

United States Patent

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[54] METHOD FOR LOADING CONTAINERS WITH ARTICLES

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53/246

[51] Int. Cl.B65b 35/30, B65b 5/10

[58] Field of Search....53/26, 35, 159, 160, 162, 163,
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DK, 6 H, 6 P

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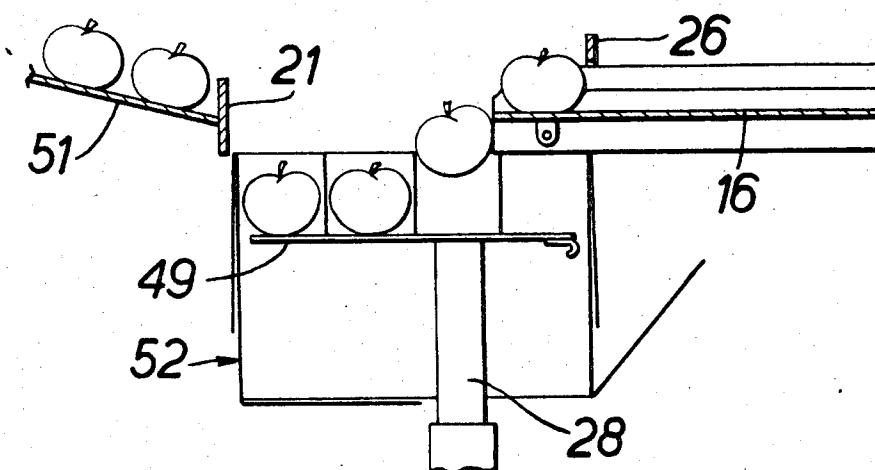
Primary Examiner—Robert L. Spruill

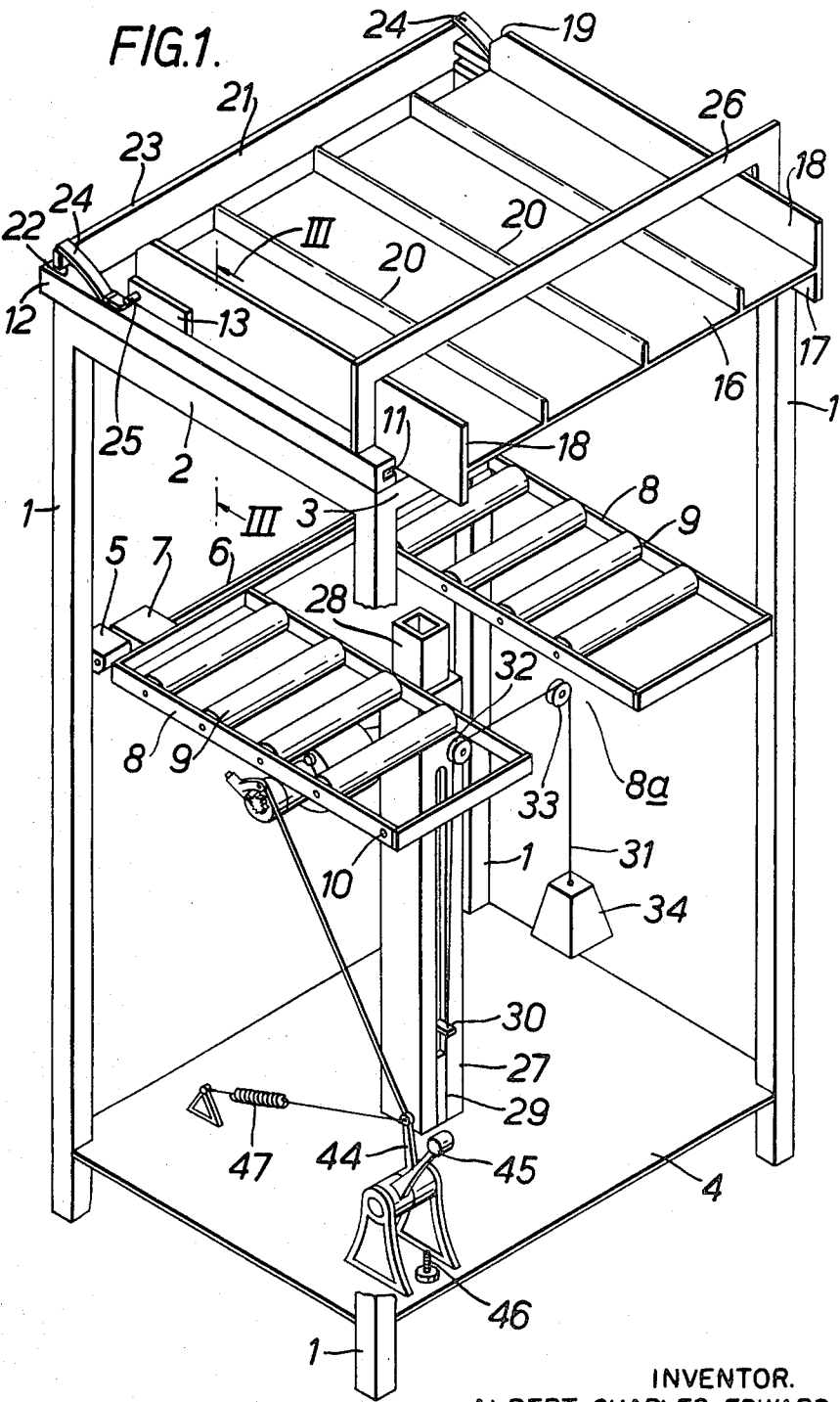
Attorney—Louis F. Kline, Jr., Melvin H. Kurtz and
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[57] ABSTRACT

In the loading of a container with two or more layers of articles which are fragile or susceptible to damage such as apples, the articles to be loaded in each layer are arranged in turn on a platform immediately above the container. The platform is movable to cause the articles to fall from the trailing edge of the platform as it uncovers the container and support means within the container is disposed a distance, substantially equal to the height of the layer, below the platform as the first layer is loaded. The support means is lowered in increments as each layer is lowered so that the articles in each layer are not allowed to fall through a distance substantially greater than the height of that layer.

1 Claim, 8 Drawing Figures





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FIG. 2.

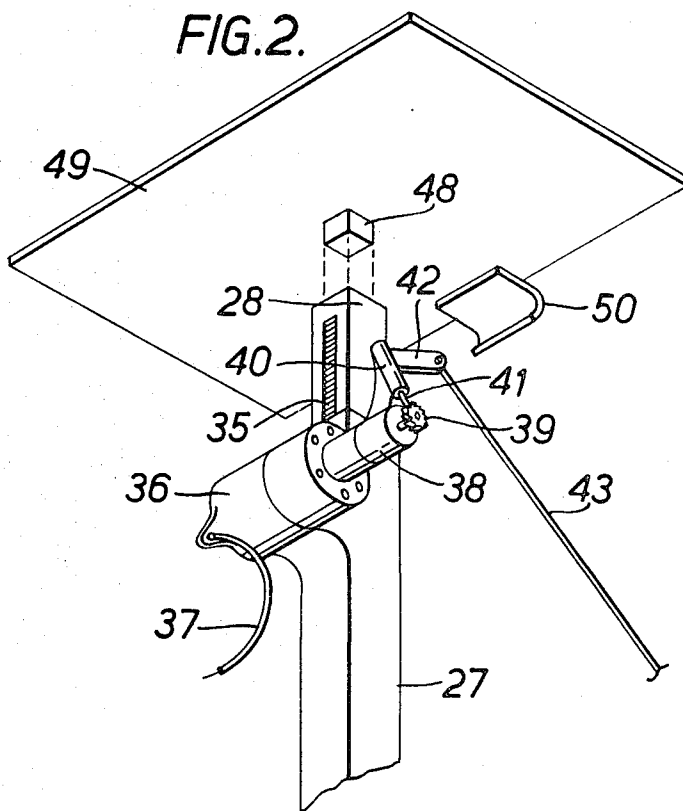
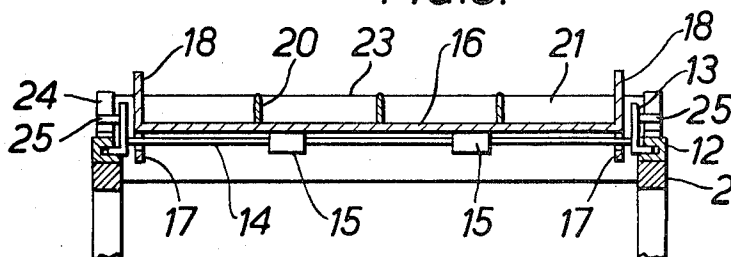
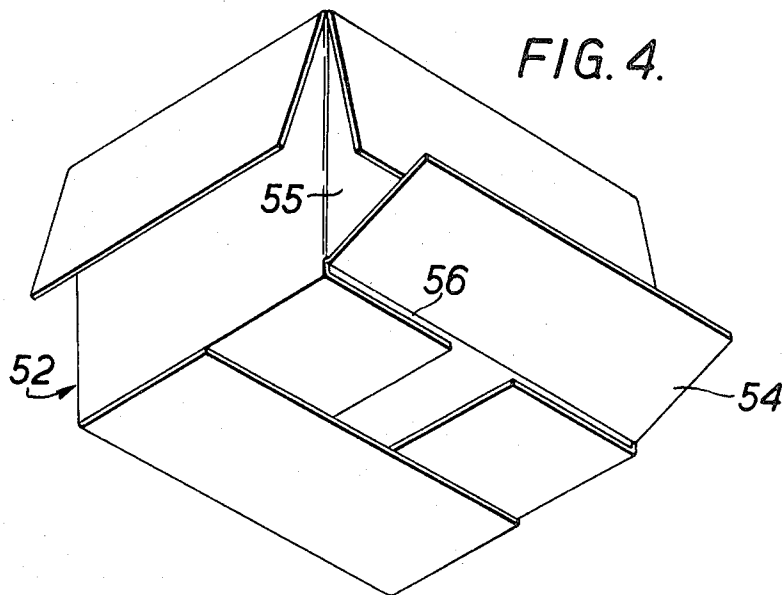
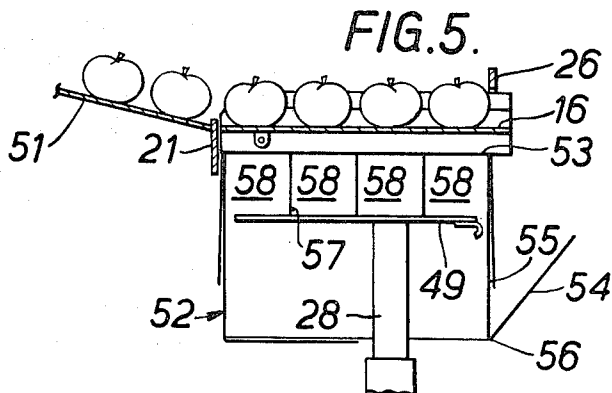
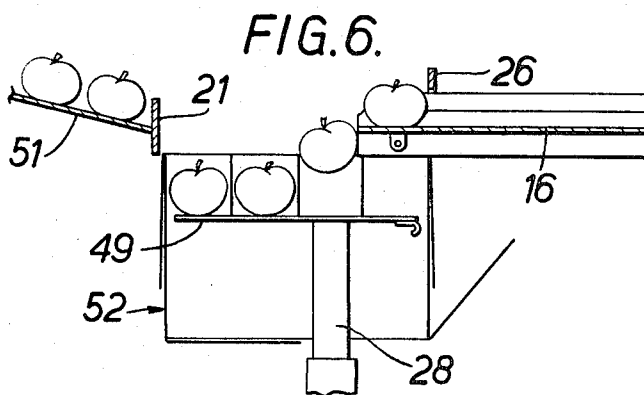


FIG. 3.



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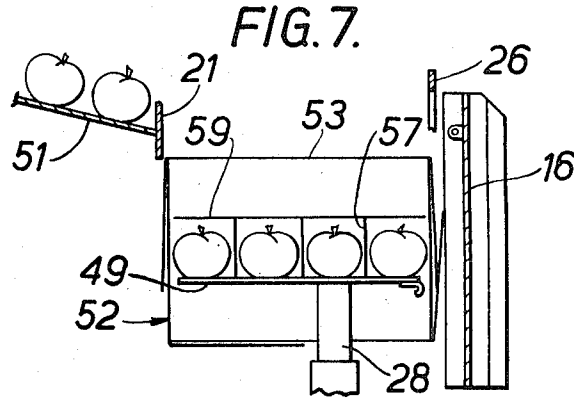
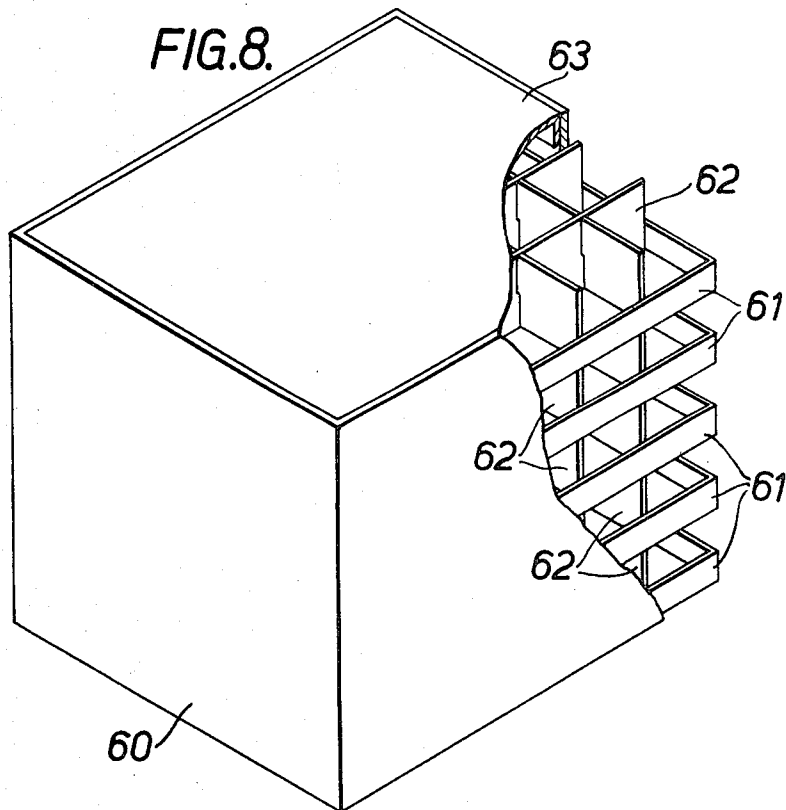
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METHOD FOR LOADING CONTAINERS WITH ARTICLES

This invention relates to a method and apparatus for loading containers with articles, particularly containers arranged to receive two or more layers of the articles and having a layer divider between each layer.

According to the present invention there is provided a method of loading a container with a plurality of articles in separate layers, each layer being separated from adjacent layers by a horizontal layer divider, comprising arranging, in their predetermined positions, the articles required for each layer in turn on a platform, positioning the container adjacent the underside of the platform, moving the platform relative to the container to cause the articles to drop from the platform into the container in said predetermined positions, providing layer supporting means to receive and support the lowermost layer of articles at a distance below the platform substantially that of the height of the layer, moving the layer supporting means downwardly in increments as each layer of articles is loaded into the container so that each layer of articles drops a distance substantially equal to the height of the layer, and covering the layers of articles with a layer divider to support the next layer of articles to be loaded into the container. Thus none of the articles are allowed to drop a distance substantially greater than the height of one layer of articles and, in particular, the articles making up the lower layer in the container do not drop through the full depth of the container. When the articles to be loaded are fragile this reduces the possibility of damage during loading of the container.

When the container is fully loaded and the layer supporting means has been lowered to the bottom of the container, the supporting means can if necessary be removed in order to avoid the supporting means remaining with the loaded container.

The layer dividers can rest upon the articles below or more preferably an assembly of intersecting dividers is inserted at each layer within the container prior to the articles for that layer being loaded to space the layer dividers above the articles in the layer below. This prevents the articles in the lower layer from supporting the weight of the other articles in the container in the layers above. When the articles are particularly vulnerable to accidental damage, or for any other reason, each article can be loaded into a separate compartment formed by the intersecting dividers.

The articles can conveniently be arranged in rows on the platform so that the articles are arranged in rows within the container.

According to another aspect of the present invention there is provided apparatus for loading a container with a plurality of articles arranged in separate layers comprising container support means for supporting a container below a platform, the platform being movable in a direction parallel with the top of the container between a first position to cover the open top of the container and a second position to uncover the open top of the container, a scraper bar extending transversely over and adjacent the upper surface of the platform so that the platform passes below the scraper bar as it is moved from the first position to the second position, and layer supporting means adapted to extend within the container and adjustable heightwise to two

or more positions to support the layers of articles within the container at predetermined distances below the movable platform during loading.

The layer supporting means can comprise a support plate adapted to support the lowermost layer of articles, the support plate being mounted on a ram arranged to pass through the base of the container to support the support plate within the container. The ram is conveniently biased towards the movable platform and is provided with operating mechanism for heightwise adjustment of the position of the support plate.

The operating mechanism can comprise a toothed member operatively connected to the ram, and a plunger operatively connected to an actuating mechanism and adapted to cooperate with the toothed member to adjust the position of the support plate in predetermined increments in response to movement of the actuating mechanism. Adjusting means is preferably provided in the actuating mechanism to enable the size of the increments to be varied to suit the size of the articles.

The container support means can comprise a plurality of rollers; the rollers can be supported on a frame pivoted parallel to the longitudinal axes of the rollers. When a container is being filled the rollers can provide a horizontal support for the container, the frame being pivoted when the container is loaded to allow the container to roll off the rollers and an empty container to be placed in position for loading. The loaded container can roll directly onto a conveyor taking the container to a closing station.

Where, for example, the articles to be loaded are fed to the loading apparatus on an inclined surface a stop bar can be provided extending parallel with the scraper bar and substantially vertically aligned with one wall of the container, the stop bar being biased towards a raised position above the surface of the platform and movable to a position flush with the upper surface of the platform when the platform is in said first position. In the raised position the stop bar prevents articles passing onto the platform, or directly into the container when the platform is not in the first position covering the open top of the container. Conveniently the stop bar can be moved to the position flush with the upper surface of the platform in response to movement of the platform.

To assist in arranging the articles on the platform the platform can be subdivided by a number of parallel ribs projecting upwardly from the upper surface of the platform and extending in the direction of movement of the platform.

An embodiment of the invention will now be more particularly described with reference to the accompanying diagrammatic drawings of an apple packing machine in which:

FIG. 1 is a perspective view of the apparatus;

FIG. 2 is a fragmentary perspective view from below showing the support means;

FIG. 3 is a fragmentary sectional view along the line III—III in FIG. 1;

FIG. 4 is a perspective view from below of a container as it is inserted into the apparatus;

FIG. 5 to 7 illustrate the method of operation of the apparatus, and

FIG. 8 is a perspective view from above of an alternative form of container to be loaded according to the invention.

Referring to FIGS. 1 to 3, the apparatus comprises a main framework having four legs 1 (one of which is shown broken away for clarity) joined at their upper ends by horizontal side members 2 and a front member 3 and at their lower ends by a base member 4.

Secured to each of the two rear legs 1 is a hinge block 5 which carry between them a hinge bar 6. Free to rotate on the hinge bar 6 are two blocks 7 which are secured to and form a hinge mounting for a container support frame 8 within the main framework. The container support frame carries a number of freely rotatable rollers 9 extending parallel with the hinge mounting of the support frame 8 and arranged to leave a free space 8a in the center of the frame. At the front of the support frame are provided catches 10 which engage with the two front legs 1 of the framework to releasably maintain the container support frame 8 in the loading position as shown, the support frame being pivoted downwards to contact a stop (not shown) to insert and remove a container.

Slidable within slotted guides 11 formed in members 12 secured to the top of the frame are a pair of sliding members 13 interconnected as shown in FIG. 3 by a pivot rod 14. The pivot rod is secured to each of the sliding members 13 and passes through two pivot blocks 15 secured to the underside of a platform 16. The underside of the platform is also provided with runners 17 which engage the front member 3 of the main framework. The upper surface of the platform is provided with two side walls 18 extending in the direction of movement of the platform and which are cut away as shown at 19. Between the two side walls 18 the platform is subdivided by ribs 20 into four channels.

A stop bar 21 is mounted at the rear of the apparatus to slide vertically in slots 22 formed in the members 12, and is biased towards the upper position as shown in FIG. 1 and 3 by springs (not shown). In this upper position the top edge 23 of the stop bar is above the level of the upper surface of the platform 16. Pivotaly secured to each of the members 12 are fingers 24 which are engaged by pegs 25 extending outwardly from each of the sliding members 13 as the platform approaches the stop bar to push the stop bar vertically downwards to the position in which the edge 23 is flush with the upper surface of the platform 16. Also secured to the members 12 is a scraper bar 26 extending across the apparatus in alignment with the inner edge of the front member 3.

Layer supporting means comprises a hollow rectangular column 27, secured to the base member 4, and within which is slidably mounted a ram 28. The column is provided with a slot 29 in which slides a lug 30 secured to the ram 28. A flexible cable 31 is attached at one end to the lug 30 and passes firstly over a freely rotatable pulley 32 mounted on the column 27, and then over a second freely rotatable pulley 33 mounted on a suitable part of the framework (not shown), the other end of the cable being attached to a weight 34 to provide biasing means to bias the ram to the uppermost position.

As shown more clearly in FIG. 2 the rearmost face of the ram 28 is provided with a toothed rack 35.

Mounted on the column 27 is an operating mechanism for adjusting the height of the ram contained within a housing 36 and comprising a pinion gear wheel in driving engagement with the rack 35 and a one way clutch mechanism releasable by means of flexible sheathed sliding cable 37 terminating in a suitable lever control (not shown) mounted on a convenient part of the apparatus. The pinion gear wheel is drivably connected through the clutch to a drive shaft extending beyond an extension 38 of the housing 36 and carrying a toothed wheel 39. The extension 38 of the housing is rotatable relative to the housing 36. Secured to the extension 38 is a housing 40 in which is carried a plunger 41 adapted to engage with the toothed wheel 39. When the extension is rotated in a clockwise direction as shown in FIG. 2, the plunger 41 which is engaged with the toothed wheel 39 causes the toothed wheel to rotate. When the extension 38 moves in an anti-clockwise direction the one-way clutch mechanism prevents the toothed wheel from rotating and the plunger 41 rides back over the teeth of the wheel 39.

An actuating mechanism lug 42, carried on the housing 40, and to which one end of a rod 43 is pivotally connected. The other end of the rod 43 is pivotally connected to a lever 44 pivotally mounted on the base 4 and connected to another lever 45 which forms a foot pedal. An adjustable stop 46 is provided to limit the movement of the foot pedal and a return spring 47 returns the pedal to a position in contact with a second adjustable stop (not shown).

Releasably located on the top of the ram 28 by means of spigot 48 adapted to fit within a recess in the ram is a support plate 49 (not shown in FIG. 1). The support plate is of a size slightly less than the inner dimensions of the container to be loaded and is provided with a handle 50 for convenience in handling.

As shown in FIGS. 5 to 7, the apparatus is arranged to receive apples from an inclined surface 51 to which apples are fed in any convenient manner. As shown in FIG. 5, a container 52 formed from a one-piece blank of board material and having flaps foldable from the side walls to close the top and bottom of the container is supported on the rollers of the container support frame. The support frame is located in the horizontal position by the catches 10, the top rim 53 of the open container lying in substantially the same plane as the top of the members 2 and 3 of the framework so that the members 2, 3 and the stop bar 21 maintain the top flaps of the container folded down towards the side walls of the container during the loading operation. The bottom flap 54 of the container which is folded from side wall 55 of the container at the front of the apparatus is not folded over to the closed position. The bottom flaps folded from the other side walls are folded to the closed position, the flaps being of such sizes as to leave a gap between one another as shown in FIG. 4 through which the ram 28 can pass. The unclosed flap 54 also leaves a slot 56 between the side wall 55 and the other bottom flaps which can be secured in the closed position before loading or they can all be secured in the closed position together with the flap 54, after loading.

As shown in FIG. 5 the ram 28 has passed through the gap between the bottom flaps of the container by releasing the clutch to allow the weight 34 to fall and thereby raise the ram to its uppermost position. With

the platform 16 in the position shown in FIG. 7 the support plate 49 has been located on top of the ram and an assembly of intersecting dividers 57 placed on the support plate. The uppermost position of the ram is arranged so that the top edges of the dividers is flush with the top rim 53 of the container. The dividers 57 form a number of compartments 58 each of a size suitable to receive a single apple.

The platform 16 is moved to the position as shown in FIG. 5 in which position it covers the open top of the container 52. In this position the pegs 25 have pushed down the fingers 24 so that the top edge 23 of the stop bar 21 is flush with the top of the platform. This has allowed apples to roll down the inclined surface 51 onto the platform and, with little manual assistance, fill the four channels on the platform between the ribs 20 and the side walls 18. The apples are prevented from leaving the opposite end of the platform by the scraper bar 26.

When the channels are filled as required the platform 16 is moved forwards as shown in FIG. 6 away from the stop bar 21. As the pegs 25 leave the fingers 24 the stop bar is released and rises up to stop apples rolling from the inclined surface 51 directly into the container 52. At the same time the apples on the platform are prevented from moving with the platform by the scraper bar 26 and consequently drop from the trailing edge of the platform, each into separate compartments 58.

When all the apples have dropped from the platform the platform is in a forward position in which it can be pivoted downwards about the pivot rod 14 so as to lie as shown in FIG. 7 against the front of the apparatus to facilitate access to the top of the container. The corners of the side wall 18 of the platform are relieved at 19 to clear the scraper bar 26 as the platform is pivoted in this manner; the sliding members 13 are still in engagement with the slots 11 in the members 12 which thereby support the platform in the position shown.

FIG. 7 shows the first layer of apples lowered by a distance equal to the height of the next layer by actuating the foot pedal 45 until it contacts the stop 46 to cause housing 40 to rotate in the clockwise direction, the plunger 41 effecting movement of the toothed wheel 39 to cause the operating mechanism to lower the ram.

A layer divider 59 has been inserted onto the assembly of intersecting dividers 56 and a further assembly of dividers will be inserted into the container whilst the platform is in the position shown in FIG. 7 before the platform is returned to the position shown in FIG. 5 to commence loading the next layer.

To load the last layer of apples the ram is lowered clear of the container 52 so that the support plate 49 forms a false bottom to the container. When the container is loaded the platform 16 is returned to the position shown in FIG. 5 and, in order to avoid the support plate remaining with the loaded container, the support plate 49 is removed by gripping the handle 50 and pulling the support plate forward to slide it from the container through the slot 56 left by not closing the bottom flap 54. The container support frame is lowered

by releasing the catches 10 so that the loaded container can roll out from the apparatus on the rollers 9. A suitable conveyor or the like can be arranged to receive the loaded containers and convey them away to a position in which the container can be closed. An empty container can then be inserted onto the rollers 9 and the support frame raised and locked in the horizontal position by the catches 10. The ram is raised to the uppermost position by releasing the clutch in the operating mechanism to enable the weight 34 to fall and thereby raise the ram.

FIG. 8 shows partly in section an alternative form of container comprising a sleeve 60 surrounding a number of shallow trays 61 which form layer dividers between the different layers. The apples are loaded into the shallow trays each divided into compartments by an assembly of dividers 62, the dividers supporting the tray above to minimize damage to the fruit. The uppermost layer of fruit is covered by an upturned tray 63. This loaded assembly can be secured by adhesive tape or by shrink wrapping in well known manner.

To load a container as shown in FIG. 8 the sleeve 60 is inserted onto the rollers 9 either from the front of the apparatus or down from the top of the apparatus. The ram 28 is raised to bring the support plate 49 to the uppermost position and the first shallow tray 61 and assembly of dividers 62 placed on the support plate. The articles are loaded as before, the support plate being lowered to contact the rollers 9 for loading the uppermost layer of articles. With the support plate in this position the loaded container can be removed without having to remove the support plate in order to avoid the support plate remaining with the loaded container.

Whilst the invention has been particularly described with reference to packing apples it will be apparent that the invention provides a method and apparatus which facilitates the packing of many articles. It will also be clear to one skilled in the art that the apparatus can be readily provided with the necessary adjustments so that containers of various sizes can be loaded with layers of any number of articles in any number of layers.

I claim:

1. A method of loading a container with a plurality of articles arranged in separate layers, each layer being separated from adjacent layers by a horizontal layer divider, comprising the steps of positioning the container adjacent the under side of a platform, arranging, in turn, the articles required for each layer on the platform, inserting an assembly of intersecting dividers into the container at each layer, moving the platform in a direction to expose the container whilst preventing movement of the articles in said direction to cause the articles to drop from the platform into the container, inserting a layer divider between adjacent layers on the intersecting dividers, supporting the articles of each layer at a distance below the platform substantially that of the height of the layer as they drop into the container by means of said intersecting dividers and layer dividers, and moving the contents downwards in increments as each layer is loaded into the container so that each layer of articles drops from the platform a distance substantially equal to the height of the layer.

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