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(54) Multi-station packaging machine.

(57) There is provided a packaging machine in which a layer of fruit (103) is loaded into a container (109) at each of several stations (105a, 105b, 105c, 105d) in the machine (100). A mechanism is provided for feeding a layer of fruit (103) into an assembly, nesting the fruit (103) within the assembly, moving it into a loaded station (105a, 105b, 105c, 105d) and subsequently lifting it from the nesting station (122) and depositing it into a container (109) located therebelow. Conveying mechanisms are provided for indexing the container (109) to the various loading stations (105a, 105b, 105c, 105d) and if desired for providing a separator sheet (124) between various layers.

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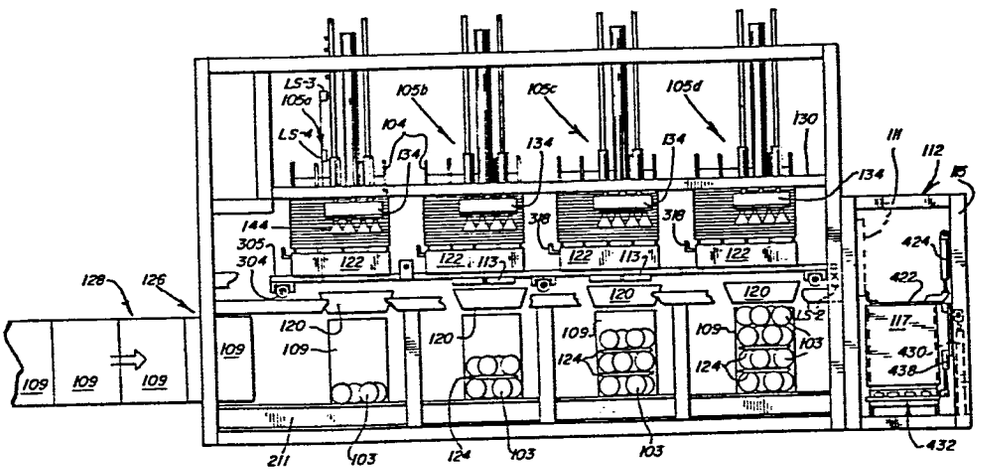
FIG. 3


LS-3
105a
LS-4
105b
104
134
105c
134
105d
134
130
134
111
112
115
144
305
304
318
318
122
122
113
122
113
122
424
422
117
430
438
432
128
126
109
109
109
109
109
120
109
120
120
120
109
109
124
124
LS-2
103
211
103
124
103
103

MULTI-STATION PACKAGING MACHINE AND METHOD OF PACKAGING

Technical Field

This invention relates to a machine and method for packaging articles, such as, fruit, a layer at a time, in containers.

Background of the Invention

Prior to the present invention, there have been numerous attempts at designing and manufacturing machines that can be used to package various articles, such as, fruit. There is a continuing demand for a machine that is capable of packaging fruit, or the like, in an orderly, systematic, rapid and highly efficient manner. This is particularly desirable in the case of fruit, since the packing season is relatively short. There currently exists packaging equipment for packaging fruit at random, which is not as desirable as having the fruit packed in a nested relationship and having the fruit in adjacent rows also designed so that one layer is slightly offset from the other to facilitate a better packaging arrangement. The present invention is an improvement over similar equipment illustrated and described in U. S. Patent No. 4,233,802, granted November 18, 1980, and U. S. patent applications Serial No. 113,625, filed January 21, 1980, Serial No. 169,625, filed July 16, 1980, and Serial No. 231,282, filed February 4, 1981, all assigned to the assignee of the present application.

In accordance with the present invention, there is provided a machine for automatically packaging layers of articles into containers. The machine comprises a multiple number of packing or loading stations, where separate layers of fruit are deposited into a container. In the particular illustrated embodiment, there are provided separator

sheets between several of the layers, which separator sheets serve not only to separate, but are impregnated with a chemical that serves as a disinfectant to facilitate preservation of the fruit.

The utilization of separator sheets of this type are usually employed when the fruit is shipped great distances. The packaging machine disclosed herein will in most cases not employ mechanisms for providing a separator sheet and it is to be clearly understood that the machine need not be provided with such a mechanism.

Essentially, at each of the loading stations, a layer of fruit in a nested pattern is provided in a container, such as, a carton, or box, and at several of the stations, separator sheets are provided between adjacent layers. While as aforementioned separator sheets need not be provided but in the situations where they are to be used, it is not necessary that the sheets be provided between all of the adjacent layers, but if that is desired, of course, the illustrated embodiment of the present invention can be modified to provide same. The containers are indexed to the respective loading stations and after the container is completely loaded, the container is directed to a station where a container top is placed on the filled container in a telescoping relationship. While the illustrated machine employs a telescoping lid, other means, such as, flaps, can be used for closing the container.

More specifically, empty containers are introduced into the machine and they are advanced in the requisite fashion to the various loading stations. At each of the loading stations, the containers are provided with a layer of fruit in a nested array, which fruit is received from a box

nesting assembly into which fruit has been directed and subsequently nested. The fruit is picked up from the nesting assembly, the nesting assembly is removed, and the fruit layer is then dropped into the container. The design of the nesting assemblies is such that the adjacent layers are slightly offset from each other, so that not only the articles are nested within the layers, but are disposed in nested relationship between layers.

In the illustrated embodiment, the machine has a total of four loading stations, but this is intended to be merely exemplary. Thus, if a container receives a layer at each loading station, the machine can provide for up to four separate layers in a container. If the size of the articles or containers dictates that more or less than four layers be provided, suitable arrangements can be made to provide filling in this manner.

Since, as illustrated, the machine is set up to pack four layers of articles, it is set to deposit one layer at each of the four loading stations and each layer is deposited into a different one of four separate boxes. Each box then moves successively through each loading station, one at a time, and receives a layer at each loading station. Thus, a box receives one layer of articles at each station for each machine cycle, and accordingly the overall productivity of the machine is one filled box for each machine cycle during normal operation of the machine. This is a great advantage over various prior art devices that provide for loading only one layer of articles into a container for each machine cycle. Thus, the ivnention provides a way for packaging articles into containers efficiently and quickly.

While the preferred embodiment of the invention to be illustrated describes boxes of fruit, and, more particularly, grapefruit, it is to be understood that any one of a large variety of articles, as will become apparent to those skilled in the art, can be packed with the illustrated embodiment of the present invention. Thus, fruit articles are used for purposes of illustration, and it is not intended to limit the instant invention to fruit articles.

Brief Description of the Drawings

An embodiment of the invention will be seen by referring to the attached drawings, in which

FIG. 1 is a perspective view of the overall machine;

FIG. 2 is a view taken along line 2-2 of FIG. 1;

FIG. 3 is a front view of the machine which schematically illustrates the four loading stations forming an embodiment of the machine of the instant invention;

FIGS. 4-9 are sequential views showing that which occurs at a particular station;

FIG. 10 is a diagrammatical perspective view showing the containers located at the various stations and a filled container about to be moved into position where a top is to be placed thereon;

FIGS. 11-13 shows schematically the box top feeding arrangement;

FIG. 14 is a detailed perspective view of the mechanism for introducing the container to be filled into the packaging machine;

FIG. 15 is a detailed perspective view of tne clutch mechanism for the chain drive for introducing a container into the system;

FIG. 16 is a detailed perspective view showing a box entered into the system, but prior to the time it is to be introduced into the paddle assembly used for indexing the containers forward in the prescribed manner;

FIG. 17 is a view similar to FIG. 16, but showing the container lowered onto the paddle drive mechanism;

FIG. 18 is a view taken along line 18-18 of FIG. 17;

FIG. 19 is a sectional view through lines 19-19 of FIG. 18;

FIG. 20 is a perspective view of the fruit feeder mechanism prior to the fruit being introduced into the nesting box assembly;

FIG. 21 is a view taken along line 21-21 of FIG. 20;

FIG. 22 is a plan view of the nesting box assembly shown in the expanded position;

FIG. 23 is a plan view of the nesting box assembly shown in the nested position;

FIG. 24 is a perspective view of the diphenyl sheet stacking mechanism taken from the rear of the machine;

FIG. 25 is a side eleVation view of the piston arrangement for the diphenyl sheets;

FIG. 26 is a top view, partially broken away, of the vacuum box for the diphenyl sheets shown in the sheet pickup position;

FIG. 27 is similar to FIG. 26, but showing the vacuum box for the diphenyl sheets in the sheet drop position;

FIG. 28 is a schematic perspective view illustrating the platen assemblies in their raised and lowered positions, and the mechanism for

controlling the picking up and releasing of the fruit from the platen housing;

FIG. 29 is a cross-section view of the valve mechanism controlling the flow of air relative to the platen housing with the valve shown drawing air through the platen housing;

FIG. 30 is a view similar to FIG. 29 with the valve positioned to push air through the platen housing;

FIG. 31 is a cross-sectional view of a cup assembly;

FIG. 32 is a view similar to FIG. 31, but showing a fruit retained in the cup assembly;

FIG. 33 is a side elevation view of the box top telescoping assembly; and

FIG. 34a, b and c are schematic views of the electrical control diagram for the machine.

Detailed Description of the Preferred Embodiment

Before describing the apparatus illustrating the invention in any substantial detail, it would be desirable to describe the series of steps that occur in the operation of the novel packaging machine 100 in conjunction with the main components of the machine. This will facilitate a ready understanding of the more specific mechanisms of the machine, which will be described subsequently. It will also be appreciated that certain operations of the machine occur simultaneously.

Turning now to FIG. 1, there is illustrated in outline form a fruit loading conveyor assembly 102 on which there is fruit 103 directed to four chute mechanisms 104 that lead to four separate loading stations 105a, 105b, 105c, 105d (see FIG. 3). When the loading conveyor 102 is actuated, the fruit is advanced down through the chutes 104 in rows until

they arrive at the position shown in FIG. 2, where they are stopped. The fruit in the rows are subsequently fed into nesting box assemblies 122 located under each of the chute assemblies. When the nesting box assemblies are moved to receive the fruit, as shown sequentially in FIGS. 4-7, the fruit is fed into the nesting box assembly, in the unnested position, as illustrated in FIG. 22. The nesting box assembly is then operated to nest the fruit, as shown in FIG. 23.

After the fruit has been nested, the platen assemblies 106, which are located immediately above the nesting box assemblies when the nesting box assemblies are in the extended position, are lowered, as shown in FIG. 7, to pick up the fruit in the nested position from the nesting box assemblies and raise them above the nesting box after which the nesting box is returned to the position shown in FIG. 4. The platen assemblies are then lowered into the containers 109, to deposit the fruit as shown in FIG. 5, after which they return to their upper position, as shown in FIG. 6. A layer of fruit is then provided to each of the cartons at one of the stations. As shown in FIG. 3, the carton at station 105a receives its bottom layer, at station 105b its second layers, etc., which is accomplished by varying the downward movement of the platen assemblies.

As will be described hereinafter in detail, the cartons to be loaded are fed into the packaging machine on a feed conveying system 108. Following this, the containers 109 are indexed to move to another station, where another layer of fruit is removed from a nesting box assembly and dropped into the containers located at each of the stations, etc.

In the illustrated embodiment, disinfectant separator sheets are introduced at stations 105b and 105c. To this end, a vacuum box assembly 113 is

secured to the nesting assemblies at stations 105b and 105c, which functions to pick up a separator sheet 124 and drop it into the container, as shown in FIG. 7 for station 105b. After the sheet is dropped, a layer of fruit is disposed on top of the separator sheet, as illustrated in FIG. 6. As the containers move longitudinally through each of the stations, as shown in FIG. 3, they then end up being fully loaded at the final station 105d, after which they are moved to the end of the machine, as shown in FIG. 10, from where they are transversely moved into a box top telescoping assembly 112, where they are to receive telescopically a container top 111 which is being fed into the telescoping assembly 112 on a box top feed conveyor 110. This is done through a telescoping mechanism, briefly described hereinafter but which is described in substantial detail in an application entitled "Telescoping Box Assembly" filed along with the instant application and is to be considered a part hereof to the extent necessary to understand the operation of same and to provide a basis for supporting whatever claim protection is sought calling for a telescoping assembly in conjunction with the packaging machine. The "Telescoping Box Assembly" is filed in the name of the same inventor and is assigned to the assignee of the present invention.

The filled and closed containers 117 are then taken away on a conveyor 114. In addition, there is provided a chute adjusting assembly 118 for adjusting the position of chutes 104 and a stationery trough assembly 120 that act to guide the platen housings into the container 109 during the filling operation.

It remains to note that there are mechanisms provided for retaining the boxes in position during the loading operation and that various suitable switching

mechanisms are provided to insure proper indexing and operation of the various mechanisms, all of which will be discussed in detail when discussing the specifics of the instant machine.

While the aforestated general discussion began with the feeding of fruit to the packaging machine, the detailed description will begin with the feeding of the containers into the packaging machines. It can be appreciated that during start-up the machine can be manually loaded to place the machine in the condition shown in FIG. 3, or if desired, fruit can be withheld from various stations during automatic operation until the machine reaches the condition shown in FIG. 3. For our purposes, it will be assumed that the machine is loaded as shown in FIG. 3 and the detailed description will begin with the introduction of a new empty container into a box loading station 126. After a box is so introduced the indexing mechanism will be activated to move the new box from the loading station to 105a, which occurs as the containers in stations 105a, 105b, and 105c are moved to stations 105b, 105c, and 105d,
respectively, and the movement of the container in station 105d into position to be moved into the box top telescoping assembly station 112.

Box Bottom Shuttle and Indexing Mechanism

Referring now to FIGS. 14-19, there is illustrated a portion of the apparatus for indexing the boxes to the various stations where they are to be loaded with layers of fruit. For purposes of describing the method of operation, it is assumed that the boxes are disposed as illustrated in FIG. 3, where there is one box disposed at each of the stations. The box in the last station 105d is completely filled with four layers of fruit; the box

in the next-to-the-last station 105c with three layers, the box in the second station 105b with two layers, and the box in the first station 105a with one layer. At the left of FIG. 3, there is illustrated a series of container bottoms with the container 109 immediately to the left of station 105 being located in the box loading station 126 in position to be indexed into the first station 105a.

The paddle assembly 200 for indexing the boxes through the various stations is illustrated in schematic outline form in FIG. 10. Generally speaking, the paddle assembly is an integrated unitary assembly which reciprocates and functions to move forwardly an amount to move the containers from one station to the next station and then rearwardly an amount slightly greater than the distance between stations to permit the pivotally mounted paddles to be returned to their upright positions so that after each container receives a layer of fruit at its respective station the paddle assembly can again be reciprocated to move the containers forwardly when the next indexing is to occur. The pivotal design of the paddles is necessary since the paddles, when withdrawn, have to slide under a container located at a preceding station and have to have enough room to return to their vertical position so they may again engage the containers located at each of the stations. The paddle assembly 200 is reciprocated in the stated manner by piston 212 and controlled in the proper sequence as will be explained when discussing the method of operation.

Briefly, a container 109 to be loaded is moved onto a shelf 250 above the end of the paddle assembly 200 which will be called the container or box loading station 126, which is spaced from the

first fruit loading station 105a by an amount essentially equal to the distance between fruit loading stations. The box 109 is subsequently lowered into the paddle assembly, and the paddle assembly is indexed forward to move the box from the box loading station into the first fruit loading station 105a, and the other boxes in the machine from their existing station to the station further on down the line or to the exit of the machine as the case may be. At this time, a new box is moved from the stack of boxes 128 behind the box loading station onto the platform shelf 250, above the paddle assembly as the paddle assembly is returned to its original position after indexing the boxes through succeeding stations.

Turning now specifically to FIG. 16, there is illustrated the box loading station 126 where box 109 is located on the box support shelf 250 above the paddle assembly 200. The box has been moved onto the shelf 250 against stops 252 by a mechanism to be described later. At the prescribed time, the piston assembly 254 is operated to move the kickplate 256 outwardly, as shown in FIG. 17, to move the arms 258 located on opposite sides of the support shelf 250 from the position shown in FIG. 16 to that shown in FIG. 17 to lower the box onto the paddle assembly. This is accomplished by arms 258 being pivotally mounted to the frame by pin 260 and connected to the support shelf by pin 262. The lowered parallel movement of the box support 250 is additionally facilitated by providing a parallel linkage arrangement which includes links 264 located on opposite sides of the carton support and connected to the main frame 116 by pivot pin 266 and to the box support by pin 268. As the box support is lowered,

the cam surfaces 252a of stop plates 252 engage projections 274 located on the side of the main frame support structure to move the stop plates out of their box limiting position against the action of the tension spring 272. Thus, the paddle assemblies are free when actuated by a suitable control mechanism to be moved forward to index the boxes. As previously mentioned, the paddle assembly 200 consists of a series of spaced paddles 202a, 202b, 202c, 202d, and 202e, that contact the boxes to move them from one station to another, after which the paddle assembly is retracted and repositioned to move the boxes through another station movement.

The paddle assembly 200 is made up of angle irons 203 through which extend the rods 214 that support the paddles relative to the paddle assembly. The paddle assembly 200 is movably supported in a track 208 that is secured to the main frame 116 through the action of rollers 206 secured to dependent plates 204 that are connected to the angle irons 203.

The boxes while moved by the paddle assembly slide off the upper surface of transversely spaced channel members 211 and are aligned by the vertical walls of longitudinally extending angle irons 213.

As shown in FIG. 19, the movement of the paddle assemblies is accomplished by the piston assembly 212 that is secured to a paddle frame assembly depending plate 210. Thus, movement of the cylinder rod of piston 212 to the right, as shown in FIG. 19, will index the paddle assembly, and retraction of the piston will return the paddle assembly back to its initial position. It is to be noted that all of the paddles, except the first one, 202a, are pivotally mounted about pins 214, so that

they can be moved clockwise, as shown in FIG. 19, and thus slide under the cartons, when the paddle assembly is retracted to permit the paddle assembly to be returned to its initial position. Stop 216 is provided to limit counterclockwise movement, and stop 218 is provided to limit the clockwise movement of the pivoted paddles. The design is such that the paddles will return to their vertical position after They have cleared the box under which it has been moved. There is no need for the first paddle assembly 202a to be pivotally mounted, since when it is returned, there is no carton under which it has to pass. Also, as previously mentioned, the paddle assembly travel is slightly longer than the distance between stations to permit the paddles to return to their vertical position when the assembly is retracted. Specifically, the distance between the paddles is equal to the distance between stations, but the piston stroke is slightly longer to accomplish the above.

Referring now to FIG. 14, there is illustrated how a subsequent box is introduced onto the box shelf 250 at the box loading station when the paddle assembly is retracted. The paddle assembly includes a pair of depending members 244 to which is connected rod 242. A longitudinally extending arm 240 is secured to rod 242 and at its opposite end is connected to a clutch mechanism 238, including a chain sprocket 246, which engages chain 236 and a ratchet arm 248 that prevents movement of sprocket 246 in the counterclockwise direction. The chain that is connected to the clutch mechanism is disposed around sprockets 232, 234, which sprockets are located on rods 228, 230, respectively. Secured to the ends of shaft 229 are pulleys 224, and to the

ends of shaft 230 are pulleys 226. Spaced V-belts 222 are disposed around pulleys 224 and 226 and are driven thereby when the chain 236 is moved.

When in accordance with the operation of the control circuit the paddle assembly 200 is moved forward, the rod 242 moves forward and carries along with it arm 240. When arm 240 moves forward, the chain sprocket 246 freely rotates in a clockwise direction relative to the chain, and thus the chain is not moved. However, when the paddle assembly moves rearwardly and the arm 240 is moved to the left, from a position adjacent rod 230, the sprocket 246 cannot move in a counterclockwise direction and therefore it remains locked relative to the chain and pulls the chain along with it, with the result that pulleys 224 and 226 are driven clockwise and a box located on the V-belts 222 is moved onto the carton support shelf 250 located above the paddle assembly 200. In order to more fully align the platen assemblies relative to the cartons 109 at their respective loading stations, trough assemblies at each of the loading stations or schematically illustrated in FIGS. 3 through 10 are employed. The trough assemblies 120 are interconnected and retained in a fixed position on the machine frame and partially supported via bushings 181 that surround vertical trough assembly guide bars 180.

The trough assembly 120 provides four individual troughs 182 which are interconnected. The troughs 182 have four downwardly depending sides 186 which act as a funnel or guide means for the fruit platen housings 106 as it lowers fruit into the box. If the container 109 is provided with top flaps, suitable box location means (not shown) help assure that these top flaps of the container are not in the path of the fruit platen

housings 106 as they lower fruit into the boxes.

Now that the movement of the boxes from station to station has been described, we will describe how the fruit is fed to the individual stations and then to the boxes.

Fruit Feeding Assembly

As previously mentioned, the fruit 103 is initially fed to the packaging machine on a feed conveyor 102 to feed chutes 104. Attention is now directed to FIGS. 20-21, which show the details of the feed-chute assembly.

The fruit feeder assembly 280 consists of spaced guide rows 282 defined by spaced plates 284. Adjustable support mechanisms 286 located on the rod 288 are provided to provide the requisite spacing for the fruit being supplied to the fruit feeder assembly, so it can be properly introduced into the nesting box assemblies 122. The rod 288 is located relative to the feeder assembly by support frame 290. Details of the mechanisms for varying the row widths are shown in my aforementioned application S.N. 169,625.

The fruit is moved forward between the spaced plates by a roller conveyor 291. The roller conveyor is operated by a chain drive mechanism 292. As shown in FIG. 21, each of the rollers of the roller conveyor consists of a central rod 294 driven by the chain drive, and located on each of the rods are freely rotatable rollers 296 to facilitate movement of the fruit relative to the roller conveyor assembly. The roller conveyor is driven by a pulley and feed-belt drive mechanism 298 shown partially in FIG. 20.

Located at the front of the fruit feeder assembly is a front guide member 300 which also

includes freely rotatable rollers thereon. The front guide 300 prevents the fruit from moving other than in the prescribed pattern. These rod and roller assemblies are designated 302.

The fruit from the feeder assembly is directed into the nesting box assemblies 122, which are shown in perspective in FIG. 20, in plan view in FIGS. 22 and 23 and schematically in FIGS. 4-9. As aforementioned, the nesting box assemblies receive the fruit from the feeder assembly in a prescribed pattern and thereafter the assemblies are moved to nest the fruit to the desired nesting arrangement after which the fruit is lifted from the nesting box assemblies by the platen assemblies and placed in a box. All of the nesting box assemblies of the packaging machine are secured to angle irons 305 and are movable together on Thompson rods 304 between the position adjacent the fruit feeder assembly into the fruit feeding stations in the sequence as shown in FIGS. 4-9. The sequence shown in FIGS. 4-9 is that which occur at station 105b. The nexting box assemblies, angle irons 305, and vacuum boxed secured to the nesting box assemblies and described hereinafter will be collectively referred to a carriage assembly. The movement of the carriage assembly on the Thompson rods are controlled by piston 338.

Referring now specifically to FIG. 20, the fruit from the feeder assembly 280 drops down into the nesting box assembly as the nesting box assembly is moved outwardly relative to the feeder assembly. The nesting boxes are all secured to frame member 305 and thus they are all moved together. For example, referring first to FIG. 6, it is seen that the nesting box assembly is located directly under the

feeder assembly and no fruit is received thereby. However, as the nesting box assembly is moved to the right, as shown in FIG. 7, the fruit is free to drop out into the forward cups of the nesting box assembly and is precluded from dropping between the cups 306 by bars 308. At this time, it is to be noted that a stop plate 312 is located in its left-hand position and thus does not prevent the dropping of fruit from the feeder assembly into the nesting box. The operation of the fruit platen assemblies 106 will be described hereinafter, but it is to be noted that prior to the movement of the nesting box assembly from that shown in FIG. 5 to that shown in FIG. 7, the platen assembly 106 has been moved out of the way to permit the nesting box assembly 122 to be moved in position over the box 109 to receive the fruit. As the nesting box is moved forward to its final position, as shown in FIG. 7, an angle iron 314 secured to the box contacts the stop plate 312 to move it forward to block any further dropping of fruit from the fruit feeder assembly. It is to be noted that when the nesting box is moved back to receive fruit, that at the end of its travel, projecting fingers 318 located on the nesting box contact the plate 312 to move it out of blocking position and thus at the appropriate time permit fruit to be dropped again into the nesting box assembly. Resilient fingers 307 prevent unwanted fruit from falling into the nesting box. It is to be noted that the nesting box assembly consists of a box within a box. The larger box 313 includes a portion 315 that is covered by rollers 317 so that when the box assembly is extended as shown in FIG. 20 the fruit will be prevented from dropping out of the feeder assembly 280 by the roller section 317.

By providing the unique box within a box arrangement the nesting box assembly can be readily connected to handle a different nesting array of articles. The illustrated box can be removed and a box with a different nesting arrangement can be readily placed therein.

After the nesting box assemblies are located at the stations, but prior to the operation of the platen assembly to engage and withdraw the fruit from the nesting box and permit the nesting box to be withdrawn and the fruit to be dropped into the container, the fruit has to be nested, and the apparatus for showing this is illustrated in FIGS. 20, 22, and 23. As shown in FIG. 22, the cups 306 are initially located in position to directly receive the fruit from the fruit feeder assembly (fingers 307 and roller bars 308 have not been shown to simplify the figures). These cups 306 are located on spaced bars 320, 322, 324, 326. The spaced bars are interconnected to each other through lost motion connecting plates 330. Thus, it can be seen that when bar 320 is operated it will move through the lost motion connection and then move bar 322, which will move through the lost motion connection 330, and so on, until the cups are in the nested position, as shown in FIG. 23. This is accomplished by a rod 328 that is connected to the first bar 320 in each of the nesting box assemblies, which rod is operated by a piston assembly 329. Briefly, movement of the piston assembly 329 in one direction will nest the cups 306 and when the piston is retracted, the cups will return to the unnested position shown in FIG. 22. The piston assembly 329 is secured to a brace member 331 that is secured to the transversely movable angle iron frame members 305.

Referring briefly to FIG. 3, in the illustrated embodiment by way of example only there is shown that there are provided separator sheets 124 at stations 105b and 105c, which separator sheets serve a dual function of separating adjacent rows of fruit and also are impregnated with a disinfectant that is exuded to minimize spoilage of the fruit during shipment. In the instant case, the separator sheets are diphenyl sheets.

Turning now to FIGS. 24-27 there is illustrated the mechanism for providing the separator sheets at stations 105b and 105c. The diphenyl sheets are stacked in stack 334 located on platforms 336. In order to take a sheet from the stack 334 and place it in the container, there is a vacuum box assembly 113 that is secured to the bottom of the nesting box assemblies located at stations 105b and 105c and thus moves with the nesting box assemblies. The sheet stack 334 is located on a platform 336, which platform is biased upwardly by springs 338 disposed about rods 340 and located between plates 336 and support plate 342. The movement of the sheet stack is controlled by piston assembly 344, which biases the stack upwardly into engagement with the vacuum box 113, and after its engagement therewith the plate 342 contacts the microswitch 346, which turns off the piston and returns the piston and stack to its lower position, leaving a single sheet in contact with the vacuum box 113. The vacuum in the boxes 113 is controlled by vacuum pump 339. It is to be noted that the plate 342 had depending therefrom plate 343 to which are secured bushing blocks 345 which slide on rods 347 that are part of the main frame structure of the machine. The support structure for the stack of separator sheets shown at

the left in FIG. 24 is identical to that illustrated for the sheet stack on the right but has not been drawn to simplify the figure.

As the vacuum box is moved to the right, as shown in FIGS. 6 and 7, the vacuum box is in the condition shown in FIG. 26, wherein there is a suction drawn through ports 360 and the ports 358 leading to the atmosphere is blocked by closure 356. However, when the vacuum box 113 is moved to the position shown in FIG. 7, the rod 350 secured to the vacuum box is engaged and it is moved to the left to open closure 356 and block off openings 360, with the result that air is introduced into the box and the sheet drops onto the layer of fruit, as shown in FIG. 7.

Now that the fruit is in the position shown in FIG. 7, the platen assemblies 106 are lowered and moved into engagement as shown in FIG. 8, wherein the cups 144 engage the fruit and the assemblies are operated to retain the fruit in position and raise the fruit into the position shown in FIG. 9, after which the nesting box assemblies 122 are moved out of the way, as shown in FIG. 4, and then the fruit is moved into the container as shown in FIG. 5.

The operation of the fruit platen assembly is set forth below.

Fruit Platen Assembly

Referring now to FIGS. 28 through 32, the fruit platen assemblies 106 will now be described in greater detail. The fruit platen assembly 106 occupies an upward portion of the machine frame 116, as best shown in FIG. 28. The fruit platen assemblies 106 are programmed to be moved simultaneously whenever fruit is vertically picked up from the nesting box assemblies. This control is facilitated using electrical circuitry, as will be

described further below. The following discussion is merely directed to the mechanical aspects of the fruit platen assembly 106.

The support for the fruit platen assemblies 106 is comprised generally of a U-shaped channel rail frame member 130 which extends the full length of the machine 100, as best seen in Fig. 28. This channel 130 is supported by channel supports 132 that form part of the main machine frame.

As aforementioned the fruit platen housings 134 are moved vertically to lift the fruit from the nesting box assemblies and then deposit them into a box. To facilitate this, vertical guide bars 136 are fastened at their lower end to each of the fruit platen housings 134 and are adapted to slide within suitable sleeves 138 which are fixed at their lower end to the rail 130. A vertical piston assembly 139 controls the vertical movement of the fruit platen housings 134, and one of these is provided for each fruit platen housing 134. The operation of each piston is identical except that the strokes will vary depending on how far the platen assembly is to move into the containers.

As to the specifics of the fruit platen housings 134, it will be seen from FIGS. 31 and 32 that a bottom plate 140 is provided with apertures 142 (only one of which is shown) which are arranged in a predetermined pattern. Each of these apertures 142 receives a cup assembly 144 which facilitates, in conjunction with a vacuum pump assembly which will later be described, the lifting of fruit from the nesting box assemblies 122. When the fruit platen housing 134 is in a vacuum condition as in FIG. 8, air is sucked into the housing 134 generally in the direction of the arrow along passage 146 as shown in

FIG. 32. When positioned over the fruit, this facilitates retaining the fruit in the cups 144 by the differential pressure acting on the fruit. The fruit holding action results from the venturi effect created by the air flow around the fruit and through the cups 144 into the fruit platen vacuum housing 134, which results in a positive differential pressure acting against the fruit to hold it in its respective cups while the housing 134 is being vertically raised above the nesting box assemblies 122 and moved vertically downward into the containers 109. When the platen is located in the container and the fruit is to be released as in FIG. 5, the flow of air in passage 146 is reversed by way of a valve control mechanism which will facilitate in positively releasing the fruit from the cups by blowing air through the fruit platen housing to create a pressure condition in the fruit platen housing. It should be understood that the term "vacuum" has been used for purposes of description, and refers to the situation where air flows upward through the cups 144, or where a sub-atmospheric air pressure condition exists in a vacuum housing 134.

The fruit platen housings 134 are lowered to different levels in the containers or carton bottoms 109, as determined by how many layers of fruit have been previously deposited into the carton or container. This is facilitated by providing a fruit platen housing stop mechanism (not shown) associated with the fruit platen vertical guide bars 136 and fruit platen vertical piston 139. The stop positions can, of course, be adjusted, when desired, to load different sized fruit.

The bottom plates 140 of the fruit platen housings 134 are capable of being removed and

replaced, depending upon the different sized fruit to be loaded into containers.

For illustrative purposes, FIG. 32 shows the construction of a cup assembly 144 secured to the plate 140 of a fruit platen vacuum housing 134. These cups 144 are mounted on a tubular member 148 and are spring-biased by spring 150 against a depending flange portion 152. As can be seen in FIG. 32, when a cup 144 is lowered to receive a piece of fruit F from the nesting box assembly, the cup 144 is moved upwardly against the action of the spring 150. In this way, the cups 144 are designed to be moved slightly so as to minimize any bruising of fruit when it is picked up, and also facilitates packing varying sizes of fruit, within a given range of tolerance.

Vacuum Manifold Assembly

The control of the flow of air relative to the cups 144 is regulated by a vacuum manifold assembly which includes two vacuum pumps 154 secured in position relative to the frame structure of the machine as shown in FIG. 28. The air flow in line 170 is determined by the schematically illustrated piston-operated flow control mechanism 158. One of the pumps and associated flow control mechanisms is for stations 105a and 105b and the others for stations 105c and 105d. They are identical and only one of which will be described. The flow-control mechanism consists of a first plate 160 having openings 162, 164 leading to conduits 166, 168 connected to opposite sides of the vacuum pump 154 and a second plate 169 having an opening 171 connected up to conduit 170 leading to conduits 172 connected to each of the platen housings 134. Plate 169 includes an opening 173 which is aligned with opening 164 when air is pulled in from the atmosphere

as whon in FIG. 30. Controlled operation of the piston assembly 174 controls the position of plate 169 to determine whether there is a positive or negative pressure in conduit 170. The piston assembly 174 is controlled by the electrical circuitry, as will be later described. Conduit 170 is either in communication with conduit 168 to create a vacuum condition, as shown in FIG. 29, or with conduit 166 to create a pressure condition, as shown in FIG. 30. When loading or carrying the fruit, air will be withdrawn through conduits 172 and 170 to create the pressure differential necessary to retain the fruit in the cups, whereas when the fruit platen assemblies 106 are to deposit the fruit, air flows through conduits 170 and 172, which acts to aid in releasing the fruit from the cups.

Conduits 170 and 172 include flexible tubing, as shown in FIG. 28, to facilitate movement of the fruit platen housings 134, as well as flow control mechanism 158.

Box Top Feeder Assembly

Referring now to FIGS. 1 and 10-13, there is illustrated in both schematic and in detail form the mechanism 110 for providing box tops to the telescoping station 112, where they are to be telescoped onto a loaded container. The box tops are initially placed on a platform 400, after which they are moved transversely onto a platform 402 against the stop 404. A pressure plate 406 which is adapted to contact the box top is moved by a cylinder 408, to move the box top past the marking rolls 410 onto a V-belt conveyor 412 which is in constant motion. The conveyor then moves the box tops through guides 44 (see FIG. 3) into the telescoping station.

Electrical Control Circuitry

Referring now to FIGS. 34a, b, and c, the electrical control circuitry of the packing machine will now be described in greater detail. Electrical control circuitry comprises numerous limit switches which sense movement of various parts of the machine and relays which are energized in response to certain conditions. For easy convenience, certain circuit components, i.e., limit switches and relays, will be referred to by their location with a line number. Line numbers appear at the extreme right of each of the FIGS. 34a, b, and c.

Referring now to line numbers L1 and L18 in FIGS. 34a and b, respectively, carriage front relay and carriage rear relay are two independent relays which control the operations of certain other components based upon whether the carriage assembly is deposed at the rear of the machine, i.e., under the fruit conveyor and over the separator sheets, or at the front of the machine, i.e., over the channel members (211). LS-1 and LS-18, respectively, are large contact switches which are closed by the movement of the carriage assembly, when in the extreme front or the extreme rear positions, respectively.

When the main power to the machine is initially turned on the carriage assembly will be located over channel members (211). Such positioning of the carriage assembly dictates that switches LS-1 and LS-2 will be closed when the main power to the main packaging machine is initially applied. Lines 3 and 4 allow selection of automatic or manual operation of the packaging machine via mode switch MS-1 (line 3a). The automatic mode will be described first. Referring now to the series connections in

line 5, all preoperative conditions must be met for current flow and machine operation in the automatic mode. Therefore, the automatic relay and carriage front relay will be energized due to the switch LS-1 being closed. Blowers 1 and 2 auxiliary relays (line 5) must be closed, signifying that blowers 1 and 2 are operative. The top, container, and fruit sensors must find a top (111), a container (109), and fruit (103) in place. If all these conditions exist, current will flow into the on-delay timer, since LS-1 is latched and the on-delay timer coil is energized. The timer allows the operations conducted by momentary switch LS-2 (line 9) to be performed before the platen heads (106) move down to pick up fruit. Therefore, since LS-1 is latched and the carriage front relay coil is energized, the fruit stop coil is energized, so the fruit stop plate (312) moves into place stopping the fruit flow in line 9. In line 10, since the carriage front relay coil is energized, the nesting cup relay will be energized allowing the piston (329) to move the cups (306) into their nested position. In line 11, the energizing of the carriage front relay coil allows the suction-on relay to be energized, causing the piston operated flow control mechanism (158) to move to the vacuum condition.

In line 12, the off-delay timer coil is also energized, signifying that the operations performed by the closing of momentary switch LS-2 have been completed and the machine can continue with its cycle. As the cycle continues, the platen heads move downward in line 6 to pick up the fruit that has been deposited into cups (306) after the carriage was moved to the front of the machine facilitated by the energizing of the carriage front relay coil in line 2. When the platen heads reach their full extreme

lower vertical position over the nesting boxes, and the carriage container nesting box is in the front of the machine, switch LS-3 in line 13 closes. This energizes the platen head-up coil, and the platens begin their upward movement lifting the fruit from the nested cups (122).

Looking now to lines 13, 14, and 15 of FIG. 34b, switch LS-4 is closed when the platen heads, now holding fruit, reach their full extreme upper vertical position, over the nesting boxes. Since the carriage front relay is energized at this time, the carriage assembly moves to the rear (line 14) and the cups (306) are unnested (line 15). The closing of switch LS-5 (line 18), by the movement of the carriage assembly to the rear, causes the carriage rear relay coil (line 18) to energize the carriage rear relay, closing carriage rear relay contacts. Momentary switch LS-6 in line 19 is closed just after switch LS-5 in line 18, by the same movement of the carriage assembly to the rear. Since the carriage rear relay is closed and the diphenyl blower interlock signals that the diphenyl blower is running, the diphenoyl sheet plates (346) move upward (line 19) until switches LS-7a and LS-7b (line 21) are closed. The closing of these switches signifies that a diphenyl sheet (334) has been lifted by the vacuum box assembly (113) and the diphenyl sheet plates returns to their down position. Simultaneously, in line 26, since the carriage rear relay is closed and either the automatic or manual relay has been closed by selections in line 4, the platen heads (106) begin to traverse downward into the container directly below.

When the platen heads reach their full extreme lower vertical position into the container,

switch LS-8 is closed (line 22). Since the carriage assembly is at the rear of the machine and carriage rear relay contacts are closed, the functions in lines 22, 23, 24, and 25 are performed. This is facilitated by the respective energized coil closing the proper relay contacts. Specifically, the platen head suction relay is energized, allowing the piston-operated control mechanism (158) to move to the pressure condition, causing the vacuum to cease.and the fruits to be deposited into the container (line 22). Simultaneously, the fruit stop rods (302) open to allow fruit to flow into the cups when the carriage assembly begins its next movement to the front of the machine (line 23). Also, the platen heads begin movement upward, out of the containers (line 24) and a counter is advanced signalling the completion of one cycle of the machine (line 25).

Upon the platen heads reaching their full extreme upper vertical position, over the containers, switch LS-4 in line 14 closes. Since the carriage is now at the rear of the machine (under the fruit conveyor and over the diphenyl sheets), the carriage rear relay is closed and the carriage moves to the front of the machine (line 16). Simultaneously, assuming that either the automatic or manual mode has been chosen, and the carriage rear relay is closed, the cartonadvance coil energizes the carton-advance relay, causing piston (212) to activate the paddle aseembly (200), advancing the containers to the next station (line 17). This completes one cycle of the packaging machine components as illustrated in FIGS. 4-9.

Referring now to line 26, momentary switch LS-9 is closed by paddle assembly (202e) coming to

the end of its forward motion. This causes the paddle assembly (200) to start its return motion and simultaneously engages piston assembly (254), causing an empty container to be lowered into place in front of the paddle assembly (202a). Switch LS-9 also energizes the container-pusher-out relay coil, causing the container-pusher-out relay contacts to close, activating piston (218). This pushes a full container into its telescoping box assembly (112).

When piston (218) is fully extended, momentary switch LS-10 is closed. This energizes the container-pusher-in coil, closing the container-pusher-in relay and fully retracting piston (218), allowing acceptance of the next full container.

The operations depicted by the close of LS-9 and LS-10 are illustrated in FIGS. 10, 16 and 17. These electrical connections complete one full cycle of the packaging machine. The packaging machine's manual mode electrical operation will now be described. Switch MS-1 (line 3a) will be in the manual position, and when the machine's main power is switched on, the carriage assembly will be in the front of the machine, over the paddle assembly (200), causing switch LS-1 to be closed (line 1). Therefore, the carriage front relay coil energizes, which closes the carriage front relay contacts.

Since the conditions above have occurred, when the push button in line 8 is closed, the platen heads will traverse downward and one complete cycle as described in the automatic mode will occur. This push button faciliates the non-continuous use of the packaging machine. It must also be noted that for manual mode operation the preoperative conditions (line 5), required for automatic mode operation need

not be met. Line 8 shows that only the carriage front relay contacts need be closed for the platen heads (106) to be lowered in the manual mode.

Loading circuitry is also provided, as can be seen in lines 15a and 22a. To operate load push buttons 1 and 2 (lines 15a and 22a), switch MS-1 (line 3a) in line 4 must be switched to its middle pole. The pole selects either the manual or automatic mode, allowing current to flow through the normally closed contacts of the automatic and manual relays and reach the load push buttons.

While the packaging machine can be used independently of a box top telescoping assembly in the illustrated embodiment one is used and will be described below.

Box Top Telescoping Assembly

As previously mentioned, when the loaded container leaves the packaging machine, it is introduced into a telescoping box assembly 112 comprising a frame 115 where a box top 111 is placed in telescoping relationship on the filled container 109. The box tops 111 are introduced on a conveyor 110, as shown in FIGS. 11-13 and guided into the telescoping 112 by guides 414 (see FIG. 1).

The details of the telescoping station are spelled out at length in my copending application entitled "Telescoping Box Assembly," filed along with this application, which is incorporated here by reference. It is briefly described in FIG. 33 when taken in conjunction with the schematic of a telescoping box assembly shown on the right hand portion of FIG. 3.

Generally speaking, the box top 111 is moved into the telescoping box assembly and placed on tipable shelves 420. A presser plate 422 pivotally

mounted at 423 operated by a cylinder 424 is biased into position on top of the box top 111. A movable frame assembly including the presser plate and presser plate cylinder is supported by bushing supports 426 that slide along stationary rods 428. This movable assembly is operated by a main piston 430 as shown schematically in FIG. 3.

In order to retain the box top in position so that it can be telescopingly applied over the filled container, a spreader assembly 432 is provided. This spreader assembly consists of a generally rectangular frame member 434 that has secured to its inner walls a plurality of spring fingers 436. The spreader assembly is secured to the main movable frame assembly through a cylinder 438 having a depending piston rod 440 that is secured through a clevis 442 to the frame 444. The cylinder 438 is attached to a bracket 446 that is part of the movable frame assembly.

When a box top is provided in the telescoping assembly, the spreader assembly is moved to the upper position, which releases the box top from the shelves 420 and the box top is then supported by the spreader assembly. The fingers 436 are located internally of the box top and the other ends of the fingers engage the outer surface of the filled container. Specifically, cam members 437 secured to the fingers engage stationary plates 439 when the spreader assembly is raised to insure that the fingers are located inwardly of the box top. With the box top in this position in the telescoping assembly and the spreader assembly supporting the box top, the presser plate is moved downwardly by the action of the main cylinder 430 and acts to move the box top telescopingly over the loaded container 109.

After the box top has been telescoped over the loaded container, the spreader assembly 412 is moved out from under the box top by operation of the cylinder 438 and moved below a platform 450 on which the loaded container is located to permit the loaded container to be removed from the telescoping box assembly. The spreader assembly is secured to bushing supports 440 that are slidably disposed on rods 428. A conventional electrical control system is provided for operating the cylinders in the desired sequence.

It is, of course, intended to cover by the appended claims all such modifications and variations that fall within the true spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A machine (100) for automatically packaging layers of articles (103) into containers (109) and closing same comprising a plurality of article loading stations (105a, 105b, 105c, 105d), a box top applying station (112), box top conveying means (110), container conveying means (108) for disposing containers (109) at each of said loading stations (105a, 105b, 105c, 105d), means (122) for providing a nested layer of articles (103) at said loading stations (105a, 105b, 105c, 105d) and loading said containers (109), said container conveying means (108) including means (200) vor indexing said containers (109) to succeeding loading stations (105b, 105c, 105d), means for directing filled containers (109) into the box top applying station (112), and means (422, 424) in said box top applying station (112) for telescopingly applying a box top (111) to a filled container (109).

2. A machine (100) as set forth in claim 1 in which the means (122) for providing a nested layer of articles (103) at said loading stations (105a, 105b, 105c, 105d) comprises means for directing articles (103) to a nesting box assembly (122), and means for nesting the articles (103) in said nesting box assembly (122).

3. A machine (100) as set forth in claim 2 in which the nesting box assembly (122) comprises a plurality of cups (144) mounted on a spaced bar assembly designed to permit nesting of said cups (144) and means for moving said assembly to nest said articles (103).

4. A machine (100) for automatically packaging layers of articles (103) into containers (109) and closing same comprising a plurality of article loading

stations(105a, 105b, 105c, 105d), a box top applying station (112), box top conveying means (110), container conveying means (108) for disposing containers (109) at each of said loading stations (105a, 105b, 105c, 105d), means (134, 144) for providing a layer of articles (103) at said loading stations (105a, 105b, 105c, 105d) and loading said containers (109), said container conveyor means (108) including means (200) for indexing said containers (109) to succeeding loading stations (105b, 105c, 105d), means for directing filled containers (109) into the box top applying station (112), and means (422, 424) in said box top applying station (112) for telescopingly applying a box top (111) to a filled container (109).

5. A machine (100) as set forth in claim 4 in which said means for providing a layer of articles (103) at each loading station (105a, 105b, 105c, 105d) comprises an article feeding system (102) defining a plurality of rows, a free-wheeling roller conveyor system (296), and a box (122) for receiving a predetermined amount of articles (103) from said feeding system.

6. A machine (100) as set forth in claim 5 in which said receiving means (122) includes means for nesting the articles (103) disposed therein, means for moving said box (122) from the article feeding system (102) into its respective loading station (105a, 105b, 105c, 105d), and means responsive to the filling of said box (122) closing off said article feeding system (102).

7. A machine (100) for automatically packaging layers of articles (103) into containers (109) comprising a plurality of article loading stations (105a, 105b, 105c, 105d), a box loading station (126), means (108) for disposing containers (109) at said box loading station (126) and at each of said loading

stations (105a, 105b, 105c, 105d), means (122, 134, 144) for providing a nested layer of articles (103) at said loading stations (105a, 105b, 105c, 105d) and loading said containers (109), said means for disposing containers (109) at such loading station (105a, 105b, 105c, 105d) including means (200) for indexing said containers (109) to succeeding loading stations (105b, 105c, 105d), said indexing means including a paddle assembly (200) which receives a box (109) at said box loading station (126) and moves it into a first loading station (105a) and simultaneously moves the partially or fully filled boxes (109) to loading stations (105b, 105c, 105d) further downstream to be closed.

8. A machine (100) as set forth in claim 7 in which the paddle assembly (200) includes a plurality of pivotally mounted paddles (202b, 202c, 202d, 202e) positioned to engage the containers (109) at the box loading (126) and each of the article loading stations (105a, 105b, 105c, 105d) and means (212) for reciprocating the paddle assembly (200) to move the containers (109) between stations (105a, 105b, 105c, 105d) and then to receive another container (109) at the box loading station (126).

9. A machine (100) as set forth in claim 7 in which the box loading station (126) includes a shelf support means (250) located above the entrance to the paddle assembly (200), means operated by said paddle assembly (200) for moving a box (109) onto said shelf support means (250), and means for moving said box (109) from said shelf support (250) into said paddle assembly (200).

10. The packaging machine (100) in accordance with claim 1 wherein the means for filling the containers (109) with a nested layer of articles (103) comprises means (114) for lifting the articles at the

loading stations (105a, 105b, 105c, 105d) and for depositing them into a container (109) comprising a platen assembly having article pickup means (144) constructed and arranged to pick up the articles (103) at the loading stations (105a, 105b, 105c, 105d) and deposit them in the container (109) at the loading stations (105a, 105b, 105c, 105d).

11. The packaging machine (100) in accordance with claim 10 wherein the platen assembly includes a platen housing (134) having depending therefrom a plurality of cups (144) constructed and arranged to engage the articles (103) located at the loading stations (105a, 105b, 105c, 105d), cylinder means (139) for raising and lowering the platen housing (134) into and out of contact with said articles (103), means for providing a vacuum in said housing (134) whereby when the cups (144) engage the articles (103), air acting to flow into the housing (134) will cause a pressure differential tending to hold the articles (103) in the cups (144), and for admitting pressurized air into said housing (134) to release the articles (103) from the cups (144) when the articles (103) are lowered into the container (109).

12. The packaging machine (100) in accordance with claim 1 wherein trough means (104) are provided associated with said loading stations (105a, 105b, 105c, 105d) for assisting in the loading of the containers (109) in position at each loading station (105a, 105b, 105c, 105d).

13. A machine (100) as set forth in claim 1 including means (113) for providing a separator sheet (124) into a container (109) at at least one loading station (105b, 105c) between adjacent layers of articles (103).

14. A machine (100) as set forth in claim 1 in which the means for introducing a nested layer of

articles (103) at said loading stations includes a nesting box assembly (122), means for providing a separator sheet (124) into a container (109) at at least ohne loading station (105b, 105c) between adjacent layers of articles (103) including a stack of sheets (124) disposed adjacent said loading station (105b, 105c), means for securing a separator sheet (124) to said nesting box assembly (122), and means for controlling the securing to and releasing from of said separator sheet (124) from said nesting box assembly (122) to provide the separator sheet (124) between layers disposed in a container (109).

15. A machine (100) as set forth in claim 1 including means (410) for marking said box tops (111) before entering said box top applying station (112).

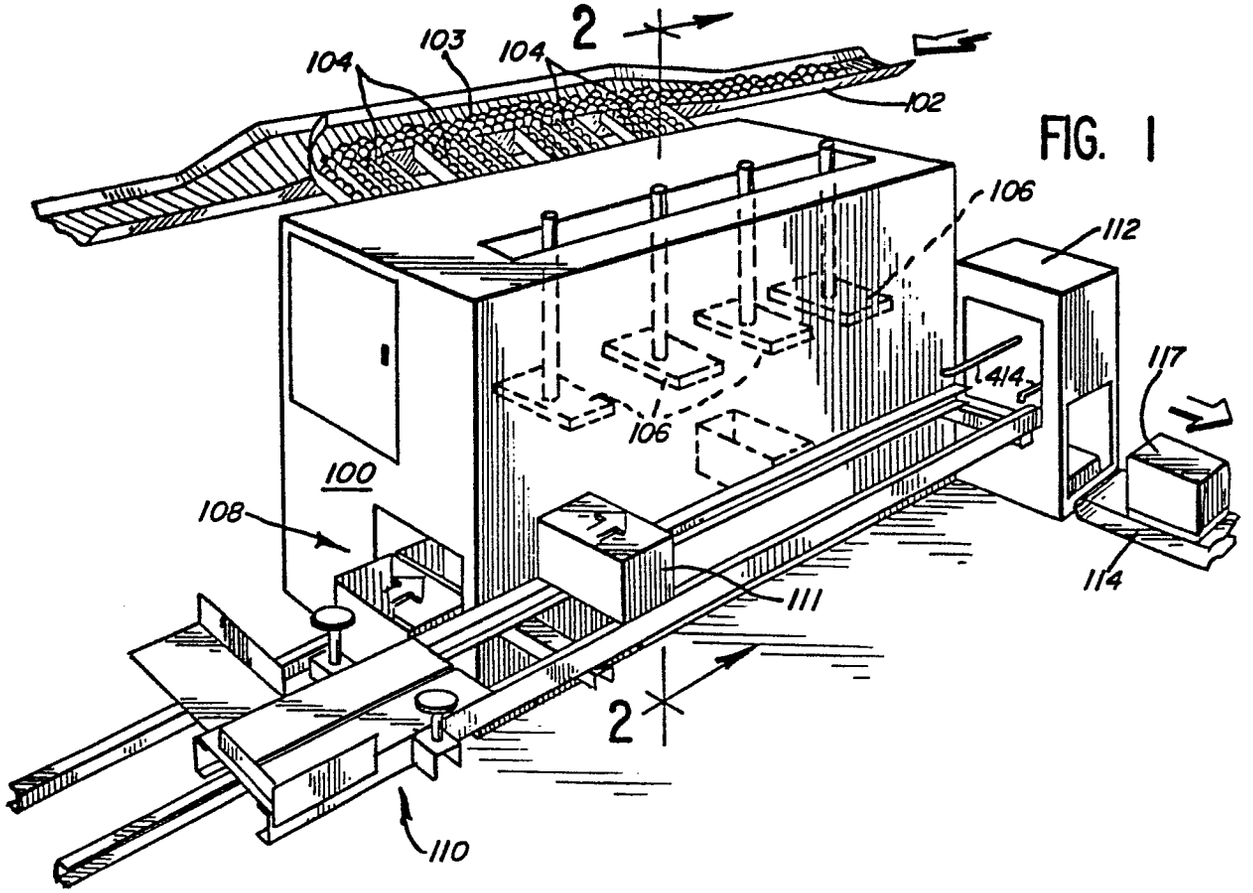

2
104
103
104
102
106
112
117
414
106
100
108
111
114
2
110

FIG. 1

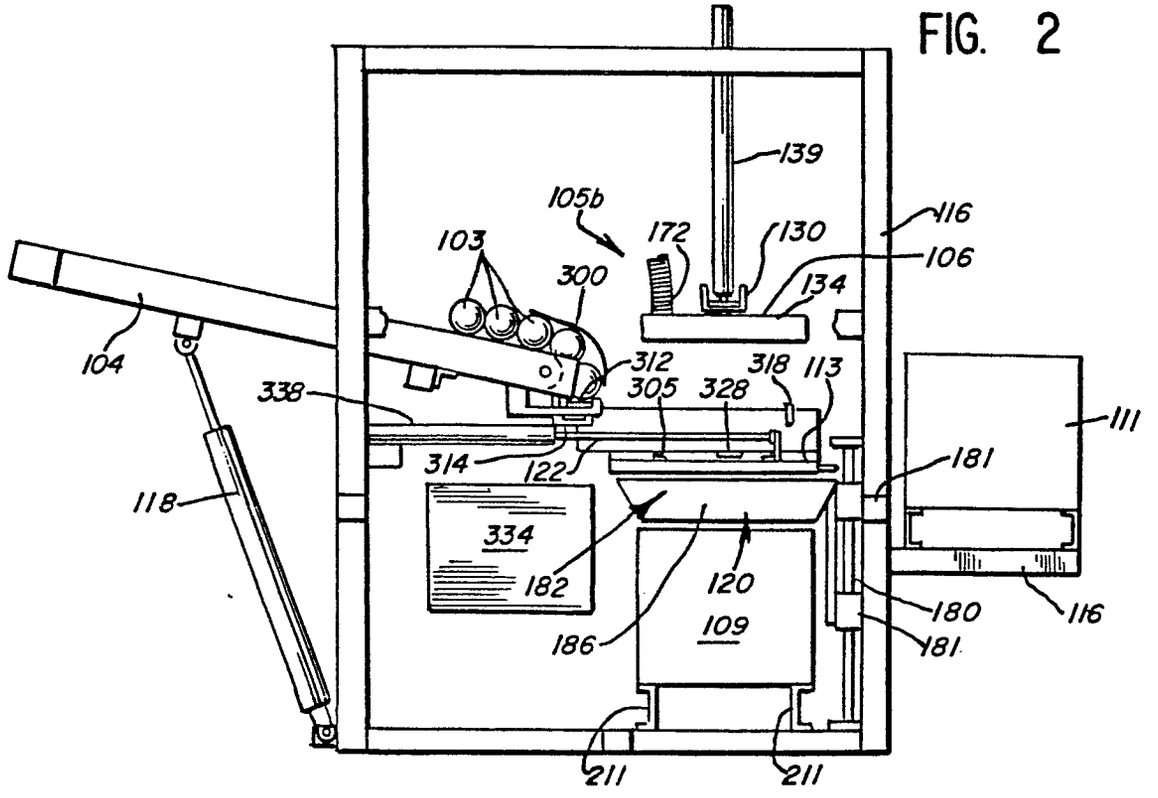
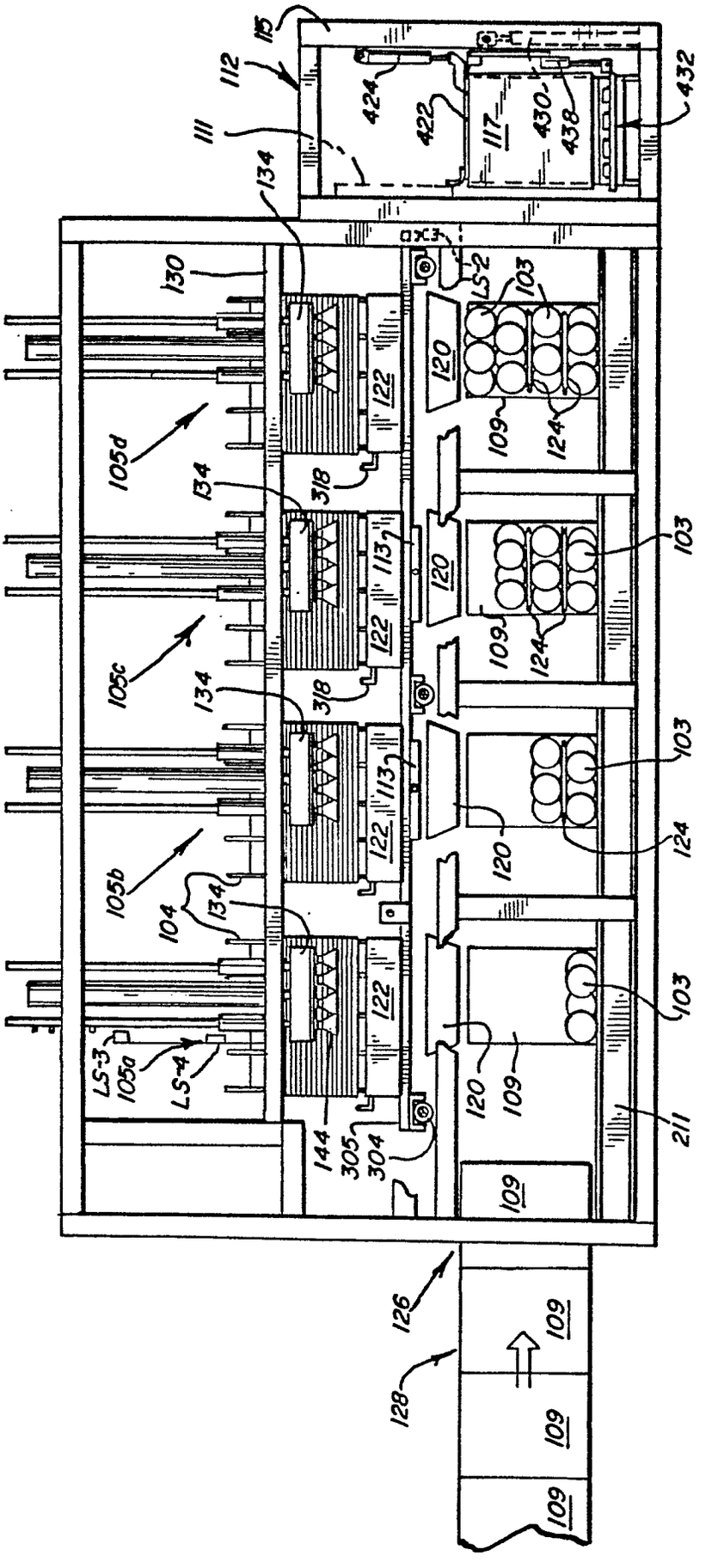

139
105b
116
103
172
130
106
300
134
104
312
318
113
338
305
328
111
314
122
181
118
334
182
120
109
180
116
186
181
211
211

FIG. 2

FIG. 3


115
112
111
134
424
422
117
430
438
432
130
LS-2
103
120
109
124
105d
318
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105c
105b
104
LS-3
105a
LS-4
144
305
304
211
126
128

FIG. 4

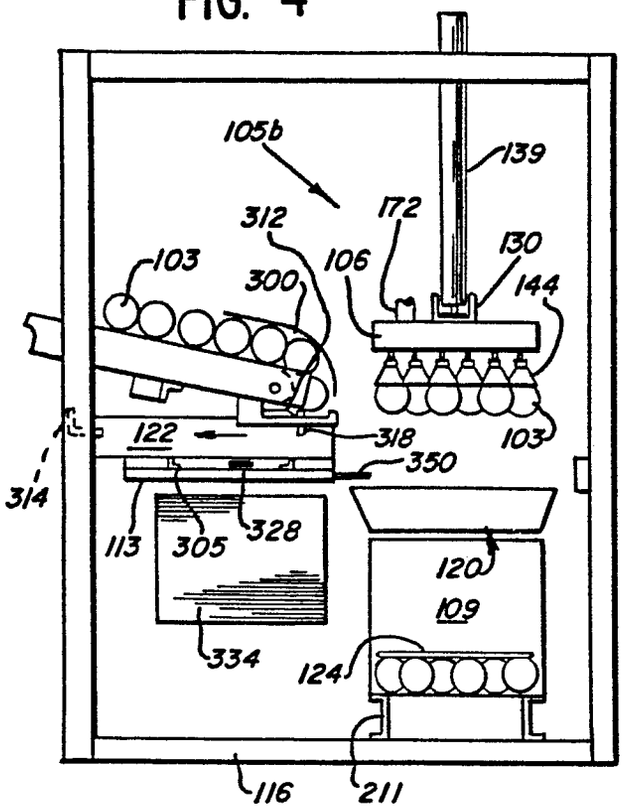


FIG. 5

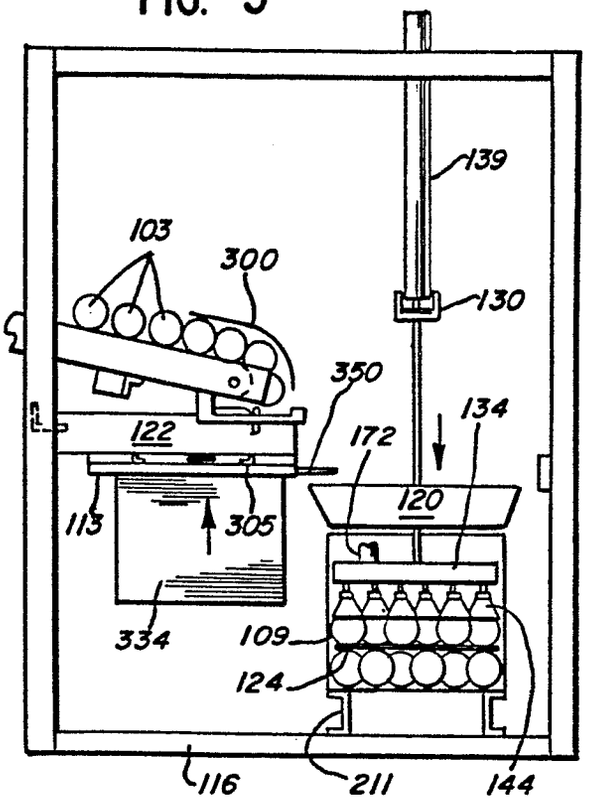


FIG. 6

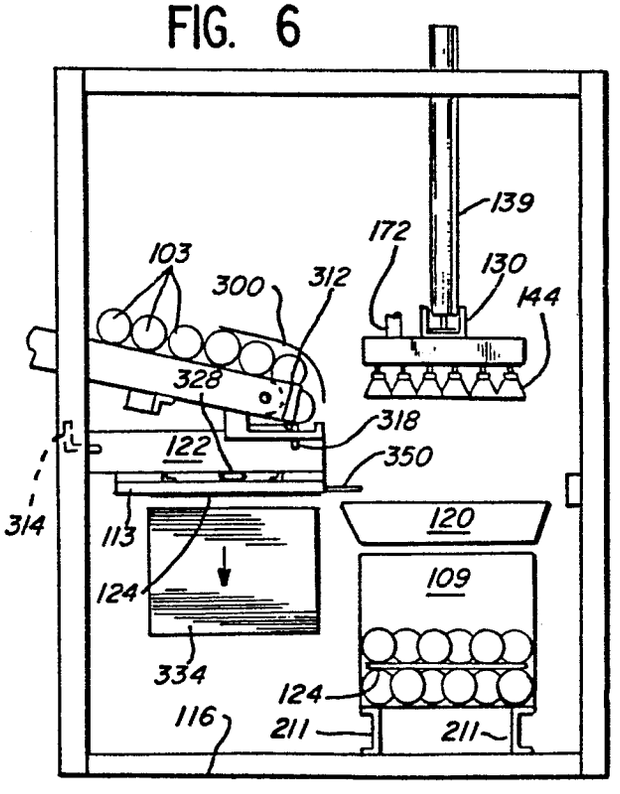


FIG. 7

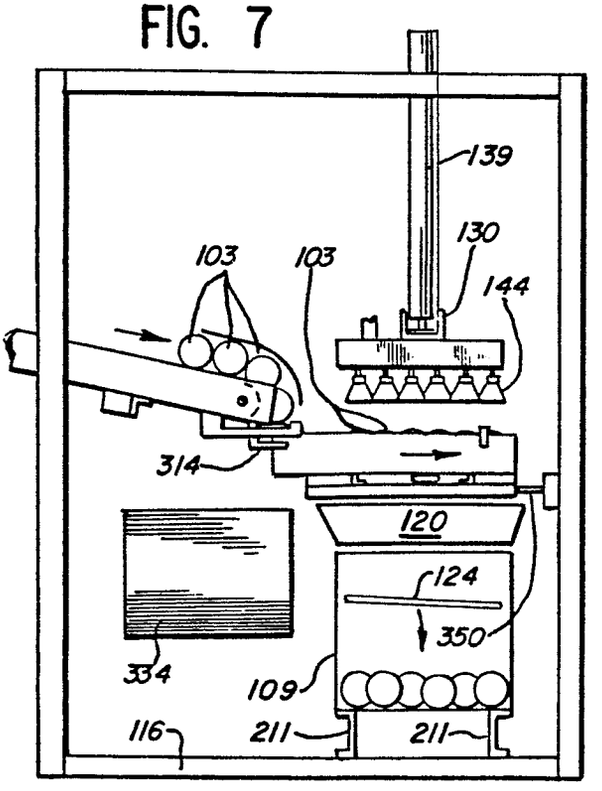


FIG. 8

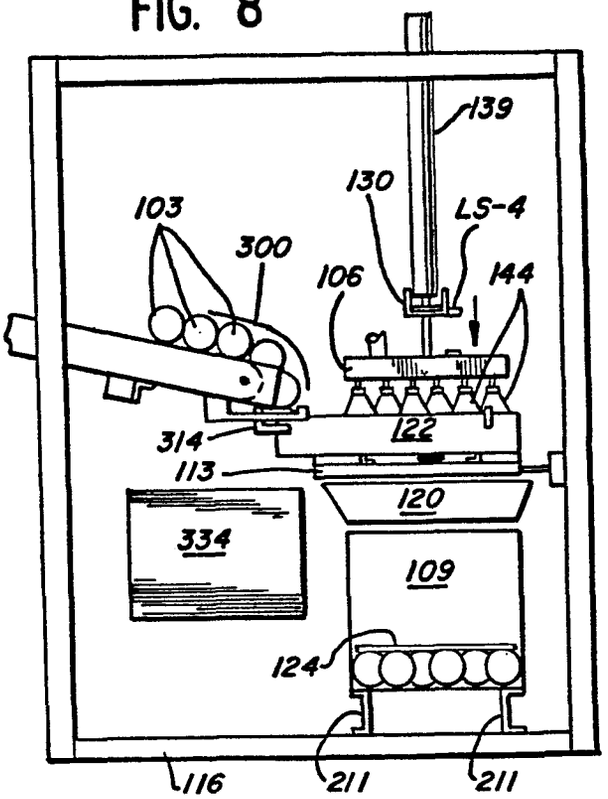


FIG. 9

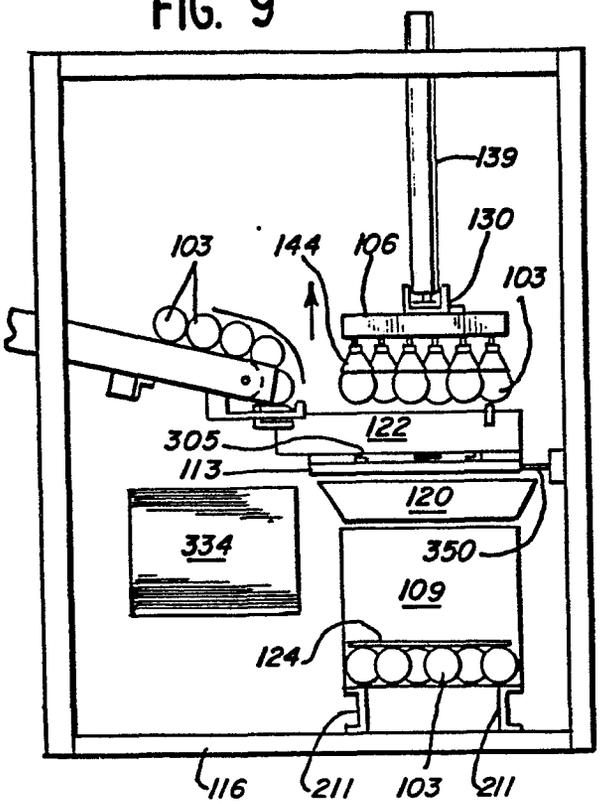


FIG. 10

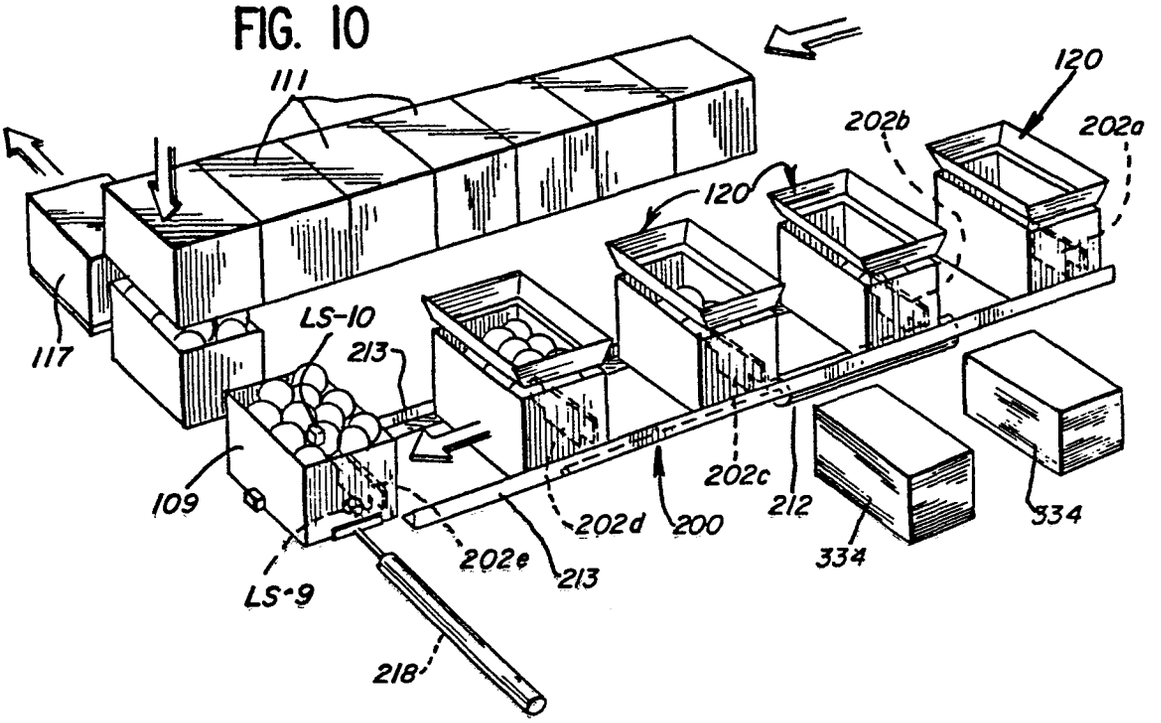


FIG. 11

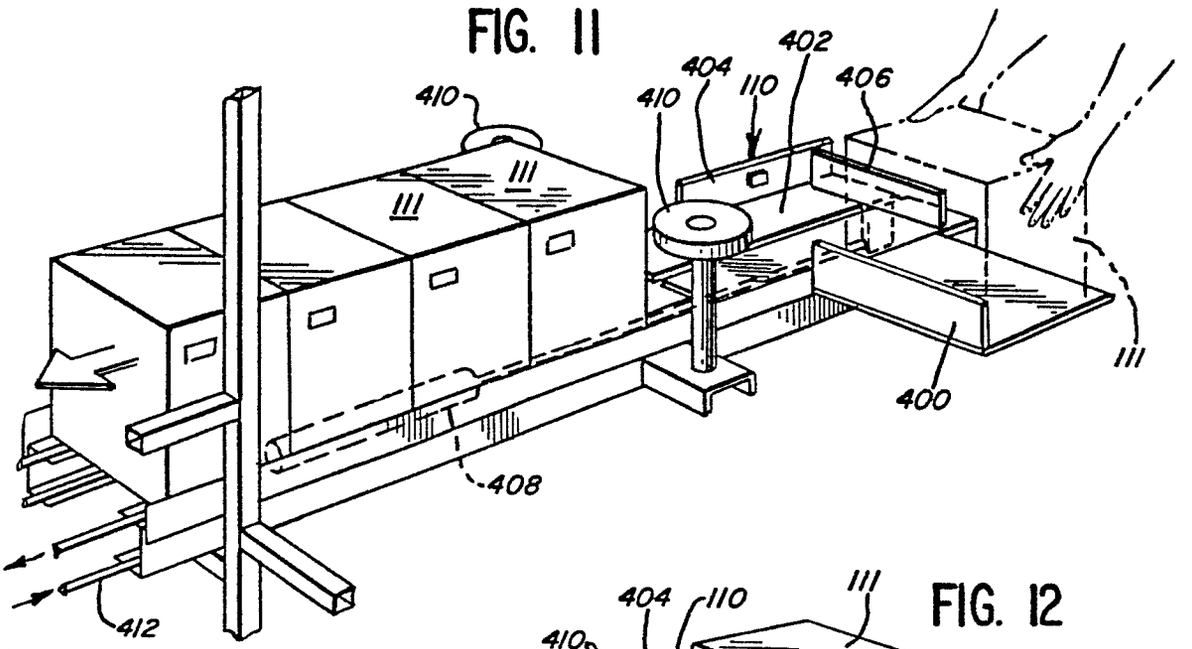


FIG. 12

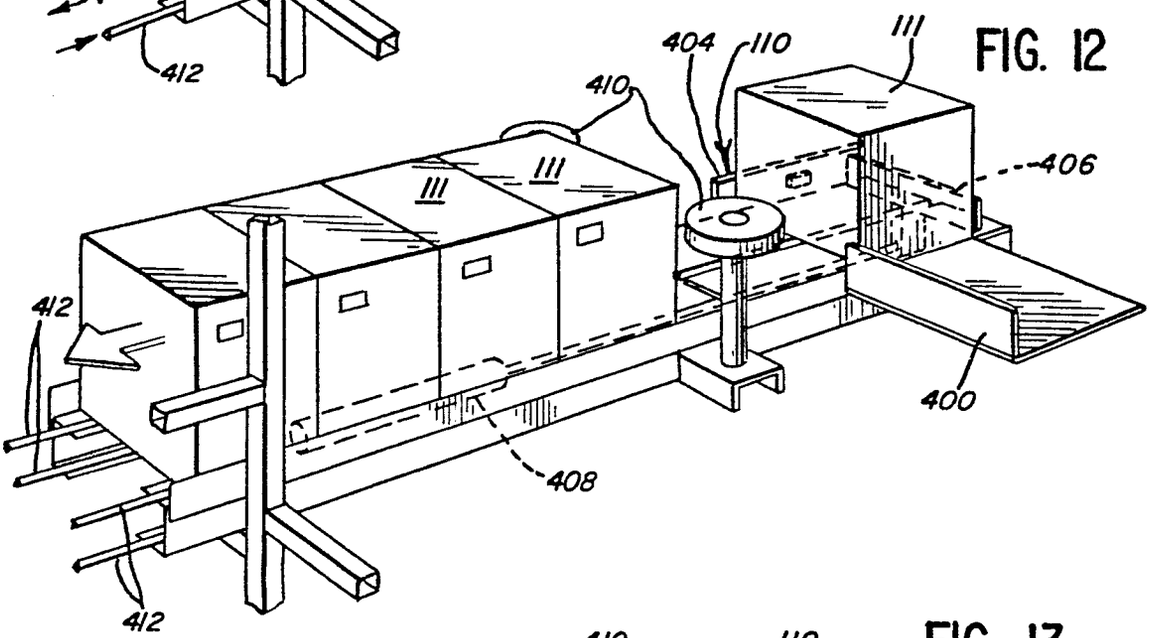
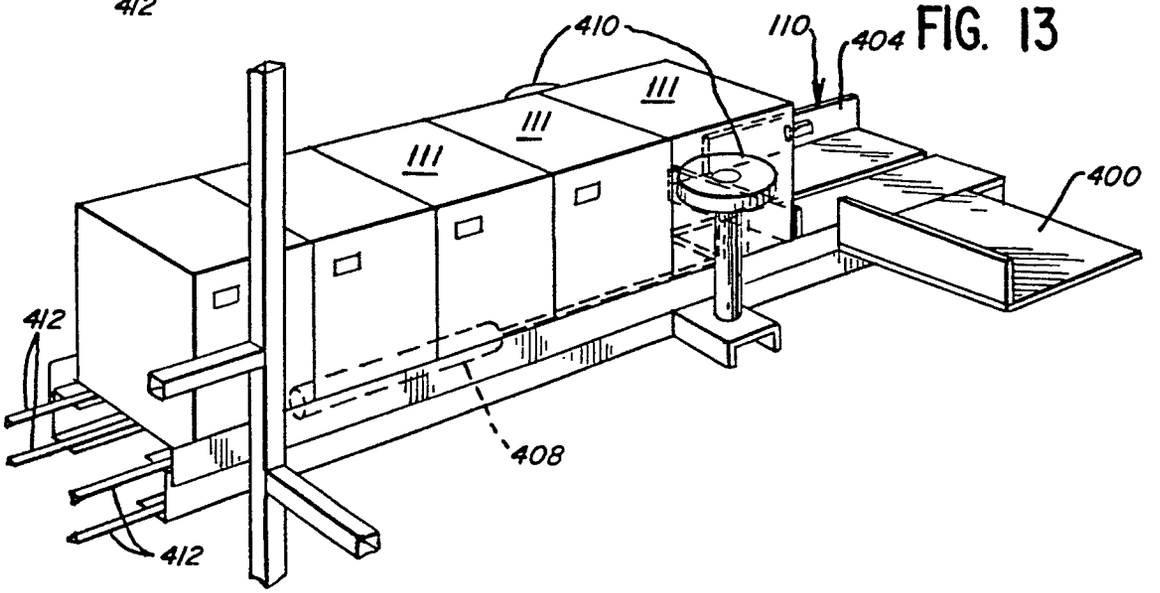


FIG. 13



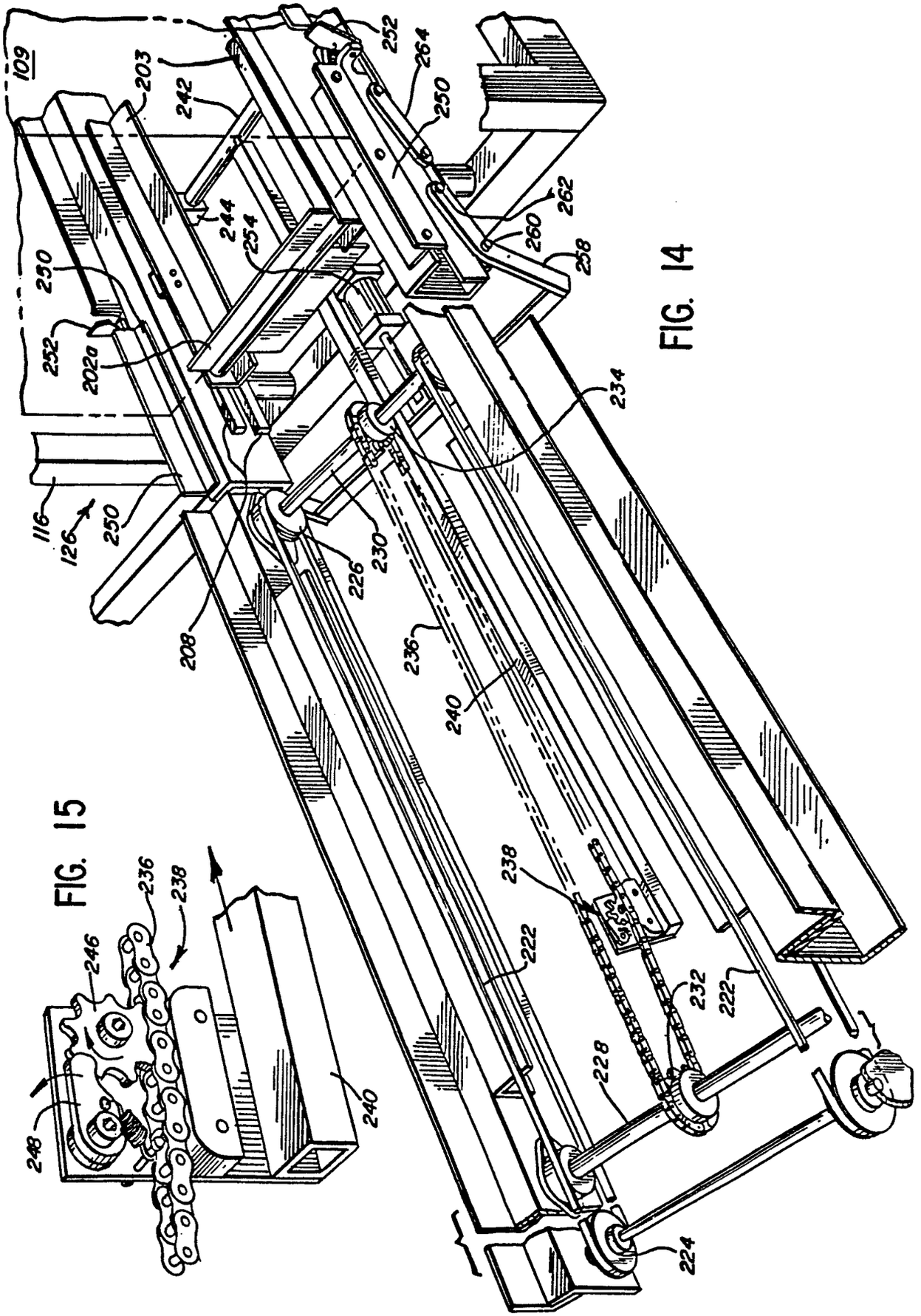
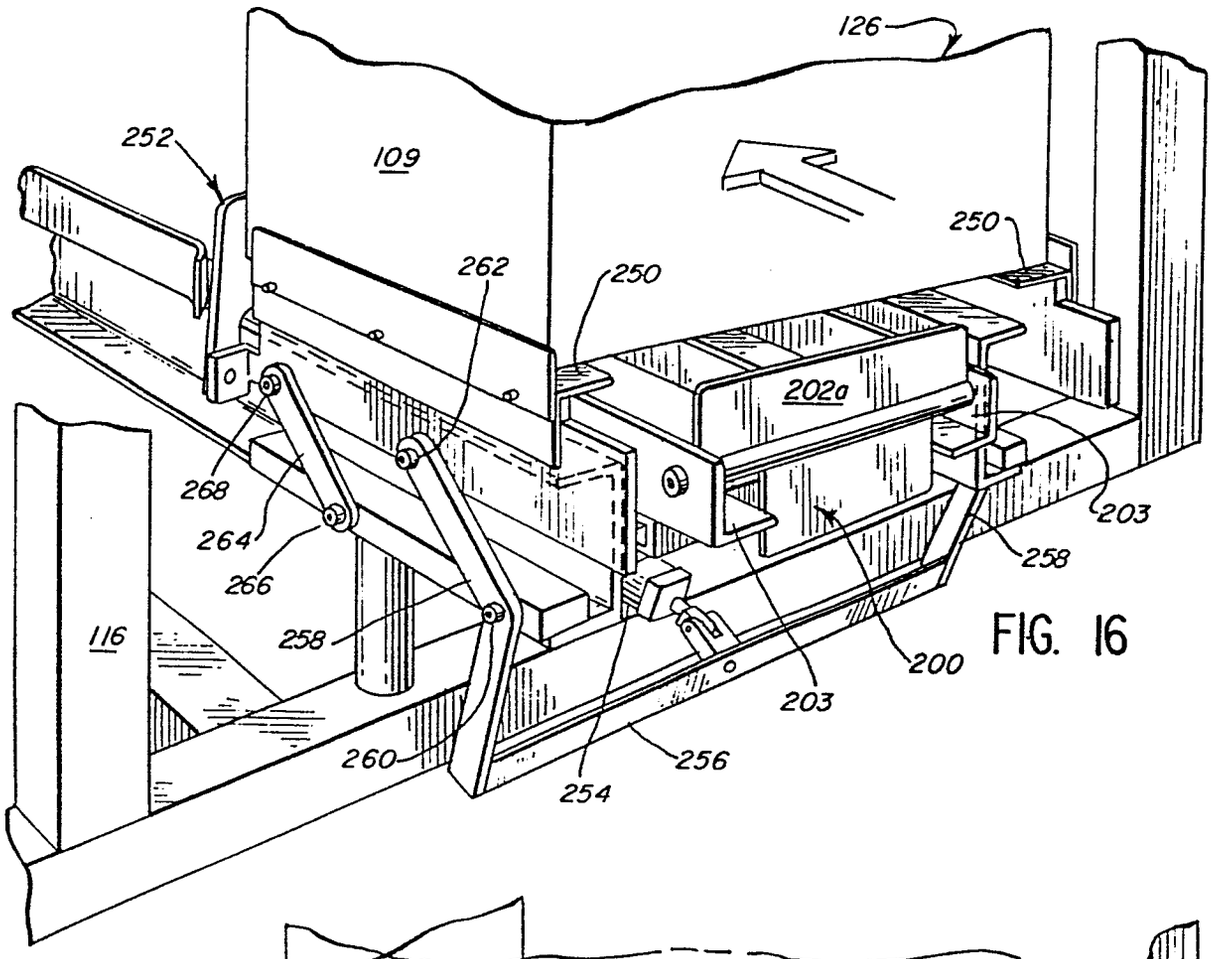

109
203
242
252
264
250
244
254
230
252
202a
262
260
258
234
116
126
250
226
230
208
236
240
238
222
232
222
228
224
246
236
238
248
240

FIG. 14

FIG. 15


126
252
109
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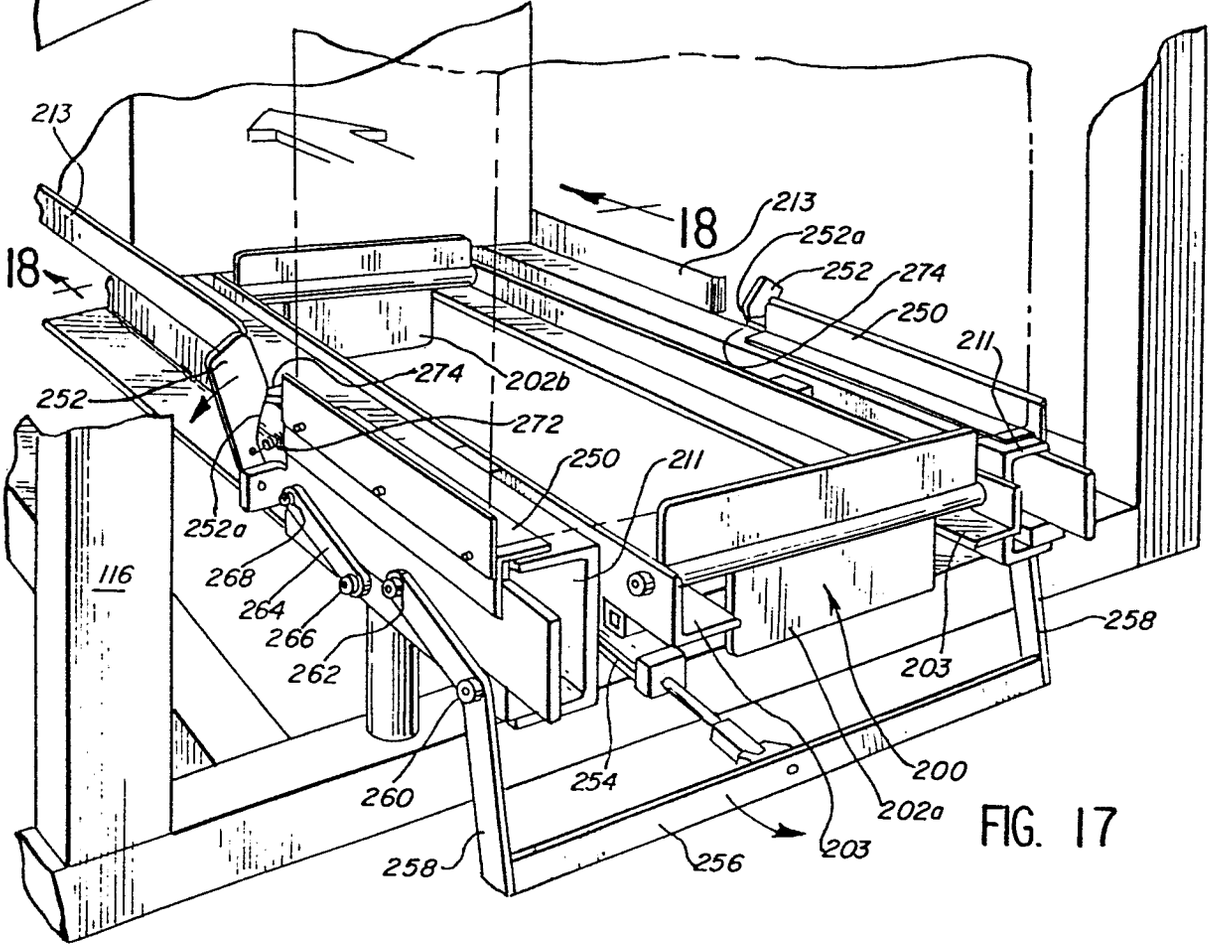
262
250
202a
268
264
266
203
258
116
258
200
203
260
256
254

FIG. 16


213
18
213
252a
18
252
274
250
211
274
202b
252
272
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211
252a
116
268
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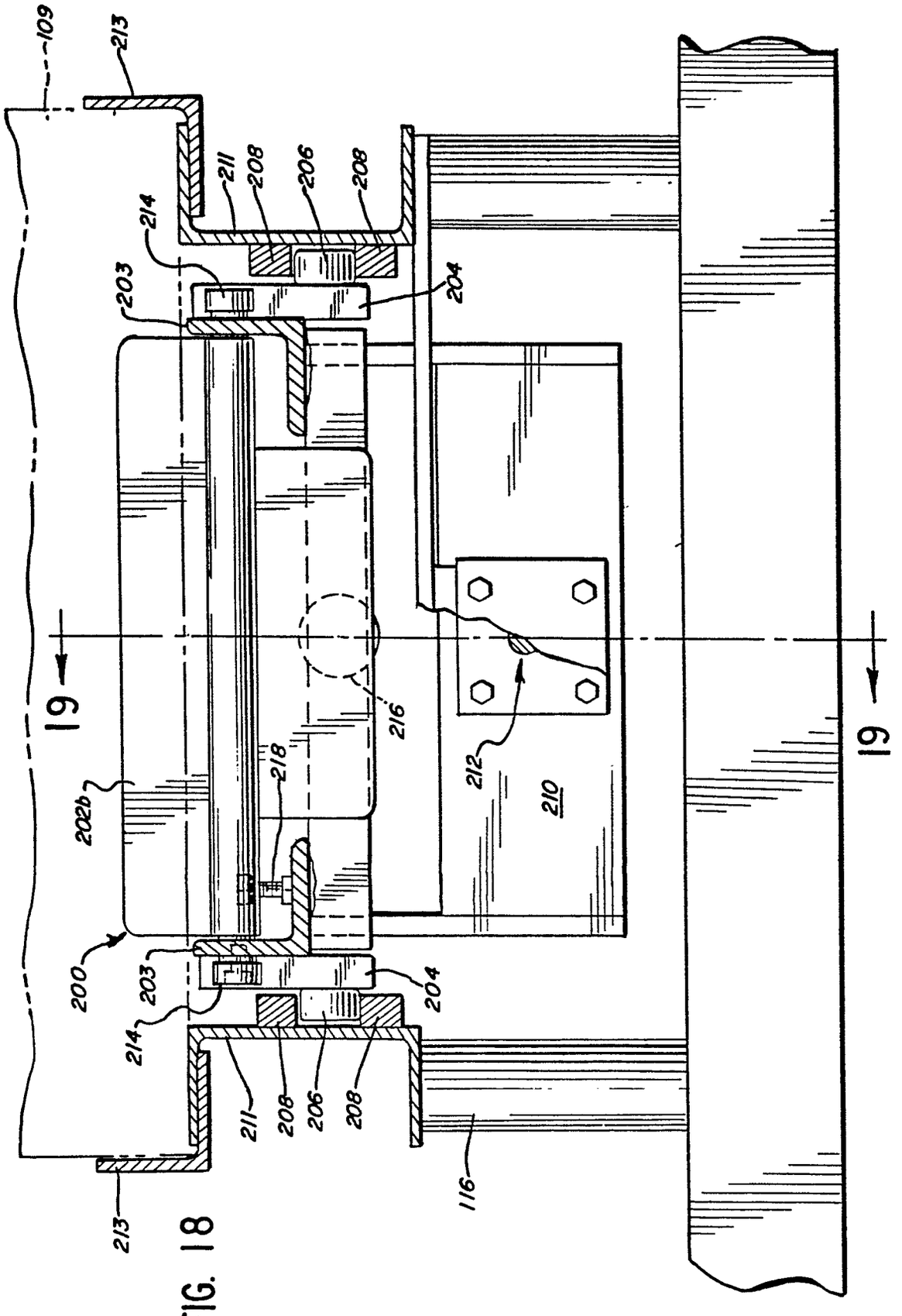
266
262
258
203
200
202a
260
254
258
256
203

FIG. 17


109
213
211
208
206
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214
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216
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19

FIG. 18

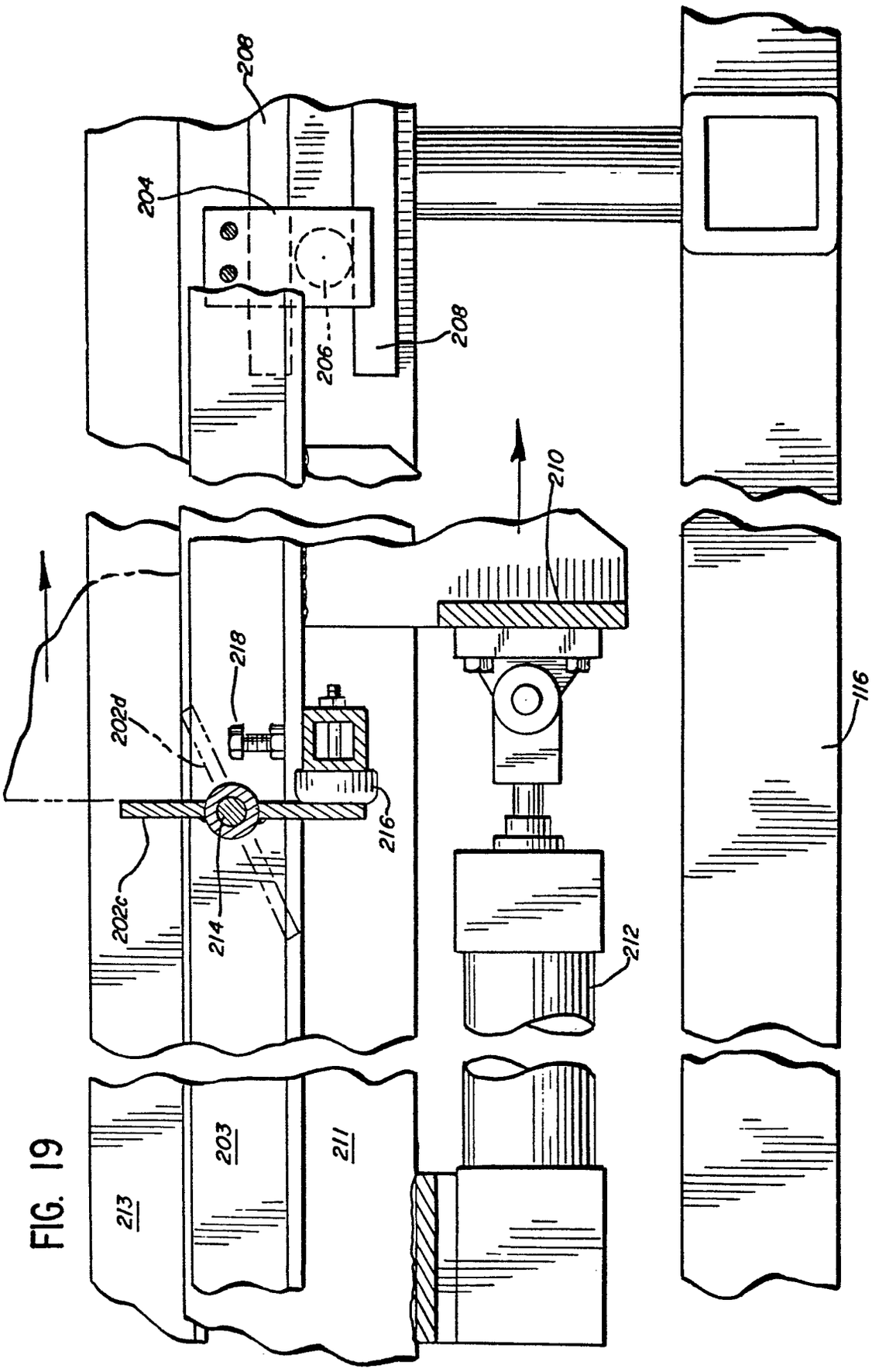

FIG. 19

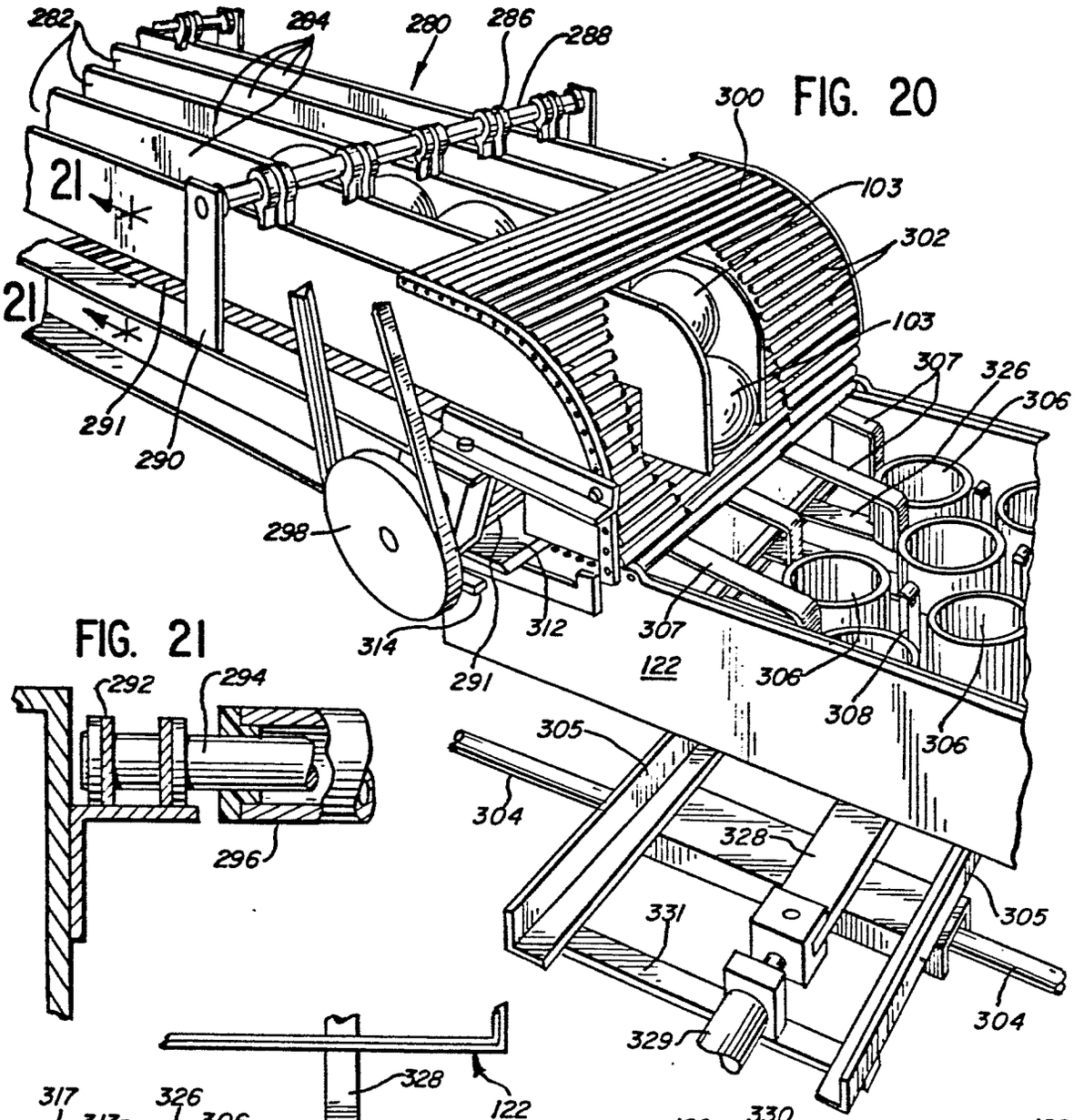

FIG. 20

FIG. 21

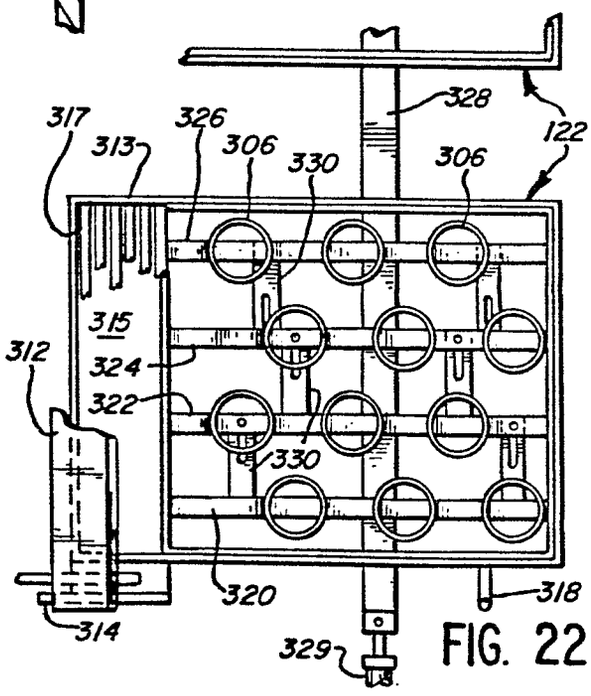

FIG. 22

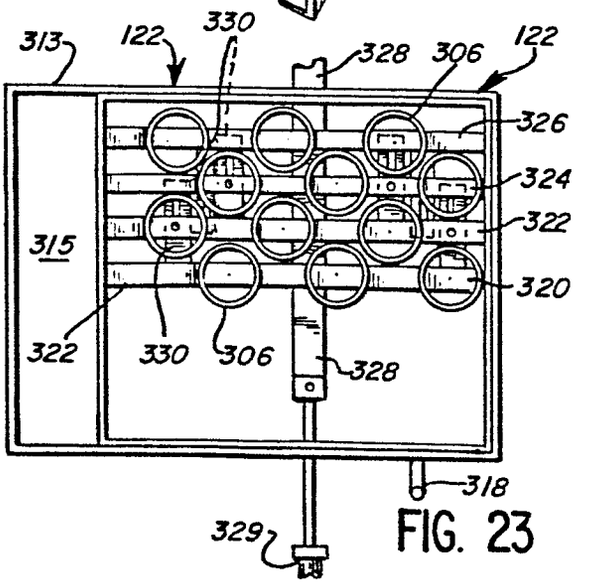

FIG. 23

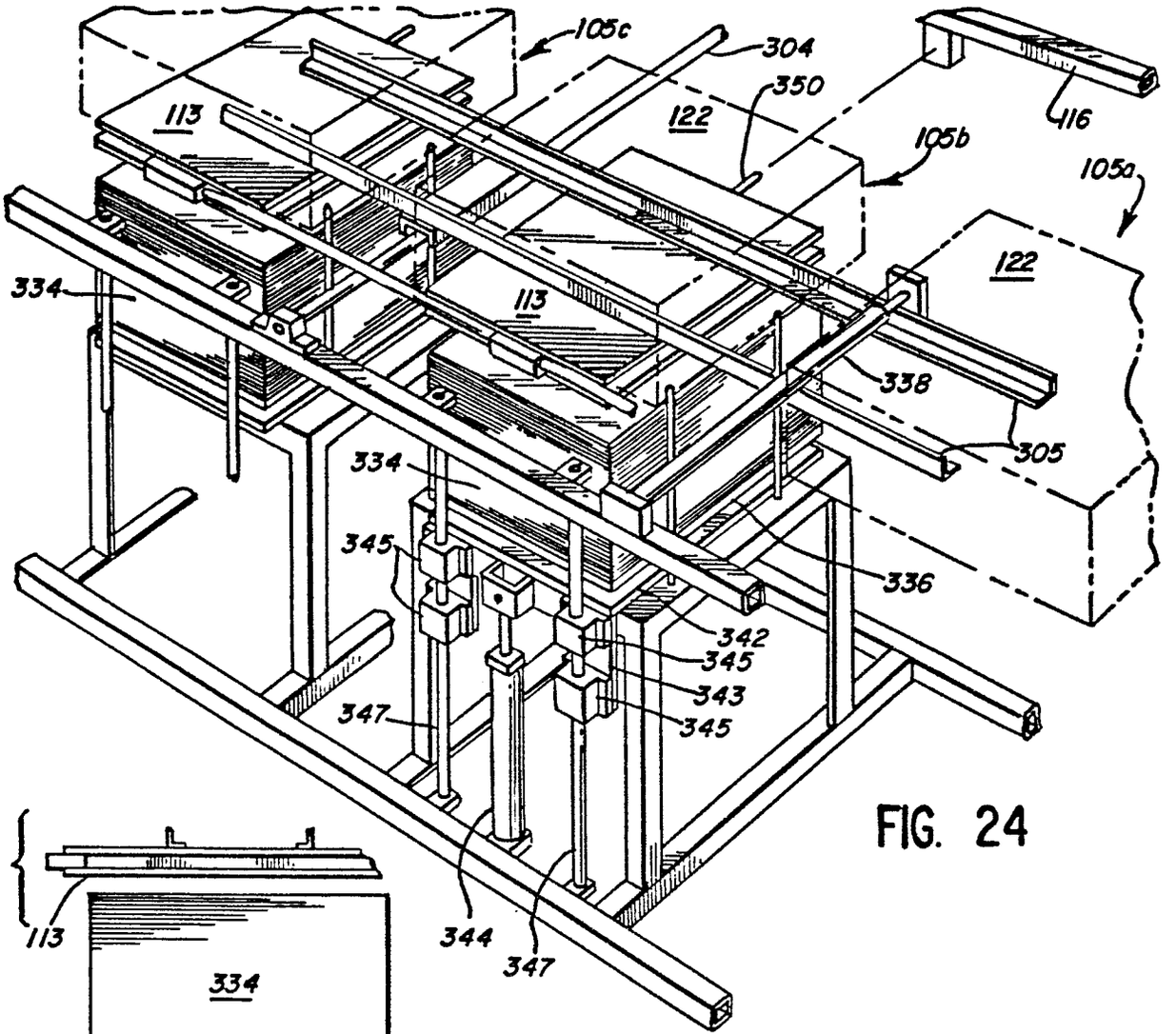

FIG. 24

FIG. 25

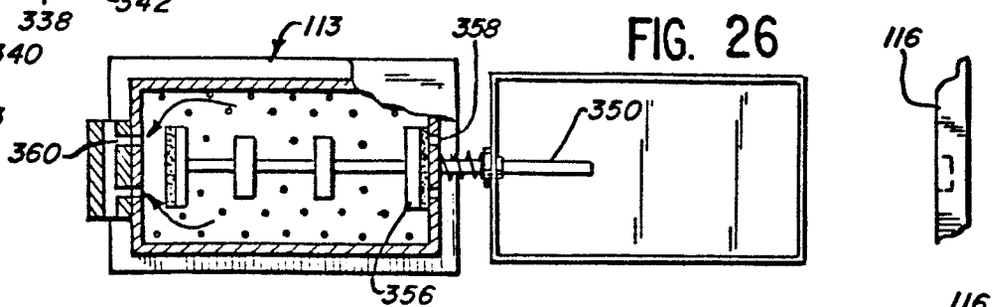

FIG. 26

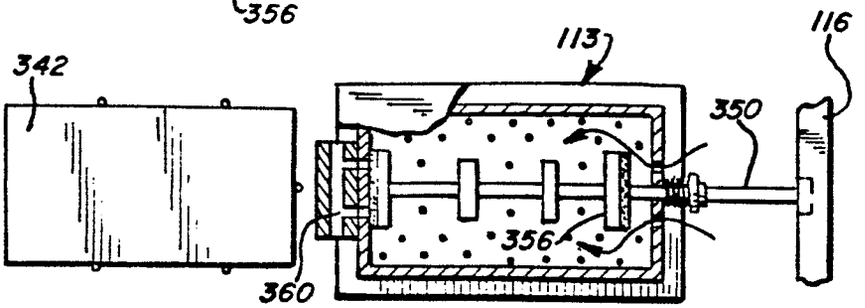

FIG. 27

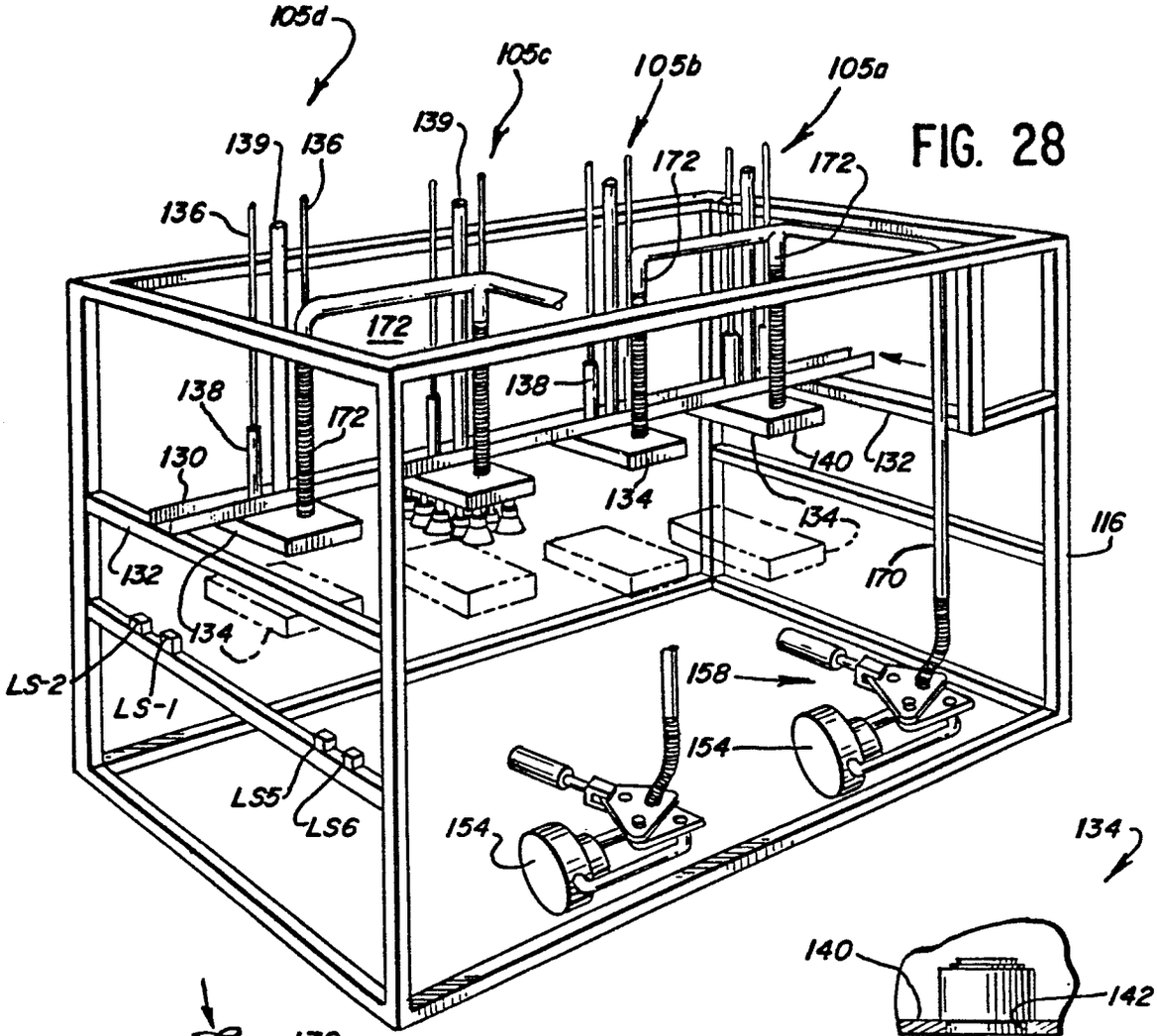

FIG. 28

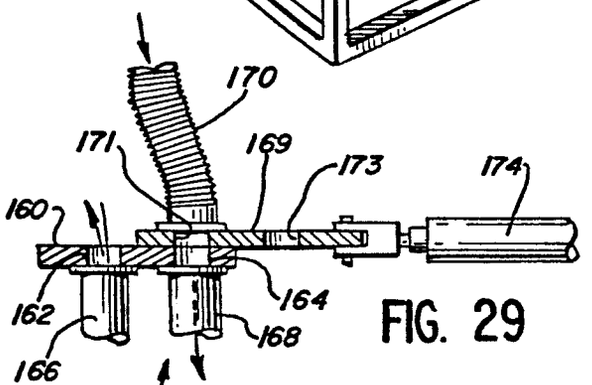

FIG. 29

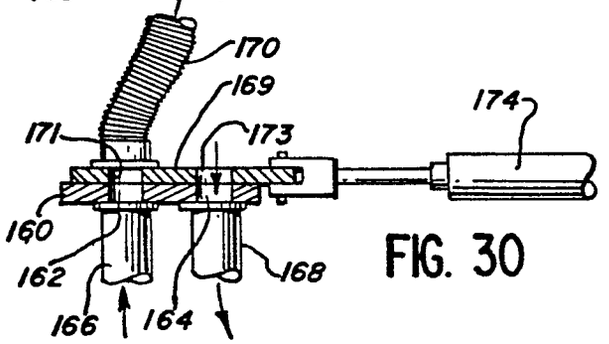

FIG. 30

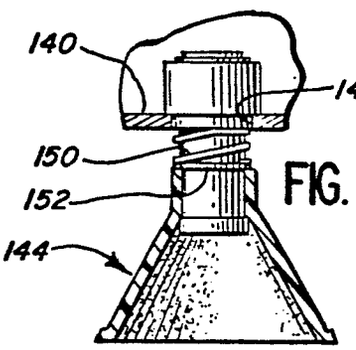

FIG. 31

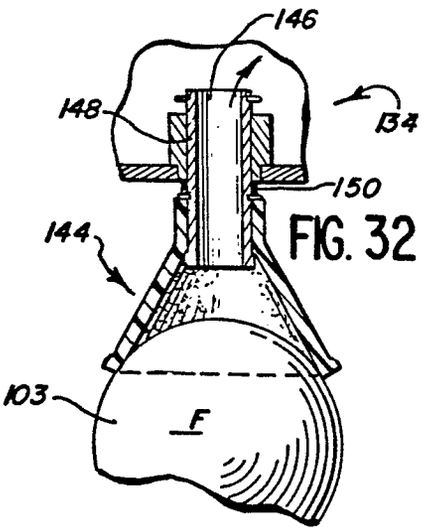

FIG. 32

FIG. 33

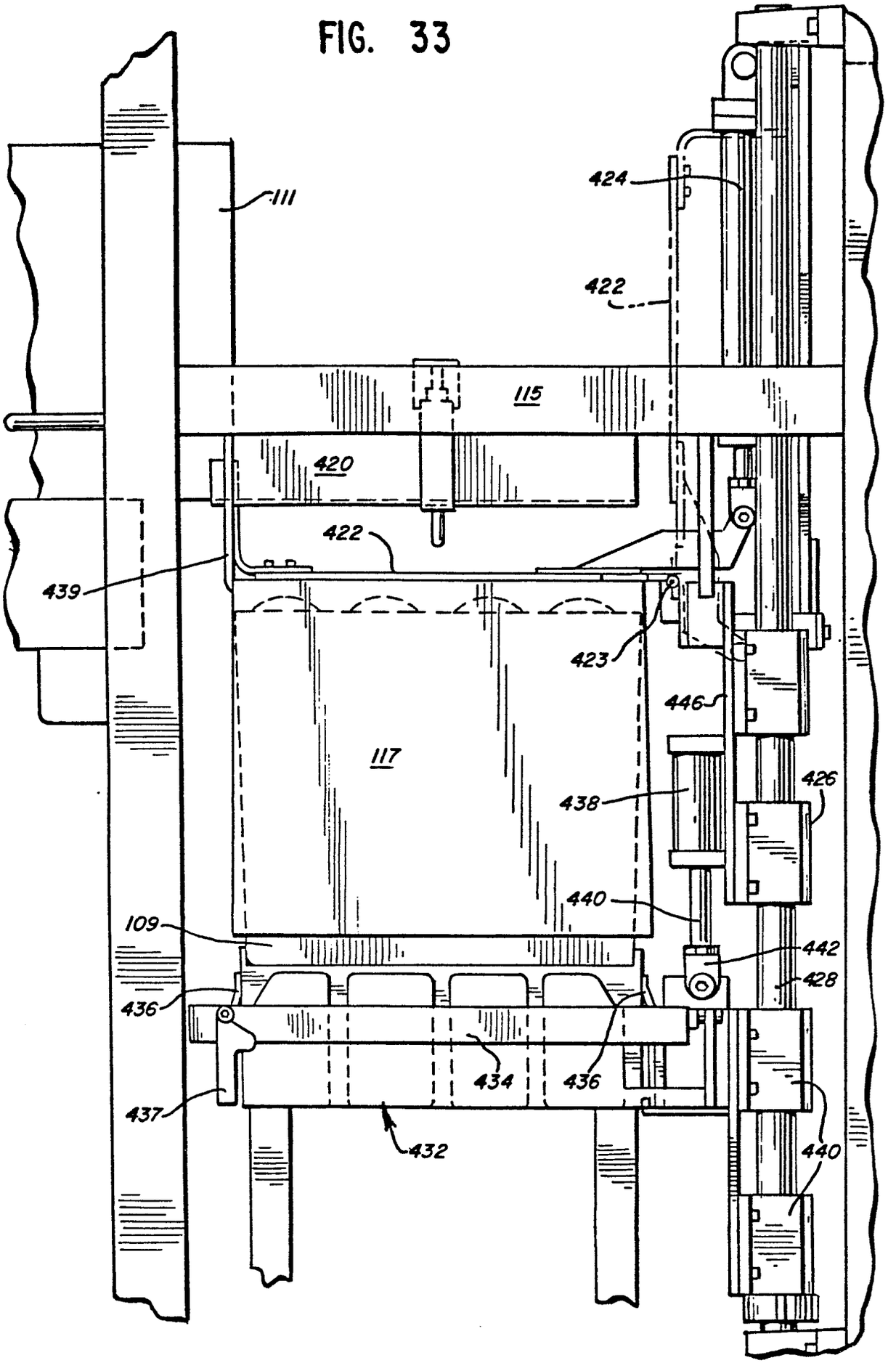
111
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FIG. 34a

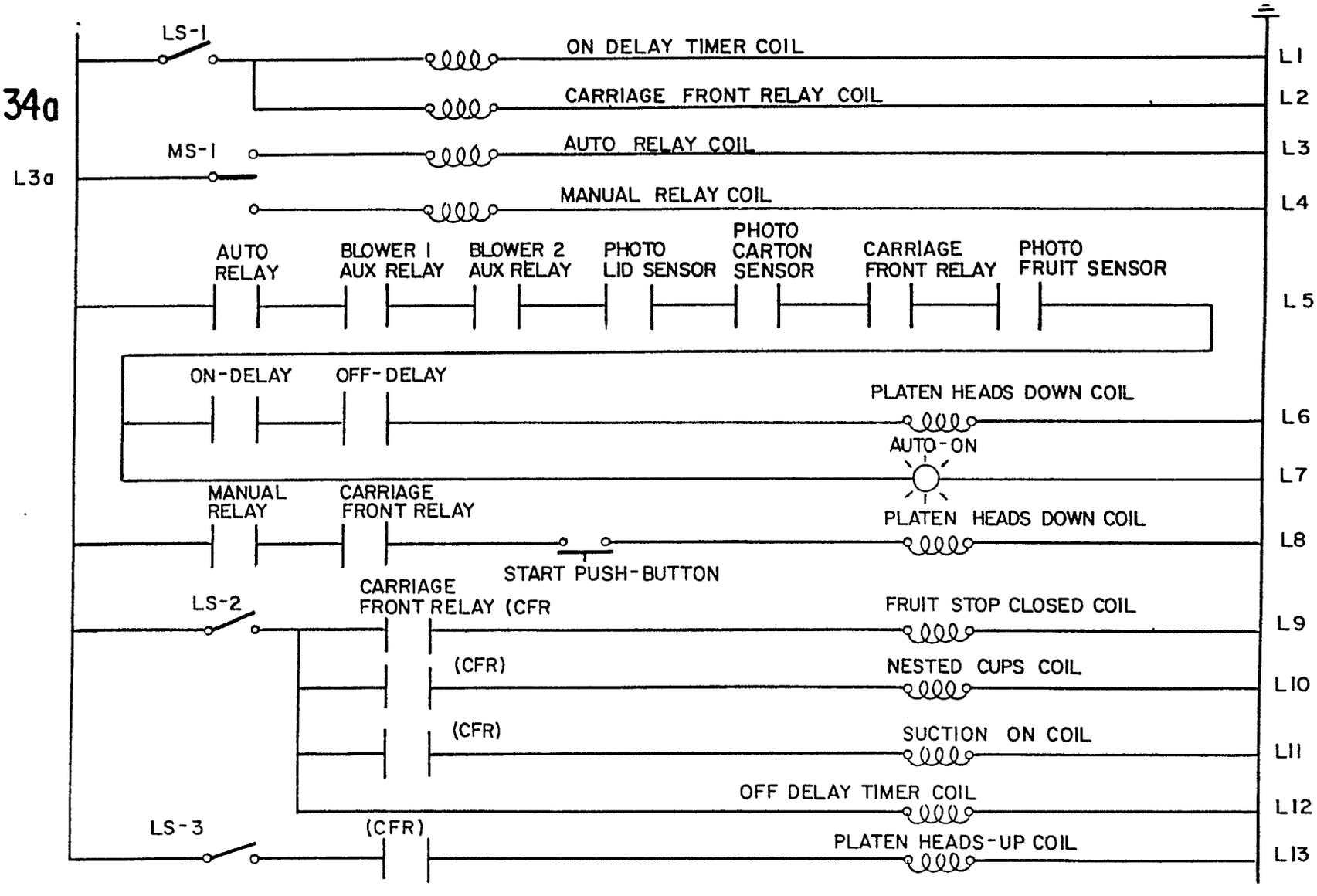
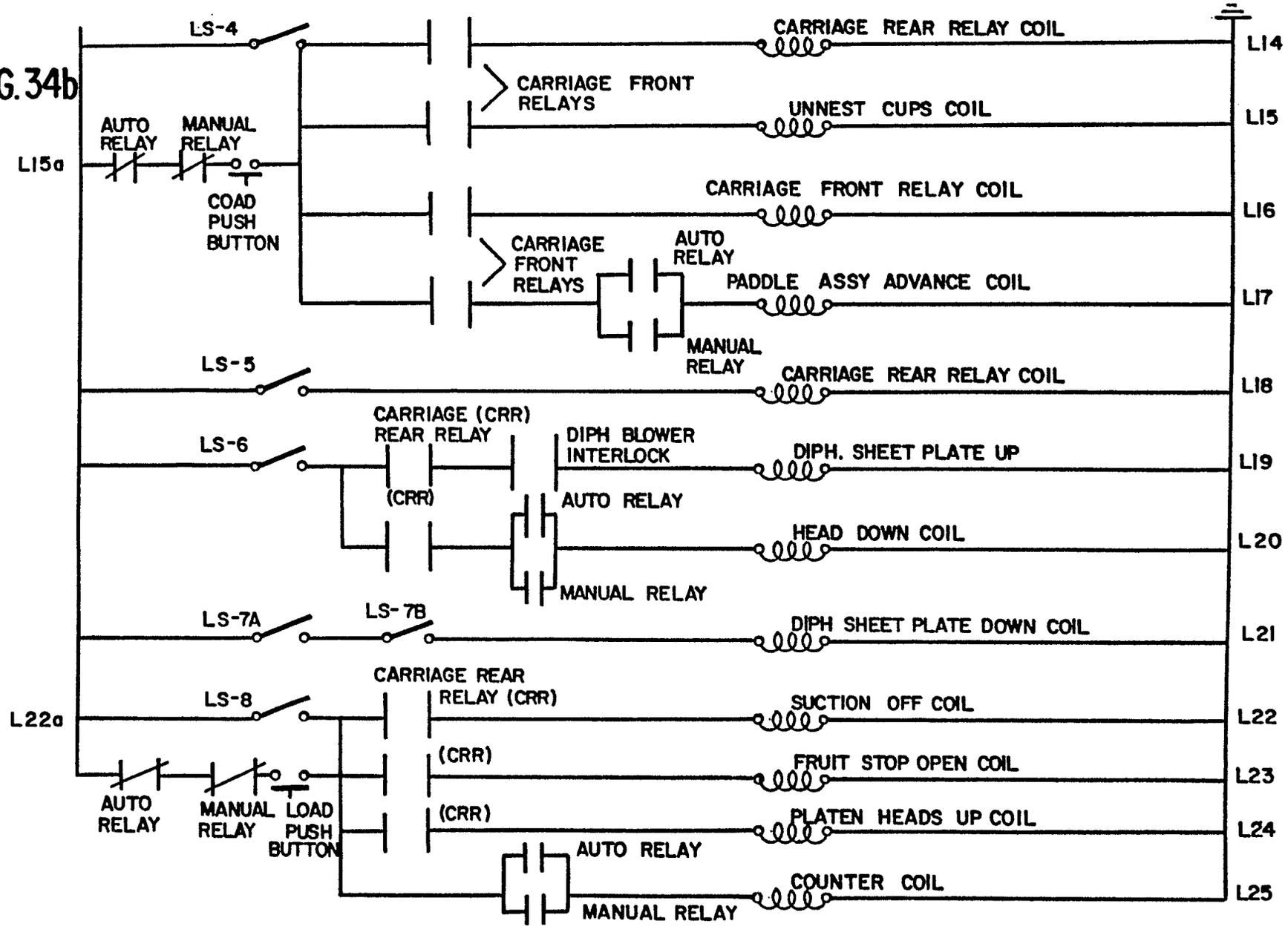


FIG. 34b



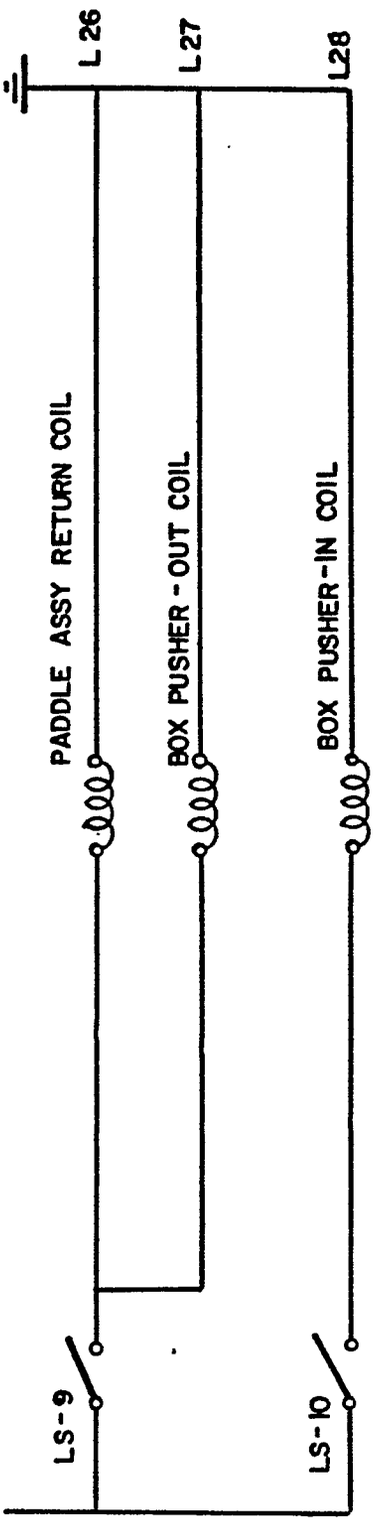

L 26
L 27
L28
PADDLE ASSY RETURN COIL
BOX PUSHER - OUT COIL
BOX PUSHER-IN COIL
LS-9
LS-10

FIG. 34c

European Patent Office

EUROPEAN SEARCH REPORT

0078055
Application number

EP 82 10 9927

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	US-A-3 590 551 (RIDDINGTON) * Column 3, line 50 - column 5, line 7; figures 1,6-8,21 *	1,2,5, 10-12	B 65 B 25/04 B 65 B 5/10 B 65 B 43/48
A	US-A-4 203 274 (WARKENTIN) * Column 3, line 55 - column 5, line 4; column 6, lines 1-27; figures 1-3,5,6 *	1,4	
A	GB-A-2 014 532 (BOOTH) * Page 3, line 58 - page 4, line 104; page 6, lines 50-71; figures 2-10,19-28 *	1-3,5, 6,10, 11,13, 14	
A	US-A-3 796 300 (HUDSON) * Whole document *	8	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) B 65 B
P,A	EP-A-0 044 001 (INTERNATIONAL HONEYCOMB) * Page 7, line 9 - page 9, line 17; figures 1-4,8,20-24 *	1,2,4-6,10-12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02-02-1983	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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