product, such as meat, passes through a beam of light from an exciter lamp to a photo-cell of the eye, the beam of light is broken, which activates the solenoid 424' of the prewrap 400 through lines 683, 684 and 289. Lines 682 supply power to the electric eye from lines 289. The solenoid 424', as alluded to above, controls the operation of the valve 424 through which air flows to the manifold 406.

When the switch S12 is closed, power is made available to the solenoid 270' and to the switch S3 through lines 293, 291, 293', 665 and 299, and to solenoid 326' and switch S4 through lines 293, 666, 667 and 299, and is also made available to solenoid 271' and switch S280 through lines 299, 284, 281 and 293. As described above, the clutch 270 is operated by the solenoid 270' to control the feeding of the wrapper material to the conveyor 212; the solenoid 326' controlling the valve 326 through which liquid flows to the conditioner; and solenoid 271' the clutch 270 which controls rotation of the cutter device 251.

With reference to the dispenser, when the switch S29 is closed, power is made available to motor 29, rectifier DC3, a relay R53 in the control box 53, switches S60, S49 and S50 through lines 668, and a light L15 is activated. Power is supplied to the dispenser motor 29 through lines 669, 58 and 670 when the relay R53 is deactivated. When the product or meat slides onto the apron 48 and engages either one of the normally open switches S49 or S50, it will cause latching of relay R53 through lines 670 and 57 and through normally closed switch S296 and lines 57, 674 and 669 and this interrupts the power applied to the dispenser motor 29, while simultaneously applying power to the coil or magnetic component 55 of the dispenser brake 52 via rectifier DC3 through lines 670, 675 and 669. The normally open footswitch S60 will accomplish the same result as either of the switches S49 or S50. When the normally closed switch S296 is opened by the clutch 274 of the conditioner 300, the relay R53 is reset by interrupting lines 674 and 57, thereby deactivating the brake 52 of the dispenser and starting the motor 29 thereof.

When all of the switches on the panel of the control 600 are "off" (the switch S9 is "off" in a closed position) to stop operation of the complete system, and thermostatic switches TH1, TH2, TH3 and TH4 will override the action of S9. The motors 546 for the fans in the heat chamber 504 and motor 506 for the conveyor 502 will continue to operate as described above until the temperature in the heat chamber is lowered, which automatically closes thermostatic switches TH3 and TH4 and deactivates the motors 546 and the motor 506 by applying a potential across the coil of R3 through lines 614 and 678 and 677 and 715, which extinguishes the lights L9 and L10.

The circuit to the motor 567 for cooling the upper belt 505 of the sealer is controlled by a relay R9, thermostatic switches TH7 and TH8, and the switch S10 through lines 616 and 617. The switches TH7 and TH8 sense the temperature existing in the manifold 570 for

the purpose of maintaining the upper belt at a predetermined temperature. The theory of operation of R9, TH7 and TH8 in conjunction with the motor 567 is analogous to the circuitry to motors 546 and 506 and related components R3, TH1, TH2, TH3 and TH4. It should be observed that two additional thermostatic switches are included in the circuits to control the motors 546 and 506 for the purpose of sensing the temperature in different areas or in opposed sides of the heat chamber. Attention is further directed to the fact that TH7 is analogous in operation to TH1 and TH2, TH8 is analogous to TH3 and TH4, R9 analogous to R3 and that operation of the motor 567 is analogous to operation of the motors 546 and 506. The thermostatic switches TH1, TH2, TH3 and TH4 are connected by lines 676, 615, and 677 to the relay R3. A temperature differential is established or predetermined between TH7 and TH8, with TH7 set high and TH8 set low. The purpose of this differential is to avoid a rapid turn on-turn off situation around a point temperature, which may cause the motors to overheat. More specifically, in what may be referred to as a stage (one) of the operation, the temperature is below the "turn off" temperature, with TH7 and TH8 closed, and relay R9 is activated, which holds the circuit open to the fan motor 567. In a stage (two) the temperature rises above the "turn off" temperature, opening TH8, but TH7 remains closed, and relay R9 is latched which continues to hold the fan motor 567 circuit open. In a stage (three) the temperature rises above the "turn on" temperature, opening TH7, unlatching R9 and closing the circuit to the fan motor 567. If the temperature drops below the "turn on" temperature, TH7 will close, but R9 will remain unlatched, which continues to activate the fan motor 567 circuit until the temperature drops below the "turn off" temperature, at which time or instant both TH7 and TH8 will be closed and R9 will latch, opening the fan motor 567 circuit and returning to stage (one).

With respect to the safety factors embodied in the system, if any or all of the cable jacks J1, J2 and J3 from the control 600 or sealer are not connected or if they are not in their proper receptacles and power is applied to the control panel 600, the alarm relays R1 and R2 circuits will be deactivated by interrupting line 621 and power will be applied to the buzzer or signal B through resistor D and lines 625 and 626 while the panel light PL2 will go out by interrupting line 620. Also, if the switch S9 is closed "off" and any or all of the normally open switches S6, S7 and S8 are closed "on", raising the temperature of the heat chamber to dangerous levels, the blower motors 546 and the conveyor motor 506 will start automatically through relay R3 when the thermostatic switches TH1 and TH2 interrupt lines 615 and 676.

As to the main fuses F1 through F5, if any one blows, creating a situation where any one of the heating elements A, B and C of heating unit 541 and elements A', B' and C' of unit 542 in the heat chamber is "on" and power is not available to the motors 546 and 506 or relay R3 and there is any interruption in the lines 608, 618, 609, 619, and 607, alarm relays R1 and R2 will deactivate and power will be applied to the buzzer B through resistor D and lines 625 and 626, while the panel light PL2 will go out by interrupting line 620 and either PL1 or PL3 may go out according to which main fuse is blown. The relay R1 is a sensing relay, which will

open when the circuits including lines 608, 618, 609, 619 and 607 are open, closing the line 625 of the buzzer circuit. The relay R2 is a power relay which will switch the line 626 of the buzzer circuit to a line that has potential with respect to line 625. If any of the sub-fuses F8, F9, F14 and F15 in the blower motor 546 circuit or to the conveyor motor 506 circuit should blow and the temperature in the heat chamber starts to reach a dangerous limit, the thermostatic switches TH5 and TH6 will open when either relay R4 or R5 is open because no power is applied to lines 680 or 681. This simultaneous opening of the relays R4 or R5 and thermostatic switches TH5 or TH6 will deactivate the alarm relays R1 and R2 by interrupting lines 621 and 624 and power will be applied to the buzzer B through resistor D and lines 625 and 626, while panel light PL2 will go out by interrupting line 620.

Attention is also directed to the fact that all circuit indicator lights L9 through L15 are on the load side of the subfusing and therefore are extinguished when any sub-fuse F8, F9 and F14 through F27 blows. The switches S1, S5, S2, S12, and S29 are on the power side of their sub-fuses and, therefore, if any of these fuse blow, the given switch can be opened and the fuse replaced without interrupting the other circuits. The fuses F6, F7, F12 and F13 which are indicating fuses are mounted on the panel of the control 600 and serve to indicate by a red disk when they are blown.

A modification from a three-phase input to a single-phase input is disclosed in FIG. 36a. More specifically in this respect, the power side of the main fuses F2, F3 and F5 are connected together through lines 603', 601' and 604' to one input line and fuses F1 and F4 are connected together through lines 602' and 605' to the other input line, with a line 606' to a ground G'.

Having thus described my invention, it is obvious that various modifications may be made in the same without departing from the spirit of the invention, and, therefore, I do not wish to be understood as limiting myself to the exact forms, constructions, arrangements, and combinations of parts herein shown and described.

I claim:

1. A conditioner for the purpose described comprising an elongated substantially rectangular frame, an elongated conveyor structure supported by said frame, an elongated track mounted on said frame below said conveyor structure, a spray device mounted on said frame, and spaced abutment means carried by said conveyor structure for selectively engaging and moving products along said track for treatment by the spray of said spray device when the latter and said conveyor structure are operated.

2. The conditioner defined in claim 1, in which said conveyor structure comprises a pair of parallel endless belts, said abutment means bridges said belts, and said spray device is disposed above said belts for emitting a spray therebetween for engaging the products and said track.

3. The conditioner defined in claim 1, in which said conveyor structure comprises a pair of parallel endless belts, said abutment means bridges said belts, including means for confining the spray within a predetermined area.

4. The conditioner defined in claim 1, in which said track is inclined and its upper extremity is provided with an inlet through which some of the spray may be

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discharged while the products are being treated by the spray.

5. The conditioner defined in claim 1, in which said conveyor structure comprises a pair of parallel belts, said abutment means transversely connects said belts, and said track is provided with anti-friction means whereby to facilitate movement of the abutment means thereon.

6. The conditioner defined in claim 1, in which a side

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of said frame is provided with an inlet through which the products may be deposited onto the conveyor structure.

7. The conditioner defined in claim 1, including an elongated sump disposed under said track, and said track is inclined and respectively provided with openings in its extremities through which some of the spray may flow into the sump.

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