March 17, 1964 A. W. KINNEY 3,125,205

PACKAGING HANDLING APPARATUS

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Fig. 1

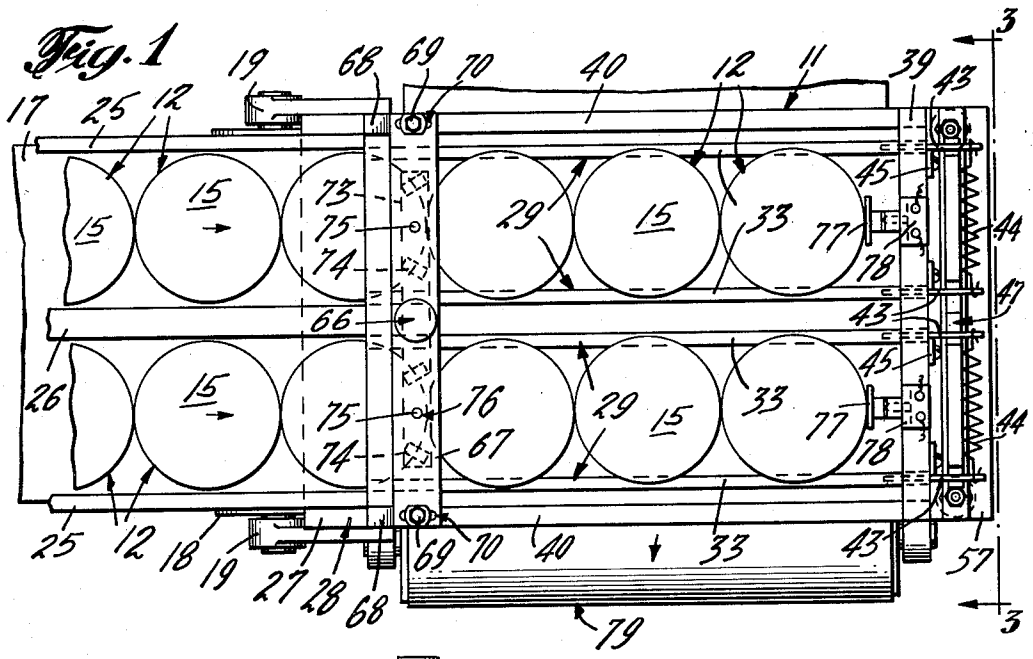
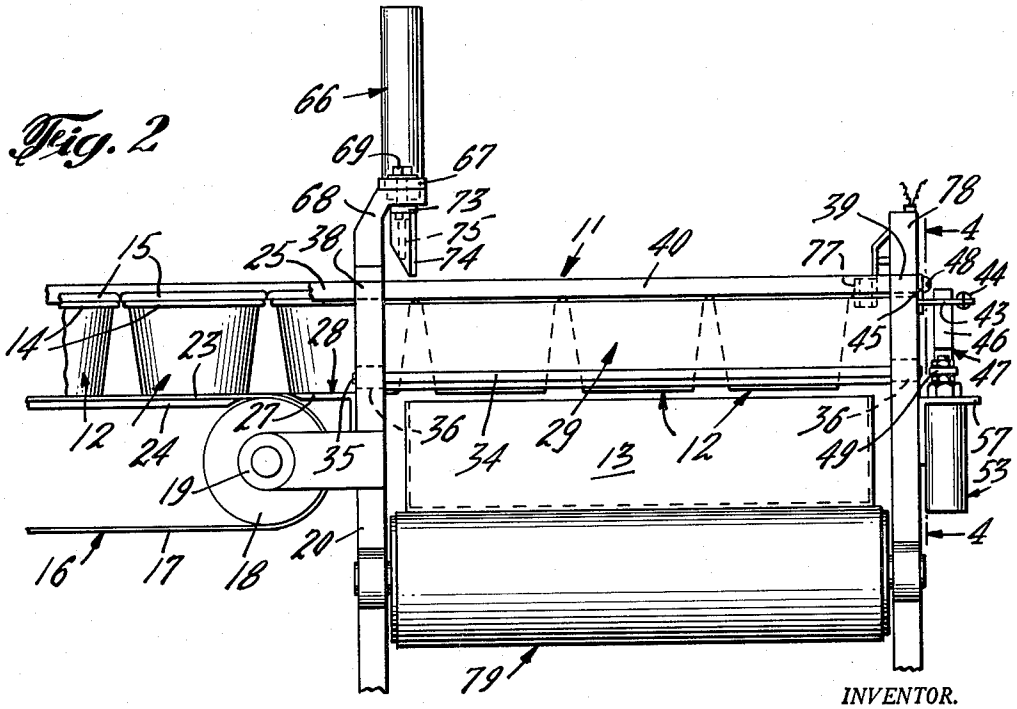


Fig. 2



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Fig. 3

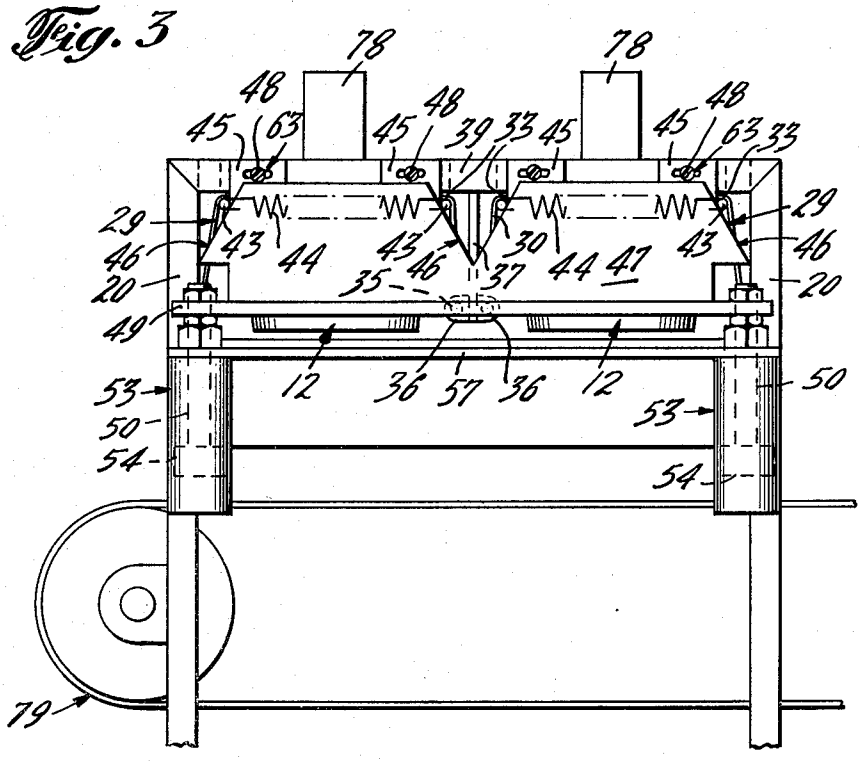


Fig. 5

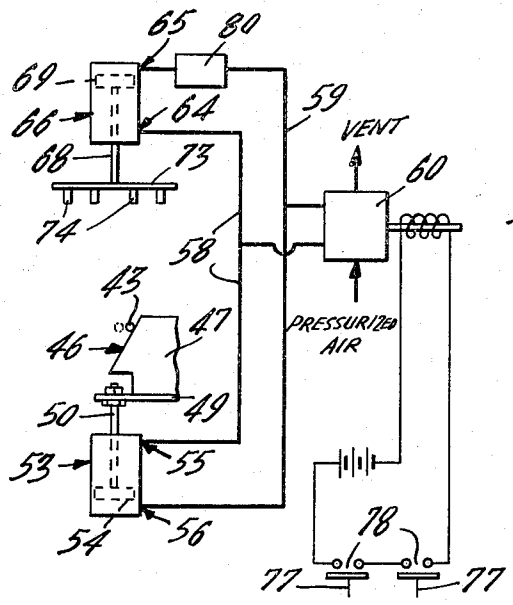
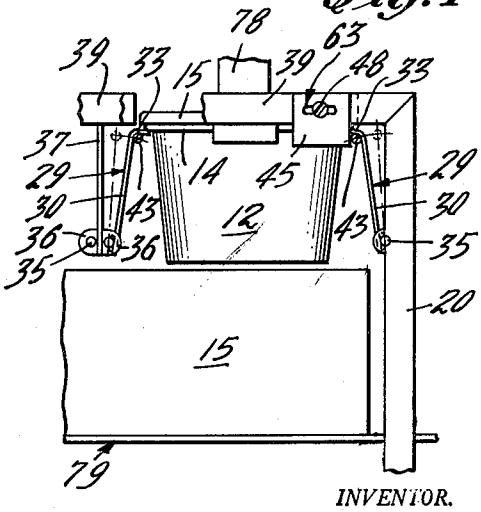


Fig. 4



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United States Patent Office 3,125,205 Patented Mar. 17, 1964

3,125,205

PACKAGING HANDLING APPARATUS

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Filed Sept. 22, 1961, Ser. No. 140,110
3 Claims. (Cl. 198—21)

The present invention relates to an apparatus for accumulating a plurality of packages and delivering them in a predetermined pattern and quantity to a receiver such as a shipping carton and, more particularly, to an apparatus for handling in such a manner packages having a frusto-conical shape.

In the case of packages having a symmetrical shape, e.g., cylindrical or rectangular, apparatus is presently available which reliably groups and delivers the packages to receiving means at high rates of speed and which at the same time is simply constructed, economical to manufacture and requires little attention or maintenance in use. On the other hand, the handling of packages which use the conventional frusto-conical containers is less easily accomplished, often requiring manual procedures.

Generally, such containers have the form of a truncated cone with the larger area at the upper end thereof. The upper end of the container is usually provided with an outwardly formed beaded lip. Various top closures are used, e.g., a disc closure seated interiorly of the lip or an overcap having a skirt portion extending around the lip.

Because of the tapered shape of frusto-conical packages they tend to tilt easily from their normal upright attitude when pushed against each other. Moreover, it is difficult to grip or support groups of such packages in a simple manner from which they can be simultaneously and positively released as a group with a minimum of tilting or undue lateral displacement of the individual packages as they drop by gravity to a receiving means such as a shipping carton or stacking elevator.

When tilting or displacement takes place during the downward movement of such packages, the predetermined arrangement may be disturbed sufficiently to prevent the proper entry and deposit of the group into the receiving means. In this event, the improperly deposited packages must generally be manually rearranged into their proper order. As a more serious consequence, the receiving means may become jammed or inoperative due to the improperly deposited packages and the packages themselves often become damaged.

An object of the present invention is to provide an apparatus for accumulating a predetermined number of frusto-conical packages and delivering them in a predetermined group pattern which will overcome the problems hereinbefore pointed out.

Another object is to provide such an apparatus wherein the means for supporting the grouped packages is positively and quickly retracted from all of the supported surfaces simultaneously.

Another object is to provide such an apparatus wherein the released group of packages tend to maintain their pattern as they drop by gravity to a receiver with a minimum change in attitude or position of the individual packages.

A further object is to provide such an apparatus wherein the release of the packages from the supporting means is initiated by the packages themselves when the predetermined quantity has been accumulated in the desired pattern.

Still another object is to provide such an apparatus which is simply constructed, inexpensive to manufacture, reliable in operation and efficient and durable in use.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

FIGURES 1 and 2 are plan and side views respectively of an apparatus embodying the features of the present invention;

FIG. 3 is an end view of the apparatus taken substantially along line 3—3 of FIG. 1;

FIG. 4 is an enlarged partial sectional view taken substantially along line 4—4 of FIG. 2;

FIG. 5 is a schematic diagram of the electrical and pneumatic systems of the apparatus.

As a preferred or exemplary embodiment of the instant invention FIGURES 1 and 2 show an accumulating device generally designated 11 adapted to deposit filled and capped frusto-conical shaped containers 12 in two rows of three containers each into a shipping carton 13 disposed below the accumulating device. The containers 12 have outwardly formed beaded lips 14 at the upper ends thereof and are provided with a top closure member such as an overcap 15. The containers 12 are conveyed to the accumulating device 11 from a filling machine (not shown) in two rows on a horizontal supply conveyor 16.

It is to be understood that the invention may be used to deliver any desired number of rows with various quantities of containers per row. Also, that the containers may be delivered to a receiving means other than a shipping carton; for example, the containers may be deposited in layers on a conventional stacking elevator from whence the stacked containers may be moved into cases or cartons using conventional transfer devices as are well known in the art.

The supply conveyor 16 has an endless belt 17 which passes around a drum 18 rotatably mounted at the conveyor discharge end adjacent the accumulating device 11. The drum 18 is journaled in bearings 19 secured to upright support members 20. The conveyor belt 17 has an upper run 23 which slides on a support plate 24 thereby maintaining the upper run at a desired level. The conveyor 16 operates continuously so as to bring the rows of containers 12 in close procession to the accumulating device 11. Side members 25 and a center divider 26 keep the containers in line as they move along and are discharged from the conveyor.

Upon arriving at the discharge end of the conveyor 16 the containers 12 are advanced onto a plate 27 secured to the upright members 20. The plate 27 has a smooth upper surface 28 at the same level as the surface of the upper run 23 of the conveyor. Movement of the containers 12 after they leave the conveyor 16 is effected by the abutting of their upper ends one against the other so that the containers still on the conveyor push against and advance the preceding containers into the accumulating device 11. The containers are thus advanced across the surface 28 of the plate 27 onto pairs of oscillatable supporting rails 29 disposed in alignment with each row of containers.

Each supporting rail 29 consists of an upstanding metal plate 30 with the upper portion bent inwardly to form a container supporting flange 33. A circular rod 34 is fastened as by welding to each plate 30 adjacent the lower edge thereof. The rods 34 have bearing ends 35 extending beyond the plates 30 into pivot bearings 36. The rods 34 of the supporting rails 29 which are adjacent the upright members 20 have the bearings 36 secured to the upright members. The remaining supporting rails 29 have the bearings 36 mounted on supports 37 depending from front and rear cross members 38 and 39 respectively which extend across and are attached to the up-

per ends of the upright members 20. Longitudinal members 40 connecting the upper ends of the upright members 20 complete the supporting framework of the accumulating device 11.

Extending rearwardly from the supporting rails 29 are actuating pins 43 attached to the rails beneath and adjacent to the supporting flanges 33. A tension spring 44 connecting the actuating pins 43 of each pair of supporting rails 29 urges the pins inwardly towards adjustable stops 45 and cam surfaces 46 of a vertically reciprocable plate cam 47. The stops 44 are secured by screws 48 to the rear cross member 39 and extend downwardly therefrom. The cam surfaces 46 are disposed adjacent to each actuating pin 43 between the springs 44 and the stops 45.

The cam 47 has a horizontal flange portion 49 at the bottom thereof which is secured adjacent each end to piston rods 50 extending upwardly from cam operating cylinders 53 (FIG. 3). The cylinders 53 have pistons 54 and upper and lower ports 55 and 56 respectively, and are mounted on an angle bracket 57 which extends across and is attached to the rearwardly disposed upright support members 20. The ports 55 and 56 are connected by branched tubes 58 and 59 respectively to a two position solenoid valve 60 (FIG. 5). In its normal de-energized position the solenoid valve 60 connects the upper port 55 to a source of pressurized air and vents the lower port 56 to the atmosphere thereby maintaining the pistons 54 in the downward position.

With the pistons 54 in the downward position, the cam surfaces 46 are disengaged from the pins 43 causing the pins to be pulled inwardly against the stops 45 by the springs 44. Horizontally disposed elongated slots 63 in the stops 45 through which the screws 48 extend permit transverse adjustment of the stops so that the minimum spacing between the supporting flanges 33 is maintained equal to or slightly greater than the diameter of the containers 12 as measured below and immediately adjacent to the beads 14. Consequently, as the containers 12 are advanced into the accumulating device 11 by the conveyor 16, the supporting flanges 33 engage and support the containers beneath the beads 14.

The branched tubes 58 and 59 are also connected respectively to a lower port 64 and an upper port 65 of a stop actuating cylinder 66. The stop cylinder 66 is mounted on a cross bar 67 disposed above the front cross member 38 and has a downwardly extending piston rod 68 attached to a piston 69. The cross bar 67 is supported at its ends on brackets 68 extending upwardly from the front cross member 38 and is adjustably secured to the brackets by screws 69 which extend through longitudinally disposed elongated slots 70 in the cross bar and threadably engage the brackets.

Attached to the lower end of the piston rod 68 is a vertically movable stop mount 73 having depending fingers 74 disposed in pairs, one pair for each pair of supporting rails 29. Guide pins 75 extending upwardly from the stop mount 73 through aligned guide holes 76 in the cross bar 67 prevent lateral rotation of the stop mount relative to the cross bar as the stop mount is vertically displaced.

In the normal de-energized position of the solenoid valve 60, pressurized air is admitted through the tubing 58 to the lower port 64 of the stop cylinder 66 while the upper port 65 is vented to the atmosphere through the tubing 59, thereby maintaining the piston 69 in the upward position. In the upward position of the piston 69 the lower ends of the fingers 74 are raised above the tops of the containers 12 permitting them to advance into the accumulating device 11.

After a predetermined number of containers 12 are advanced on to each pair of supporting rails 29, the lead container is pressed by the following containers against a switch lever 77 closing a normally open microswitch 78 mounted on the rear cross member 39. The microswitches 78, one of which is provided for each pair of supporting rails 29, are connected in series with a source of electromotive force to the solenoid valve 60 (FIG. 5). When each pair of supporting rails 29 has the predetermined number of containers 12 thereon, whereby all of the microswitches 78 are closed, the solenoid valve 60 is energized. In the energized position, the valve 60 reverses the flow pattern so that the pressurized air is directed to the upper port 65 of the stop cylinder 66 and the lower ports 56 of the cam operating cylinders 53, while the lower port 64 and upper ports 55 of the stop cylinder and cam operating cylinders respectively are vented to the atmosphere.

This causes the piston 69 of the stop cylinder 66 to be depressed moving the stop mount 73 and fingers 74 downwardly to a position wherein the fingers are disposed between the containers 12 in the accumulating device 11 and those on the conveyor 16 and plate 27. Consequently, the further movement of containers 12 into the accumulating device 11 is interrupted. The elongated slots 70 permit the position of the cross bar 67 and thereby the fingers 74 to be adjusted to insure that the fingers in their downward position enter between the adjacent containers 12.

Simultaneously, the pistons 54 of the cam operating cylinders 53 are moved upwardly moving the cam 47 upwardly and causing the cam surfaces 46 to engage the actuating pins 43. The cam 47 oscillates the pins 43 and thereby the supporting rails 29 outwardly so that the supporting flanges 33 are positively withdrawn from beneath the beads 14 of the containers 12 which are in the accumulating device. The containers 12 are thus simultaneously disengaged and drop with substantially no change in their attitude or in their predetermined group pattern into the shipping carton 13. The empty cartons 13 are moved into position below the accumulating device 11 and removed therefrom after the containers 12 have been deposited therein by a conventional transfer conveyor 79 of a type well known in the art.

As the containers 12 drop from the accumulating device 11, they disengage the switch levers 77 whereupon the microswitches 78 return to their normal open position and the solenoid valve 60 is de-energized. This causes the cam 47 to be moved downwardly disengaging the cam surfaces 46 from the pins 43 and permitting the springs 44 to return the supporting flanges 33 to the position for receiving additional containers 12 thereon. Also, the fingers 74 are moved upwardly to permit the containers 12 to advance into the accumulating device.

A one-way restrictor 80 in the tube 59 adjacent the upper port 65 of the stop cylinder 66 retards the venting of the upper portion of the stop cylinder. Consequently, the upward stroke of the piston 69 of the stop cylinder 66 is delayed slightly thereby insuring that the fingers 74 are not fully retracted until the supporting flanges 33 have fully returned to the position for receiving and supporting additional containers 12 as they advance into the accumulating device 11.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. An apparatus for grouping and delivering in a predetermined quantity and pattern a plurality of frustoconical shaped containers having the larger ends thereof uppermost, each container having an outwardly disposed peripheral bead formed in the side wall adjacent the larger upper end, comprising receiving means, grouping means disposed above said receiving means, conveyer means continuously feeding a plurality of said containers in a predetermined number of parallel rows

into said grouping means, said grouping means having a pair of oscillatable support gates disposed in alignment with each of said rows, each gate of said pairs of gates being pivotally mounted at the lower end and having an inwardly extending flange formed on the upper end thereof, spring means connecting and urging the two gates in each pair of gates inwardly towards each other, stop means limiting the inward movement of said support gates whereby said flanges automatically assume a predetermined spacing for slidably receiving said containers therebetween with said flanges engaging the underside of said beads to form the sole support of said containers in said grouping means, each of said pairs of supporting gates having a length sufficient to receive a predetermined number of said containers therebetween, means for sensing when said grouping means has a predetermined quantity of said containers therein, first means responsive to said sensing means for interrupting the entry of said containers into said grouping means and second means responsive to said sensing means for oscillating said support gates outwardly to positively and simultaneously retract said flanges from beneath the beads of all of the containers in said grouping means whereby the predetermined quantity of containers in said grouping means maintain their attitude and position in the group pattern as they move unsupported into said receiving means.

2. The apparatus set forth in claim 1 wherein said second means for positively retracting said flanges of said support gates and releasing said containers therefrom comprises pneumatically operated cams, said cams engaging cam followers attached to said gates and causing said gates to oscillate outwardly to positively and simultaneously withdraw said flanges from beneath said beads.

3. The apparatus set forth in claim 1 wherein said sensing means comprises switch means engageable by the lead container supported on each of said pairs of support gates, said switch means being operably connected in series whereby all of said pairs of support gates must have a predetermined number of said containers thereon to cause said first and second means responsive to said sensing means to be actuated.

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