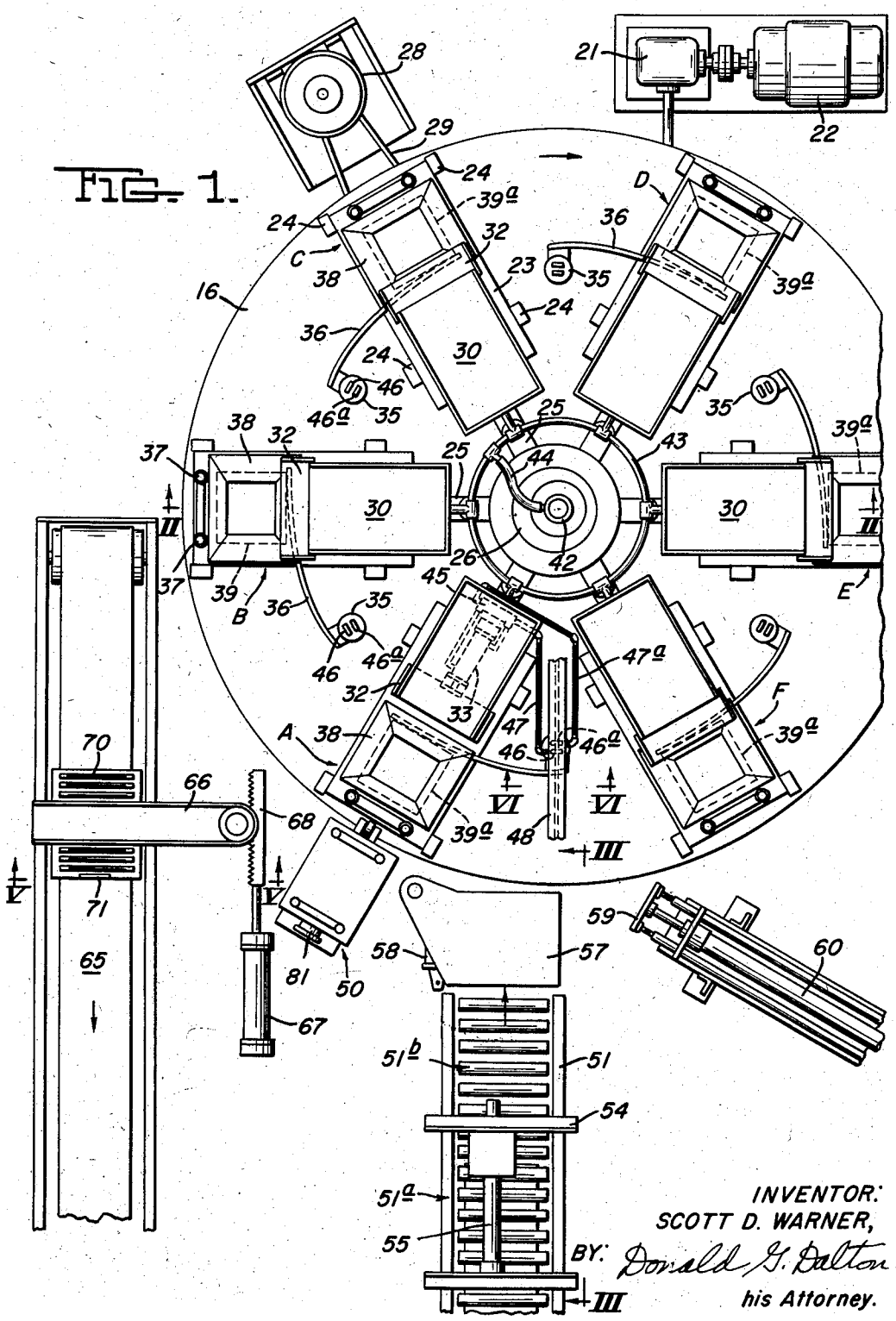
April 7, 1959 S. D. WARNER 2,880,763

NAIL-PACKAGING MACHINE

Filed July 31, 1956 5 Sheets-Sheet 1

FIG. 1.



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April 7, 1959 S. D. WARNER 2,880,763

NAIL-PACKAGING MACHINE

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FIG. 2.

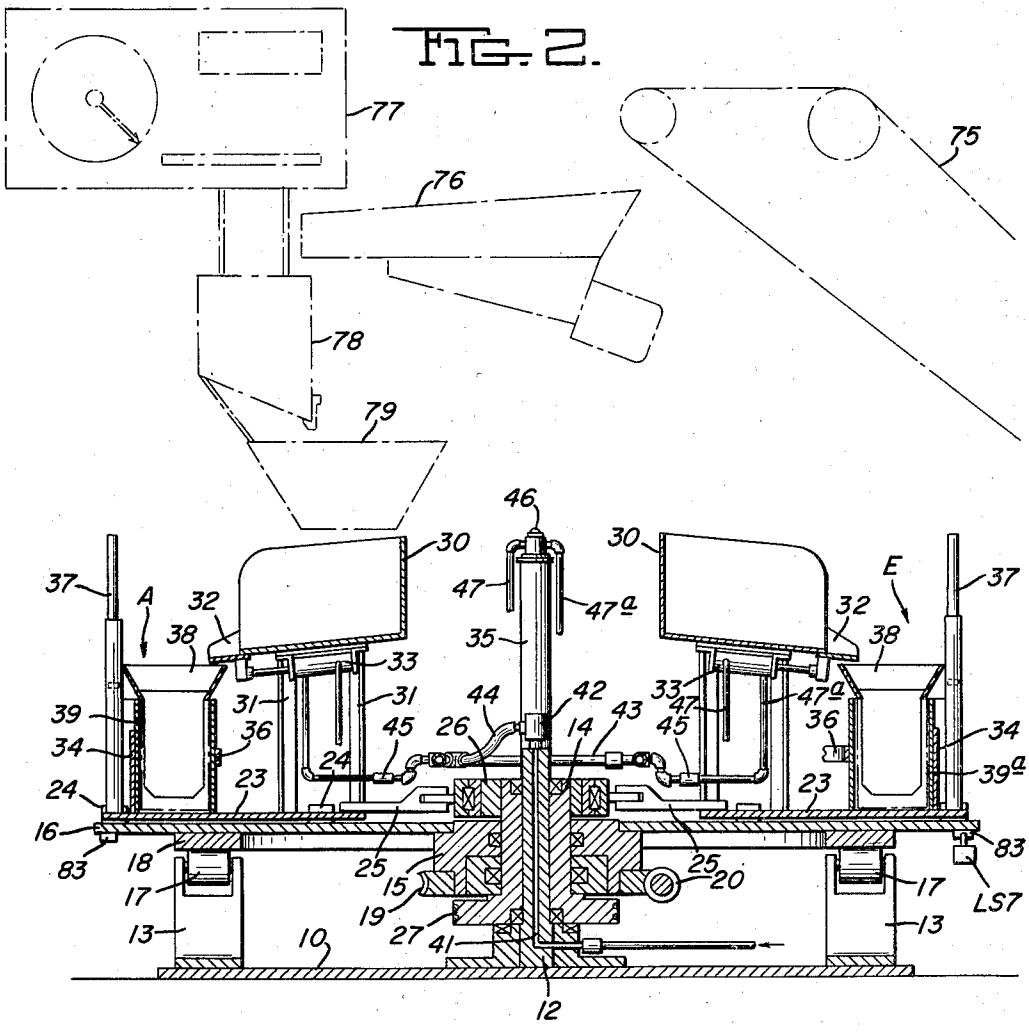
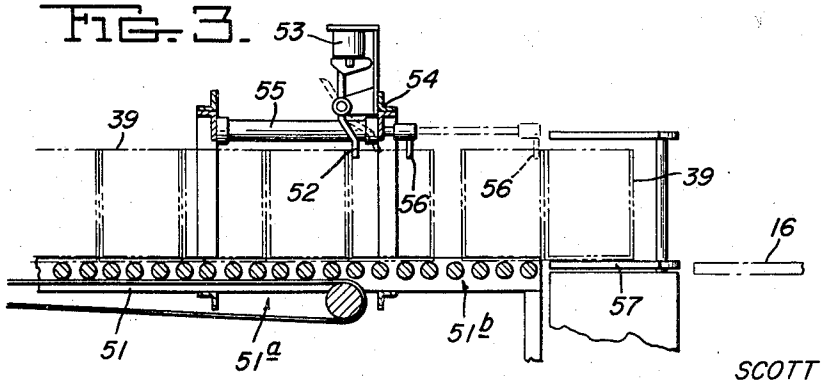


FIG. 3.



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NAIL-PACKAGING MACHINE

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FIG. 4.

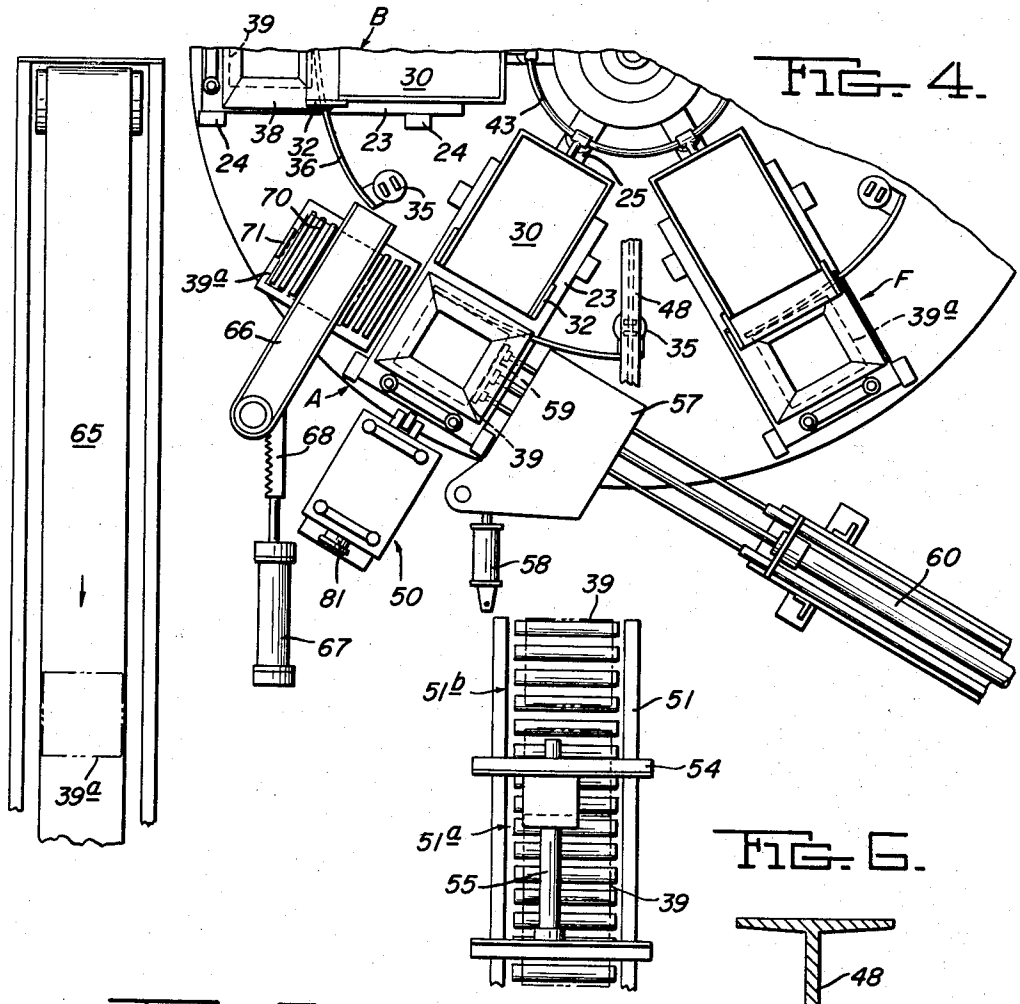


FIG. 6.

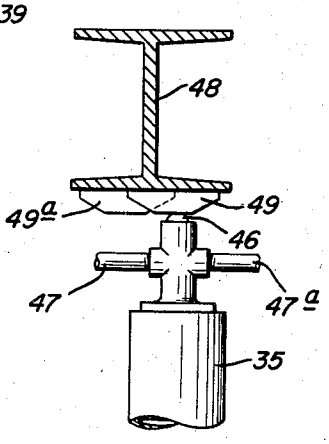
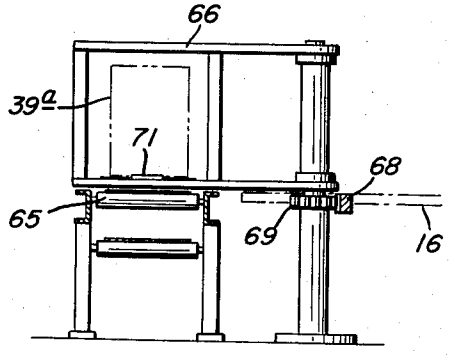


FIG. 5.



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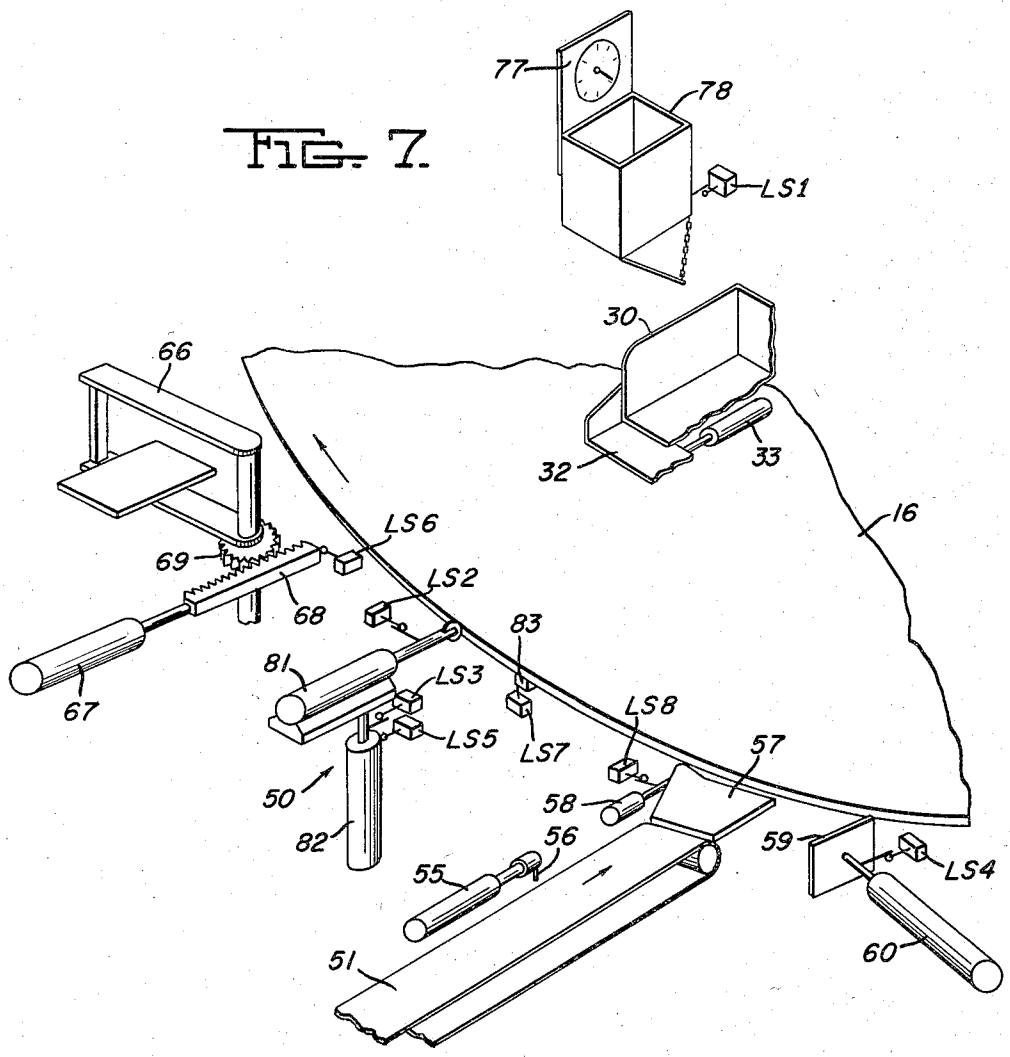
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April 7, 1959 S. D. WARNER 2,880,763

NAIL-PACKAGING MACHINE

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FIG. 7.



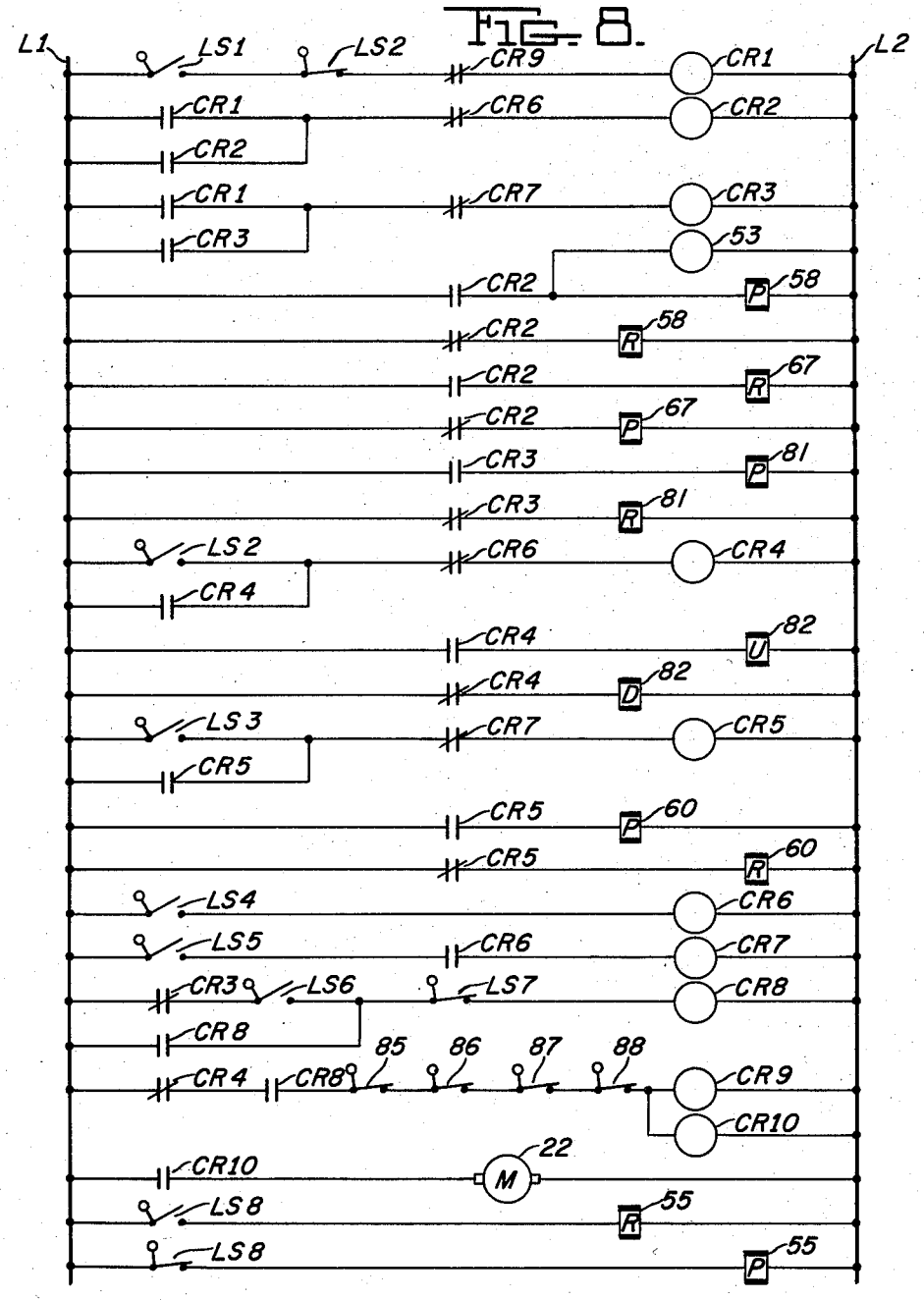
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NAIL-PACKAGING MACHINE

Filed July 31, 1956 5 Sheets-Sheet 5

FIG. 8.



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United States Patent Office 2,880,763 Patented Apr. 7, 1959

2,880,763

NAIL-PACKAGING MACHINE

Scott D. Warner, Pittsburg, Calif., assignor to United States Steel Corporation, a corporation of New Jersey

Application July 31, 1956, Serial No. 601,140

15 Claims. (Cl. 141—79)

This invention relates to a machine for packaging loose articles such as nails.

An object of the invention is to provide an improved machine which packages loose articles in definite quantities rapidly and automatically.

A further object is to provide an improved packaging machine which overcomes any need for manually handling either the articles or the containers in which they are packaged.

A further object is to provide an improved packaging machine which automatically positions a container to receive articles, feeds a definite quantity of articles to the container, compacts the articles in the container, and replaces the filled container with an empty container.

A more specific object is to provide an improved unitary packaging machine which includes a container-mounting turntable, cooperating means for delivering empty containers to stations on the turntable and positioning them thereon, means for feeding definite quantities of loose articles to each container in succession, means for compacting articles in the container, and means for thereafter replacing the filled container with an empty container.

In accomplishing these and other objects of the invention, I have provided improved details of structure, a preferred form of which is shown in the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic top plan view of a packaging machine constructed in accordance with my invention, the weighing mechanism being omitted to afford a clearer showing;

Figure 2 is a vertical sectional view through the turntable taken on line II—II of Figure 1, two of the container-mounting stations being omitted to afford a clearer showing;

Figure 3 is a fragmentary vertical sectional view of the empty container feeding mechanism taken on line III—III of Figure 1;

Figure 4 is a fragmentary top plan view of a portion of my machine showing the relation of parts as an empty container is replacing a filled container;

Figure 5 is a vertical section on line V—V of Figure 1;

Figure 6 is a fragmentary vertical section on a larger scale on line VI—VI of Figure 1;

Figure 7 is a diagrammatic perspective view to show the location of limit switches which control the various operations; and

Figure 8 is a schematic wiring diagram.

As best shown in Figure 2, my packaging machine includes a base **10** which carries a fixed vertical shaft **12** and a plurality of trunnion supports **13** arranged radially with respect to said shaft. A quill **14** is journaled on the shaft **12**, and a bearing mounting **15** on said quill for rotation on a common vertical axis. A turntable **16** of circular outline is fixed to the bearing mounting **15** for rotation relative to the base **10**, and is further supported on rollers **17** journaled in the trunnion supports **13** and riding on a circular track **18** on the underface of the turntable. The bearing mounting **15** carries a worm gear **19** which is driven intermittently clockwise in fractional revolution steps through a worm **20** and speed reducer **21** by an indexing motor **22**. (Figure 1.)

As best shown in Figure 1, the turntable **16** carries a plurality of uniformly arcuately spaced container-mounting stations or assemblies A, B, C, D, E and F, illustrated as six in number. (In the present specification and claims the terms "station" and "assembly" are used synonymously.) Station A is illustrated occupying a position for an empty container to replace a filled container, station B for articles to feed to a container mounted thereon, and the other stations carrying filled containers in intermediate positions. Each station includes a plate **23** of rectangular outline supported for radial movement on the turntable between opposed guides **24** fixed to the latter. Links **25** connect the respective plates **23** with an eccentric mechanism **26** carried by the upper end of the quill **14**. The lower end of this quill carries a drive pulley **27** (Figure 2) which is driven continuously by a motor **28** (Figure 1) through a belt **29**. Thus the plates **23** vibrate continuously radially of the turntable.

The container-mounting stations are of similar construction so that only one need be described in detail. Each includes an outwardly and downwardly sloping hopper **30** carried in spaced relation above plate **23** on uprights **31**. The outer edge of the hopper carries a retractible lip **32** which is moved inwardly or outwardly by a double-acting fluid pressure cylinder **33** on the bottom of the hopper. Outwardly of the hopper the plate **23** carries an upstanding clamping plate **34**. Midway between the stations the turntable **16** carries a series of upright pipes **35**, there being one such pipe for each station located counterclockwise therefrom. Each pipe **35** carries a leaf spring **36** which extends over the plate **23** of the corresponding station in horizontally spaced relation from the clamping plate **34** thereof. Outwardly of the clamping plate, plate **23** carries a pair of upright guide rods **37** which support a vertically movable funnel device **38**. As hereinafter explained, an empty or filled container **39** or **39***a* is clamped between the plate **34** and spring **36**. When the lip **32** retracts, the funnel device can be lifted clear of a filled container **39***a* to enable the container to be displaced from the turntable, or the funnel device can be lowered into an empty container **39** to guide loose articles into the container as they feed from the hopper **30**.

The machine includes automatic means for operating the cylinders **33** to retract lip **32** of each station arriving at the container-replacing position and again to project the lip as it leaves. As shown in Figure 2, the vertical shaft **12** contains a duct **41** connected at its lower end to a source of compressed air and at its upper end to a rotating air union **42**. A circular air manifold **43** is connected to the air union via a flexible line **44**. Each station has a pressure operated four-way master valve **45** connected with said manifold and with opposite ends of cylinder **33** of that station to apply pressure to one end while exhausting the other. As best shown in Figure 6, each master valve is controlled by a pair of cam operated bleeder valves **46** and **46***a* mounted at the upper end of pipe **35** of the corresponding station and connected to opposite ends of the master valve via lines **47** and **47***a*. A horizontal beam **48** extends above turntable **16** and carries a pair of cams **49** and **49***a* positioned to engage the respective bleeder valves **46** and **46***a* immediately before the station stops at its container-replacing position and immediately after it leaves. When valve **46** engages cam **49**, the master valve **45** shifts to operate cylinder **33** to retract lip **32**. When valve **46***a* engages cam **49***a*, the master valve returns to its normal position

to project the lip. Since valves of the types used per se are well known, no detailed showing is deemed necessary.

Any desired mechanism can be employed for raising and lowering the funnel device while the lip 32 is retracted, but the preferred mechanism is the power operated lifter shown and claimed in Prenk application, Serial No. 580,309, filed April 24, 1956 (now Patent No. 2,873,772), and indicated diagrammatically at 50 in Figures 1 and 4. It is located adjacent the circumference of the turntable at the container-replacing position. When the turntable brings a filled container to this position and the lip 32 retracts, the lifter automatically raises the funnel device. When the empty container subsequently is clamped in place, the lifter automatically lowers the funnel device before the lip again is projected. Since the lifter per se is not of my invention, no detailed showing is made herein.

A cooperating roller conveyor 51 carries a row of empty containers 39 for delivery of one to each station reaching the container-replacing position. As best shown in Figure 3, this conveyor includes a continuously but slowly driven live roller section 51*a* and an idler section 51*b*. A retractible latch 52 and operating solenoid 53 therefor are mounted over the end of the live roller section 51*a* on a frame 54. The solenoid 53 normally is deenergized and latch lowered where it holds back containers on the conveyor. A double-acting fluid pressure cylinder 55 also is mounted on frame 54, and the extremity of its piston rod carries a pivotally mounted pusher plate 56. A pivotally mounted empty container transfer carriage 57 is situated between the discharge end of conveyor 51 and the turntable 16 (Figures 1 and 4). A double-acting fluid pressure cylinder 58 is supported beneath carriage 57 and its piston rod is connected to the carriage through a suitable linkage for swinging the carriage between container-receiving and container-discharging positions shown respectively in Figures 1 and 4.

At the appropriate point in the operating cycle, hereinafter explained, solenoid 53 is energized and raises latch 52 long enough to release the leading container 39 on the live roller section 51*a*. The released container is propelled to the idler section 51*b*, where it stops behind a container already on the idler section. Solenoid 53 again is de-energized before the latch can release any more containers. Cylinder 55 retracts the pusher 56 which pivots freely over the trailing wall of the front container on the idler section and the leading wall of the newly released container. At a later point in the cycle cylinder 55 projects the pusher to shove the newly released container along the idler section and load the front container onto the carriage 57, which of course is in its container-receiving position. At the appropriate point in the cycle cylinder 58 swings the loaded carrage 57 to its delivering position aligned with station A, whereupon a pusher 59 operated by a double-acting fluid pressure cylinder 60 pushes the container therefrom to the plate 23 of this station between the clamping plate 34 and leaf spring 36. Resiliency of the spring allows the container to move into position despite continuous vibration of the station. Thereafter the pusher retracts and carriage 57 returns to its starting position to receive another container.

As the pusher 59 pushes an empty container 39 onto the station, this empty container displaces a filled container 39*a*. The apparatus includes a cooperating continuously driven belt conveyor 65 for carrying away filled containers 39*a* thus displaced, and a filled container transfer carriage 66 for transferring filled containers from the station to said conveyor. Carriage 66 swings on a vertical axis between container-receiving and container-discharging positions shown respectively in Figures 4 and 1, and is motivated by a double-acting fluid pressure cylinder 67. The connection between the cylinder and carriage includes a gear rack 68 on the piston rod from said cylinder and a cooperating pinion 69 on the carriage shaft (Figure 5). The carriage has a series of rollers 70 which support a filled container and a spring loaded stop 71 at its exit end to prevent a container from being pushed off the far side of the carriage as an empty container 39 displaces it from a station. As hereinafter explained, carriage 66 swings to its container-receiving position aligned with the station as shown in Figure 4 just before a filled container is displaced, and on receiving the container, returns to its container-discharging position aligned with conveyor 65, as shown in Figure 1. When the carriage stops in the latter position, inertia carries the filled container 39*a* across the stop to the belt conveyor 65.

After an empty container has been delivered to a station, the turntable 16 is cleared for rotation when (*a*) the lifter 50 has disengaged the funnel device 38 of that station, (*b*) the empty container transfer carriage 57 has returned to its container-receiving position, (*c*) the pusher 59 has retracted, and (*d*) the filled container transfer carriage 66 has moved to its container-discharging position. The various motions are initiated by the article feeding means, hereinafter described, to assure that the prescribed quantity of articles have been to the station already at the article feeding position before the turntable moves. Once these conditions are fulfilled, the indexing motor 22 indexes the turntable 60° (or other appropriate angle depending on the number of stations) clockwise to place station A and the empty container 39 in the article feeding position.

As shown diagrammatically in Figure 2, means are situated over the station in article feeding position for feeding a definite quantity of loose articles, such as nails, to its hopper 30. Briefly this means is illustrated as including a magnetic belt conveyor 75 for bringing articles from a supply source, a vibratory feeder 76 for receiving articles from said conveyor, and a scale 77 which has a hopper 78 for receiving articles from said feeder. The feeder delivers articles to hopper 78 until the scale registers a predetermined quantity, whereupon the feeder stops. While a station is stopped under hopper 78, the bottom of the hopper opens to discharge the articles via a funnel 79 to hopper 30 of that station, and then closes so that feeding can resume. Since article feeding means of this type per se are known and not of my invention, no more detailed disclosure is deemed necessary. Continued vibration imparted to plate 23 by the eccentric mechanism 26 sends the articles from hopper 30 into the funnel device 38 and thence into the container 39 and compacts the articles. The actions at stations A and B can take place simultaneously; that is, dumping of scale hopper 78 initiates replacement of a filled container with an empty at a different station, and the hopper can be filling again while the container is being replaced.

Control circuit

Figure 7 is a schematic perspective view to show one suitable arrangement of limit switches for effecting operation of the control circuit. The lifter 50 is shown as including a horizontal cylinder 81 for projecting and retracting the funnel-engaging bar and a vertical cylinder 82 for raising and lowering the funnel devices 38 when the bar is projected. For simplicity only one of the container-mounting stations is shown, along with its corresponding cam 83 on the turntable 16. Each station of course has such a cam similarly related thereto, the cams being uniformly spaced around the turntable. Each of the cylinders of course has the usual fluid connections and solenoid operated valves for admitting fluid to effect operation in the desired direction, but since these parts are conventional, no showing is deemed necessary. The starting position of the machine is assumed to be when the latch 52 is holding back containers on conveyor 51,

the reciprocable elements of cylinders 58, 60, 81 and 82 are fully retracted, those of cylinders 55 and 67 fully projected, the scale hopper 78 empty or containing less than the prescribed weight for a package, and the empty container transfer carriage 57 loaded as shown in Figures 1 and 3.

A limit switch LS1 is associated with scale 77 and remains open until the hopper contains the prescribed weight of articles for one package, whereupon it closes. A limit switch LS2 is associated with horizontal cylinder 81 of the lifter 50 and has two contacts, one being open and one closed in the starting position, but which reverse their positions when the reciprocable element is projected. Limit switches LS3 and LS5 are associated with the vertical cylinder 82 of the lifter 50, LS3 being open in the starting position and LS5 closed. LS3 closes when the reciprocable element is fully projected and LS5 opens as soon as this element commences to project. A limit switch LS4 is associated with cylinder 60 and is open in the starting position and closes when the reciprocable element is projected. A limit switch LS6 is associated with cylinder 67 and is open in the starting position, but closes as soon as the reciprocable element commences to retract. A limit switch LS7 is associated with the turntable 16 and is closed unless actually engaged by a cam 83. After such engagement inertia of the turntable immediately carries the cam past LS7, which thus opens only momentarily. A limit switch LS8 is associated with cylinder 58 and has two contacts, one being open and one closed in the starting position, but which reverse their positions as soon as the reciprocable element commences to project. In addition interlock switches 85, 86, 87 and 88 (shown only in Figure 8) are associated with cylinders 58, 60, 67 and 81 and open to prevent the turntable from indexing unless the reciprocable elements of the respective cylinders are in their starting positions.

As the simplified wiring diagram of Figure 8 shows, the machine is energized from lines L_1 and L_2 connected to any suitable power source. LS1 (associated with the scale) is in series with the winding of a relay CR1 across these lines, which relay picks up when LS1 closes in response to the prescribed weight being registered. When CR1 picks up, the scale dumping mechanism operates to dump the contents of the hopper 78 into the hopper 30 of station B at the article feeding position and the feeder stops. However the part of the circuit which accomplishes these operations is in the scale mechanism and not of my invention; therefore no showing is made. CR1 has front contacts in series across these lines with the winding of a relay CR2 and with back contacts of a relay CR6. CR1 also has front contacts in series across these lines with the winding of a relay CR3 and with back contacts of a relay CR7. Thus CR2 and CR3 both pick up with CR1 and both seal in around the CR1 contacts since CR1 drops out after the scale dumps.

CR2 controls the operating solenoids for both cylinders 58 and 67 which motivate the empty and filled container transfer carriages 57 and 66 respectively and also controls the latch solenoid 53 above the empty container conveyor 51. To effect control of the carriages CR2 has front contacts in series with the "project" solenoid for cylinder 58, back contacts in series with the "retract" solenoid therefor, other front contacts in series with the "retract" solenoid for cylinder 67, and other back contacts in series with the "project" solenoid for the latter, in each instance connected across lines L_1 and L_2. Thus when CR2 picks up, the "project" solenoid for cylinder 58 and the "retract" solenoid for cylinder 67 and energized, and the opposite solenoids therefor de-energized, whereupon cylinder 58 swings the previously loaded empty container transfer carriage 57 to its discharging position, and cylinder 67 swings the filled container transfer carriage 66 to its receiving position shown in Figure 4. The solenoid 53 is connected in parallel with the "project" solenoid for cylinder 58. When CR2 picks up, this solenoid is energized, whereupon latch 52 releases the leading container 39 on the live roller section 51*a*, but this container of course cannot yet be loaded on the carriage 57. Conveyor 51 travels at a sufficiently slow rate that only one container is released before the latch returns to its holding position. CR3 controls the operating solenoids for the horizontal cylinder 81 of the lifter 50 and has front contacts in series with the "project" solenoid therefor and back contacts in series with the "retract" solenoid, both connected across the lines. Consequently when CR3 picks up, the "project" solenoid is energized and the "retract" solenoid de-energized, whereupon the cylinder projects the lifting bar into engagement with the funnel device 38.

The LS2 contacts which close when the lifting bar is projected are in series across lines L_1 and L_2 with the winding of a relay CR4 and with back contacts of a relay CR6. Thus CR4 picks up when the lifting bar is projected into engagement with the funnel device 38 and seals in. CR4 controls the operating solenoids for the vertical cylinder 82 of the lifter 50 and has front contacts in series with the "up" solenoid therefor and back contacts in series with the "down" solenoid therefor both connected across the lines. Consequently when CR4 picks up, the "up" solenoid is energized and the "down" solenoid de-energized, whereupon cylinder 82 raises the funnel device 38 and withdraws it from a filled container 39*a*. LS3, which closes when the reciprocable element of cylinder 82 is fully projected, is in series across the lines with the winding of a relay CR5 and with back contacts of a relay CR7. When LS3 closes, CR5 picks up and seals in. CR5 controls the operating solenoids for cylinder 60 which motivates the pusher 59, and has front contacts in series with the "project" solenoid therefor and back contacts in series with the "retract" solenoid connected across the lines. Consequently when CR5 picks up, the "project" solenoid is energized and the "retract" solenoid de-energized, whereupon cylinder 60 motivates the pusher 59 to shove an empty container 39 from the loaded transfer carriage 57 to the plate 23 of one of the stations on the turntable 16. The empty container displaces a filled container 39*a* from the plate to the filled container transfer carriage 66.

LS4, which closes when the pusher 59 is projected, is in series across the lines with the winding of relay CR6, hereinbefore mentioned. Thus CR6 picks up when pusher 59 is projected, whereupon its two back contacts open and drop out CR2 and CR4. The front contacts of CR2 and CR4 open, de-energizing the "project" solenoid for cylinder 58, the "retract" solenoid for cylinder 67, and the "up" solenoid for cylinder 82, while the back contacts of these relays close, energizing the opposite solenoid for each cylinder. Consequently both carriages 57 and 66 return to their starting positions shown in Figure 1, and the funnel device 38 is lowered into the empty container 39 on the station. Solenoid 53 is de-energized to return the latch 52 to its holding position. LS5, which closes when the reciprocable element of cylinder 82 is retracted, is in series across the lines with the winding of relay CR7 hereinbefore mentioned and with front contacts of relay CR6. Thus CR7 picks up when the funnel device is lowered, CR6 having already picked up to close its front contacts, whereupon the back contacts of CR7 open and drop out CR3 and CR5. The front contacts of CR3 and CR5 open and de-energize the "project" solenoids for horizontal cylinder 81 of the lifter 50 and for cylinder 60 of the pusher 59, while the back contacts thereof close and energize the "retract" solenoids therefor. Consequently the lifting bar and the pusher 60 return to their starting positions.

CR3 has another back contact in series with LS6, LS7 and the winding of a relay CR8 across lines L_1 and L_2. When CR3 drops out and closes its back contacts, CR8 picks up, LS6 being closed since carriage 66 has not yet reached its starting position. CR8 seals in around LS6,

whereby it remains energized after the carriage returns to its starting position. CR8 controls additional relays CR9 and CR10 which in turn control the scale hopper 78 and the turntable 22. CR8 has front contacts in series across lines L_1 and L_2 with back contacts of CR4, the four interlock switches 85, 86, 87 and 88, and the windings of the two relays CR9 and CR10. The back contacts of CR4 prevent CR9 and CR10 from picking up until CR4 has dropped out, and the interlock switches prevent these relays from picking up until the reciprocable elements of cylinders 58, 60, 67 and 31 have returned to their starting positions. CR9 has back contacts in series with LS1 and the winding of CR1, which contacts open when CR9 picks up to prevent the scale from dumping and the foregoing operating cycle from beginning while the turntable is indexing. The contacts of LS2 which open unless the lifting bar of lifter 50 is retracted also are connected in series with the winding of CR1. CR10 has front contacts in series across lines L_1 and L_2 with the motor 22. When CR10 picks up, the motor commences to index the turntable. When the latter rotates one-sixth revolution (or other appropriate fraction depending on the number of stations), the cam 83 for station A momentarily opens LS7, as already explained. Thereupon CR8, CR9, and CR10 all drop out. In the meantime the filled container transfer carriage 66 has returned to its starting position and opened LS6.

The contacts of LS8 which close when the reciprocable element of cylinder 58 projects are in series with the "retract" solenoid for cylinder 55. Consequently, when the loaded empty container transfer carriage 57 swings to its discharging position, the pusher 56 retracts over the trailing wall of the empty container 39 which lies on the idler section 51*b* and the leading wall of the container newly released by the latch 52. The other contacts of LS8 which close when the reciprocable element of cylinder 58 retracts are in series with the "project" solenoid for cylinder 55. Consequently, when the now unloaded carriage 57 returns to its receiving position, the pusher 56 shoves the newly released container ahead and thereby loads the container from the idler section onto the carriage.

From the foregoing description it is seen that my invention affords a fully automatic machine for packaging loose articles such as nails. The articles are weighed, packaged in containers and compacted without need for manually handling either the containers or the articles. My machine is adapted for use with other mechanical handling equipment which applies covers to the containers and subsequently loads groups of containers on a pallet or the like, thus assisting in making the entire operation automatic.

While I have shown and described only a single embodiment of my invention, it is apparent that modifications may arise. Therefore, I do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

I claim:

1. A packaging machine comprising a turntable journaled for rotation on a vertical axis, a plurality of arcuately spaced container-mounting assemblies on said turntable, means adjacent a first of said assemblies and supported on one side thereof for delivering empty containers singly thereto, means adjacent a second of said assemblies for feeding a predetermined quantity of loose articles to a container mounted thereon, said container delivering means being adapted also to displace a filled container from the other side of the first assembly as it delivers an empty container thereto, means supported on the side of the first assembly opposite said container delivering means for receiving filled containers thus displaced, and means for indexing said turntable to position each assembly successively to receive an empty container and to have articles fed to this container.

2. A machine as defined in claim 1 including means for vibrating said assemblies to compact articles fed to containers thereon.

3. A machine as defined in claim 1 in which said container delivering means includes a conveyor adapted to carry a supply of empty containers, a transfer carriage mounted for pivotal movement on a vertical axis between said conveyor and said first assembly and pushers for moving the containers.

4. A machine as defined in claim 1 in which each of said assemblies includes an article receiving hopper, means to clamp a container below said hopper, and a vertically movable funnel device adapted to enter a container thus clamped to guide articles from said hopper into the container.

5. A machine as defined in claim 4 including a retractible lip mounted on the bottom of each of said hoppers and adapted to bridge the space between the hopper and funnel device or, when retracted, to clear the funnel device for raising and lowering, and means for automatically retracting said lip on an assembly moving into position for delivery of a container thereto and projecting the lip on an assembly moving away from this position.

6. A machine as defined in claim 1 in which the means for receiving filled containers includes a carriage which is mounted for pivotal movement on a vertical axis and has a container-receiving position adjacent the first assembly and a container discharging position spaced therefrom, means for moving said carriage between these positions, and a conveyor for receiving containers discharged from said carriage.

7. A packaging machine comprising a turntable, means supporting said turntable for rotation on a vertical axis, a plurality of container-mounting assemblies uniformly arcuately spaced around said turntable and supported thereon, means for vibrating said assemblies, means adjacent a first of said assemblies for delivering empty containers singly thereto, means above a second of said assemblies for feeding a predetermined quantity of loose articles to a container mounted thereon, said container delivering means being adapted also to displace a filled container from the first assembly as it delivers an empty container thereto, means for receiving and removing filled containers thus displaced, and means for indexing said turntable to position each assembly successively to receive an empty container and to have articles fed to this container, each of said assemblies including a plate movable radially of said turntable, container clamping means on said plate, a vertically movable funnel device adapted when lowered to enter a container held by said clamping means and when raised to clear the container to permit its replacement, and a hopper adapted to receive articles from said feeding means and drop them into said funnel device.

8. A packaging machine comprising a turntable, means supporting said turntable for rotation on a vertical axis, a plurality of container-mounting assemblies uniformly arcuately spaced around said turntable and supported thereon, a conveyor adapted to carry a series of empty containers for delivery to a first of said assemblies, a pivotally mounted transfer carriage situated between said conveyor and the first assembly and having a receiving position aligned with said conveyor and a discharging position aligned with the first assembly, means for pushing containers singly from said conveyor to said carriage when the carriage is in receiving position, a pusher for pushing a container from said carriage to the first assembly when the carriage is in discharging position, means above a second of said assemblies for feeding a predetermined quantity of loose articles to a container mounted thereon, said pusher being adapted also to displace a filled container from the first assembly as it pushes an empty container thereon, means for receiving and removing containers thus displaced, and means for indexing said turntable to position each assembly suc-

cessively to receive an empty container and to have articles fed to this container.

9. A packaging machine comprising a turntable, means supporting said turntable for rotation on a vertical axis, a plurality of container-mounting assemblies uniformly spaced around said turntable and supported thereon, and means for vibrating said assemblies, each of said assemblies including a horizontal plate movable radially with respect to the turntable as the assembly vibrates, a hopper supported in spaced relation above said plate, a vertical clamping plate upstanding from said horizontal plate, a leaf spring supported from said turntable and spaced from said clamping plate, said spring and clamping plate being adapted to engage opposite faces of a container for mounting it on the assembly, upstanding support means carried by said horizontal plate, a funnel device carried by said support means for vertical movement and adapted to enter a container mounted on the assembly, and a retractible lip on said hopper adapted to extend over said funnel device for guiding loose articles from the hopper to the funnel device.

10. A machine as defined in claim 9 including a fluid pressure cylinder for each assembly for retracting and projecting said lip, valve means for controlling admission of fluid to said cylinder, and means for actuating said valve means to operate said cylinder and retract said lip when said turntable rotates to a predetermined position and to project said lip when the turntable leaves this position.

11. A machine as defined in claim 9 including a plurality of uprights mounted on said turntable alternating with the assemblies, said leaf springs being fixed to said uprights on the side of the assemblies away from the direction of rotation.

12. A machine as defined in claim 11 including a fluid pressure cylinder at each assembly for retracting and projecting said lip, cam operated valve means on said uprights for controlling admission of fluid to said cylinders, and operating cams for said valve means fixed above said turntable and uprights to retract said lip when the turntable rotates to a predetermined position and to project said lip when the turntable leaves this position.

13. A packaging machine comprising means for mounting and positioning a container for feeding loose articles thereto, a conveyor adapted to carry a supply of empty containers, an empty container transfer carriage pivoted on a vertical axis between said conveyor and said mounting means and having a position to receive containers from said conveyor and a position to deliver containers to said mounting means, means for moving containers singly from said conveyor to said carriage in its first named position, means for pivoting said carriage to its second named position, a pusher for pushing a container from said carriage in its second named position to said mounting means, the pusher and empty container being adapted to displace a filled container from said mounting means, and a filled container transfer carriage pivotally supported adjacent said mounting means and having a position to receive a container therefrom and a discharging position.

14. A machine as defined in claim 13 in which said filled container transfer carriage includes a plurality of container-supporting rollers and a stop at the edge remote from said mounting means to prevent containers from being pushed off as they are delivered thereto but allowing containers to ride thereover as they discharge.

15. A packaging machine comprising a turntable journaled for rotation on a vertical axis, a plurality of arcuately spaced container-mounting assemblies on said turntable, means adjacent a first of said assemblies for delivering empty containers singly thereto from one side of this assembly and simultaneously displacing a filled container toward the opposite side thereof, means adjacent a second of said assemblies for feeding a predetermined quantity of loose articles to a container mounted thereon, means for indexing said turntable to position each assembly successively to receive an empty container and to have articles fed to this container, and a control circuit actuated by feeding of articles for operating said container delivering means and then said indexing means.

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