June 13, 1950 G. E. HUBE ET AL 2,511,266

APPARATUS FOR HANDLING CONTAINERS

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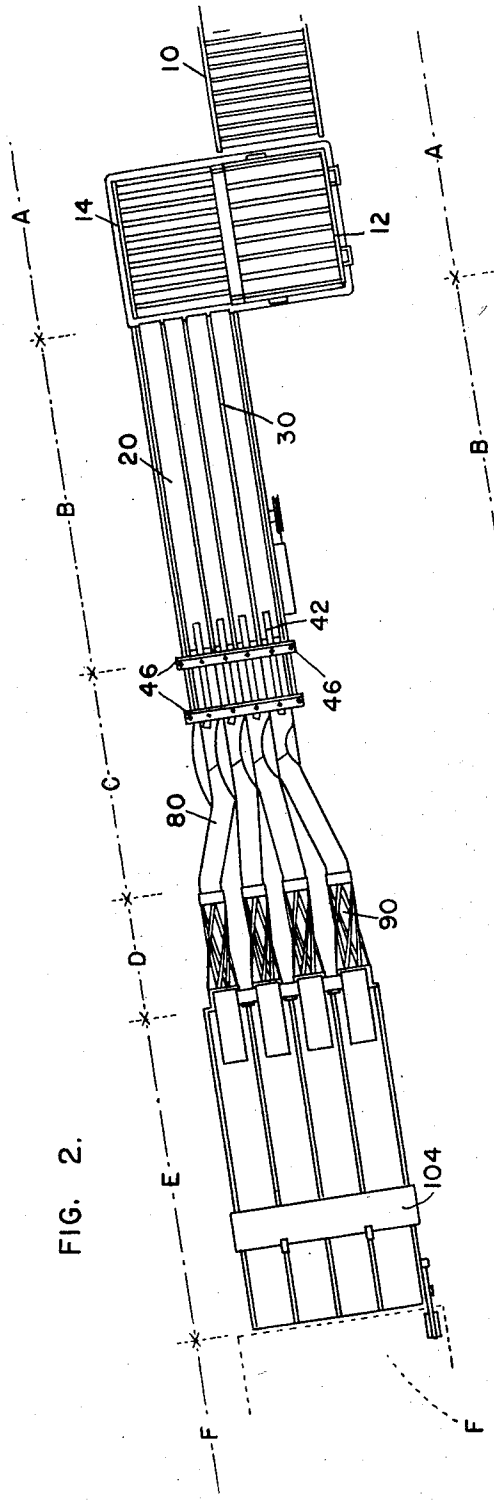


FIG. 2.

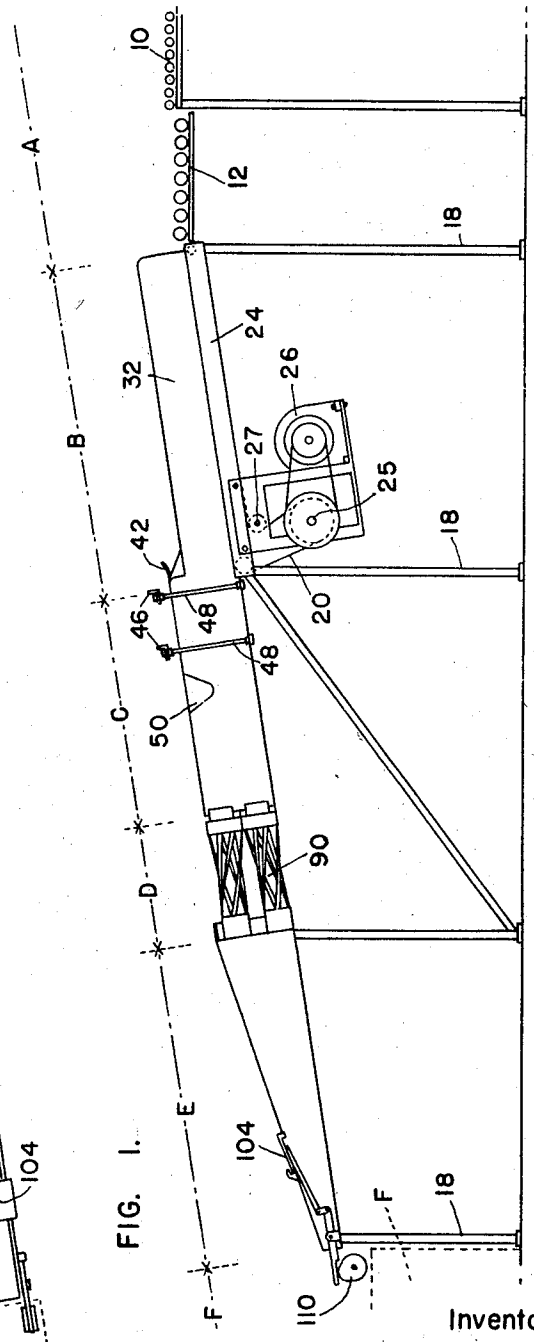


FIG. 1.

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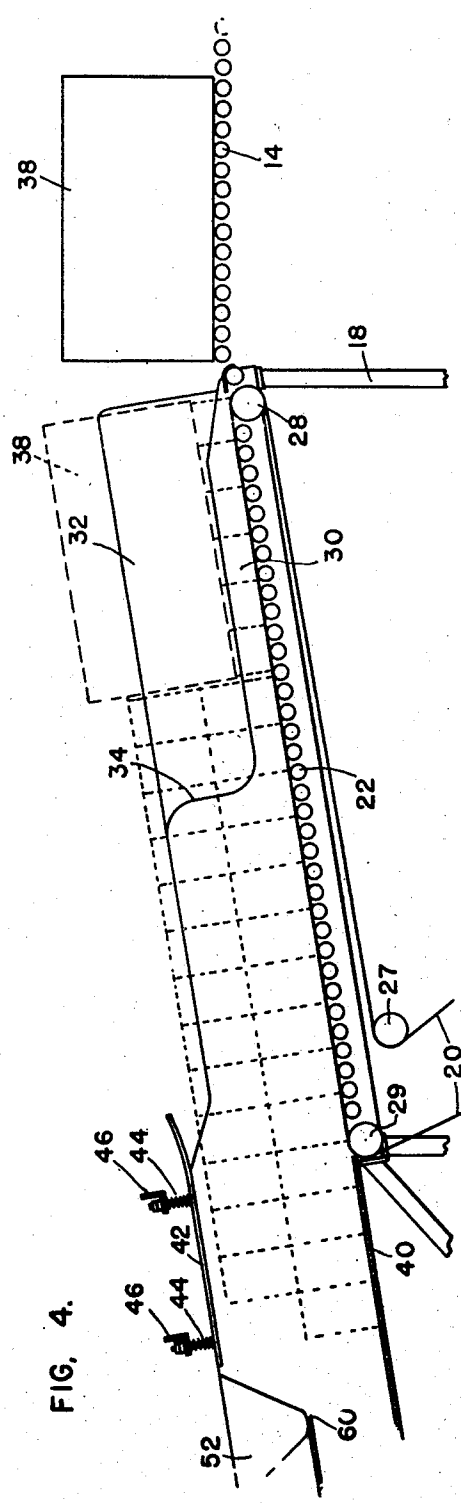


FIG. 4.

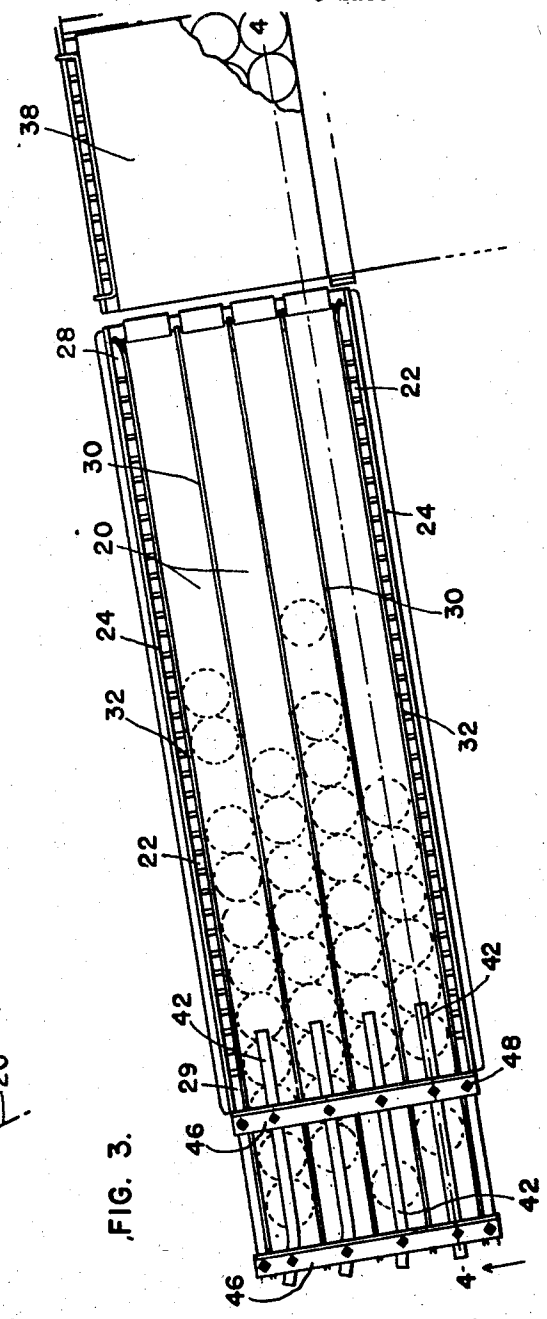


FIG. 3.

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APPARATUS FOR HANDLING CONTAINERS

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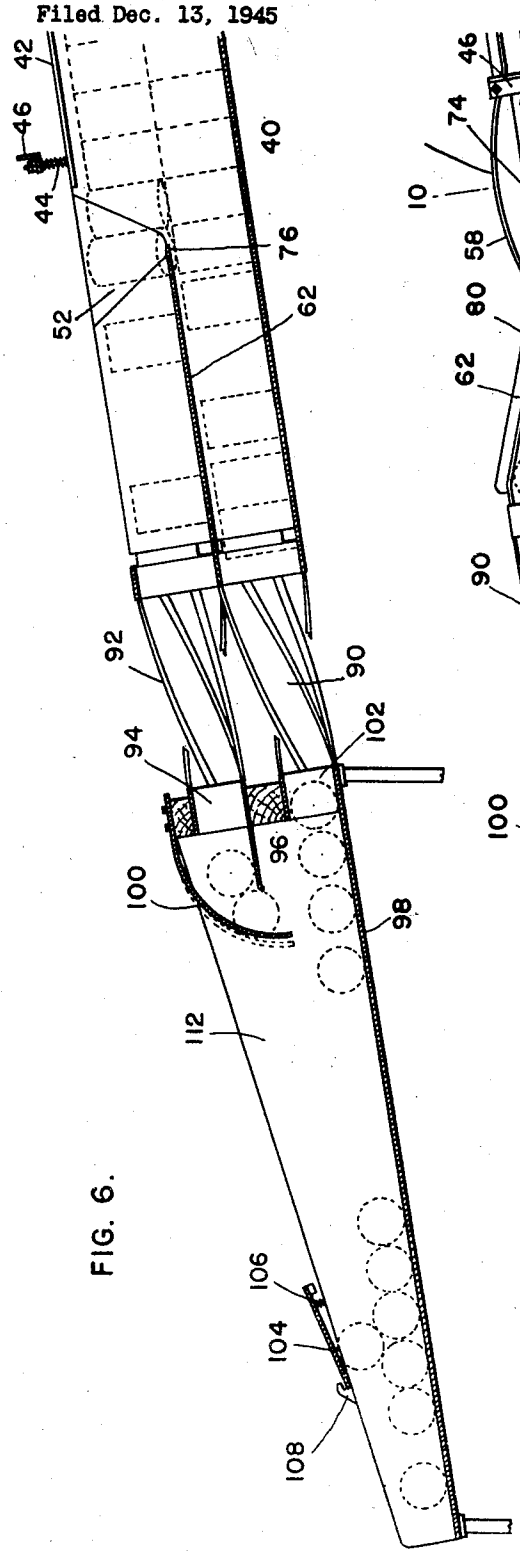


FIG. 6.

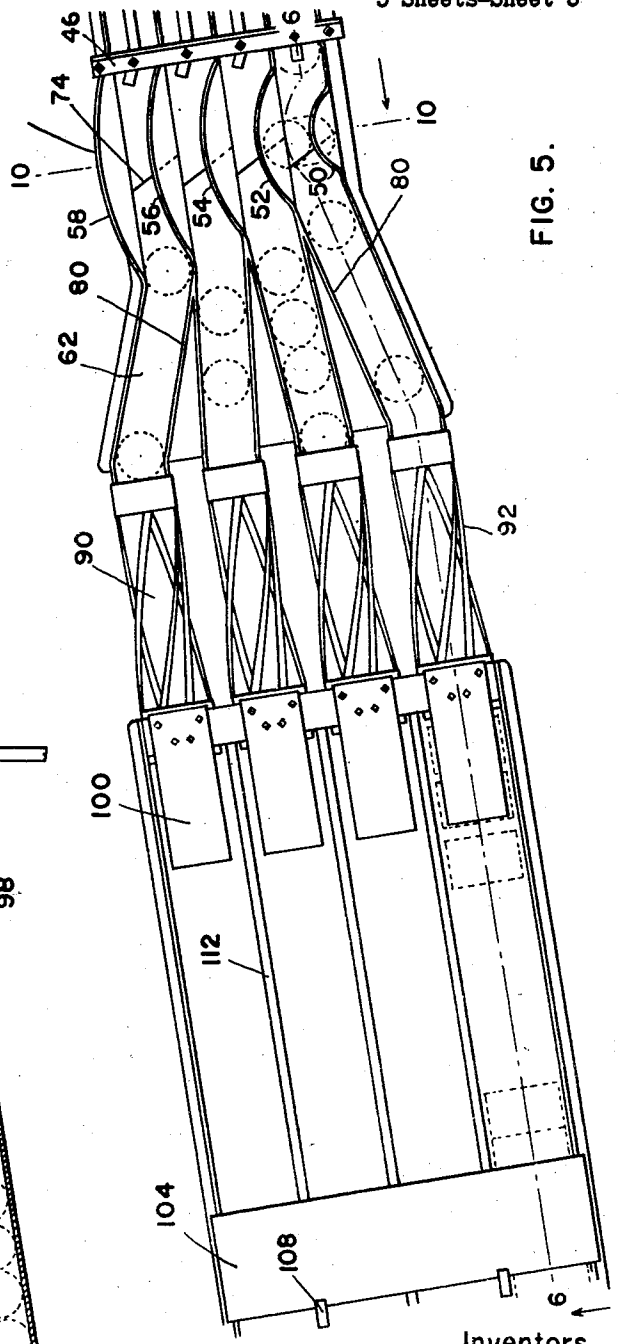


FIG. 5.

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APPARATUS FOR HANDLING CONTAINERS

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FIG. 7.

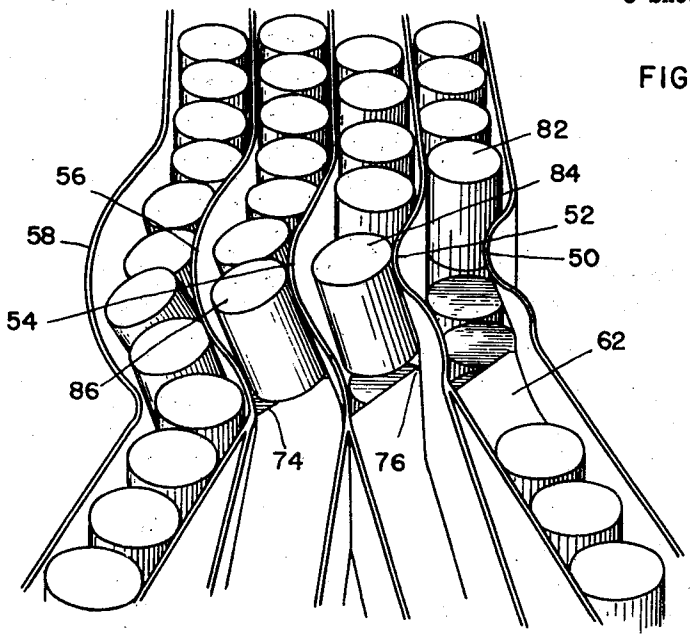


FIG. 8.

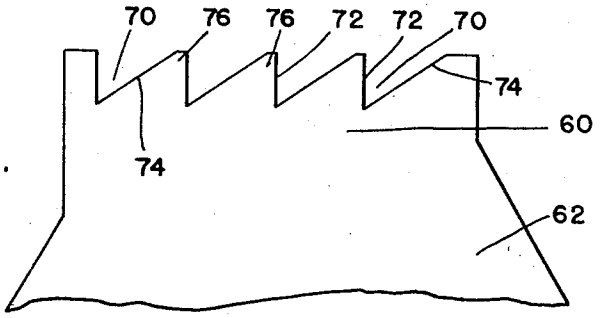




FIG. 9

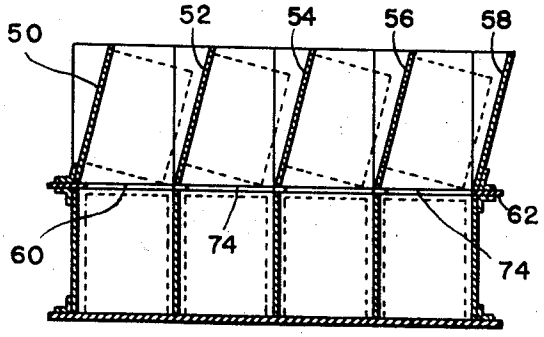


FIG. 10.

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FIG. 11.

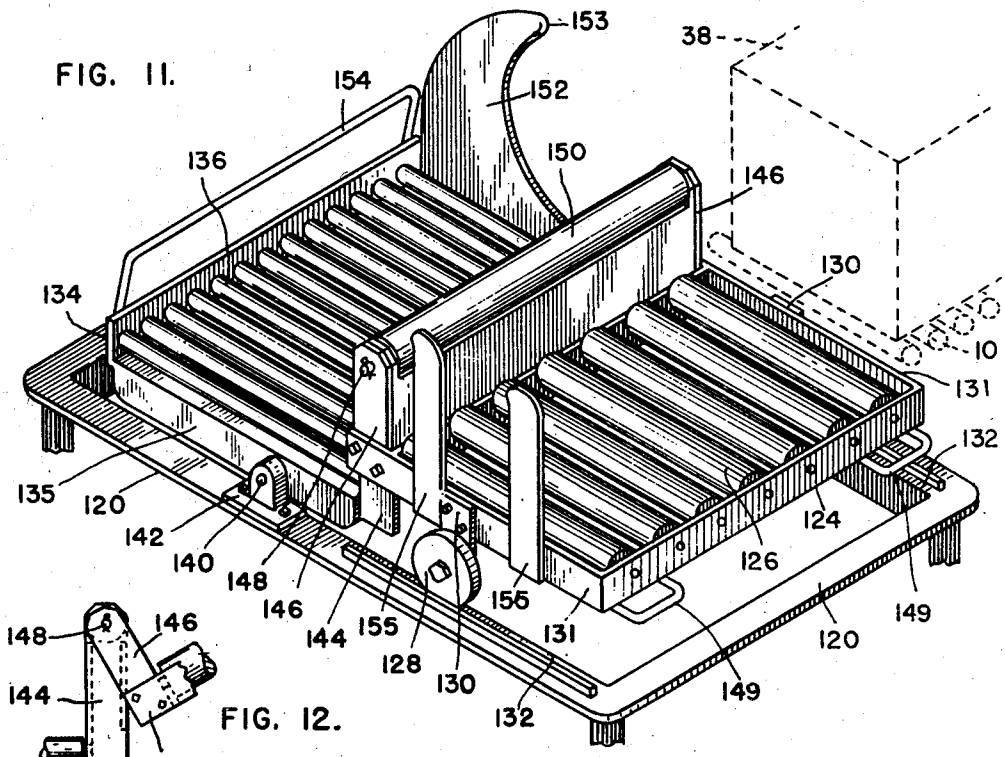


FIG. 12.

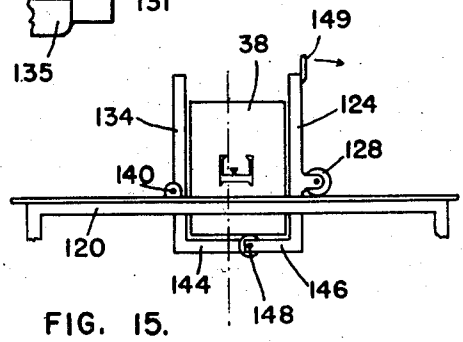


FIG. 15.

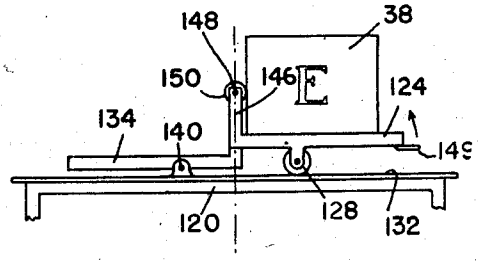


FIG. 13.

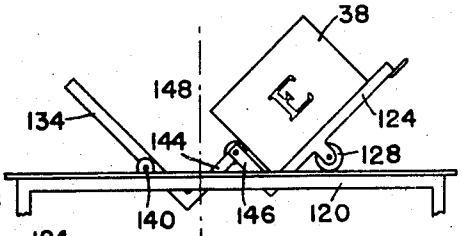


FIG. 14.

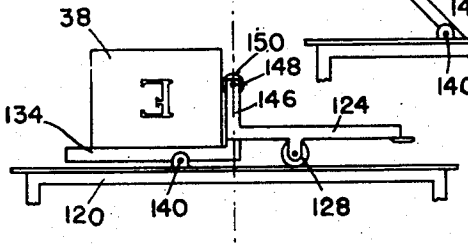


FIG. 16.

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UNITED STATES PATENT OFFICE

2,511,266

APPARATUS FOR HANDLING CONTAINERS

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Application December 13, 1945, Serial No. 634,784

8 Claims. (Cl. 198—29)

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The present invention relates to methods and apparatus for handling and deploying containers such as cans of food and the like for further treatment of the containers. The invention is in the form of an assembly of mechanisms which receives the containers packaged in cartons, removes the containers from the cartons, and then conveys them to the apparatus for further treatment of the containers. The apparatus for further treatment referred to may be a machine for painting or for labeling the containers, or for any other treatment which may require the containers to be handled individually. The construction of the machine or apparatus is such that minimum attendance of an operator is required, nearly all of the steps of the method being automatically accomplished.

Fibre cartons and ordinary cylindrical tin cans are used herein to illustrate the methods and operation of the machine. It will be apparent, however, that the invention is applicable to individual containers other than tin cans and to packages other than fibre cartons, specific changes being contemplated to suit the material being handled. While the machine is designed to handle cartons of 48 one pound cans, enlargement or reduction of the mechanism will permit handling containers of greater capacity, or cartons having more or less than 48 cans.

After containers have been packaged into cartons, for instance, in stacked relation comprising rows of containers having more than one tier, with the containers of an upper tier supported on the containers of a lower tier, it may be necessary to remove the containers from the cartons and to deploy them in such a manner as to conveniently present them individually to a painting machine, labeling machine, or the like.

Obviously, it would be extremely difficult and time consuming to perform the above operations by hand, and we have evolved methods and designed the machine described herein to accomplish these operations mechanically, and with a minimum of individual or collective manipulation of the containers by hand. In general, the method comprises feeding the cartons to the machine with the stacked containers therein in upright position, opening the tops of the cartons prior to, or as they approach the machine, mechanically inverting the cartons to stack the containers on a table, moving the containers on a suitable conveyor while separating the containers into rows of more than one tier, separating the containers of upper tiers from those of lower tiers to form individual lines, thereafter twisting the individual containers from upright to horizontal position and then individually rolling the containers through a further portion of their path of movement to the machine where they are individually treated as by painting and labeling. By reason of the methods and apparatus which we have developed, it is economically practical to treat great quantities of containers which have already been packaged in cartons, boxes, or the like, and after treatment they may be again assembled in cartons or boxes and marketed.

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In the drawings, which illustrate a preferred embodiment of the invention, and which are not intended to restrict the same to any precise form:

Figure 1 is a side elevational view of the complete machine.

Figure 2 is a top plan view of the complete machine.

Figure 3 is a top plan view of the upper or initial half of the machine.

Figure 4 is a vertical sectional view of the upper part of the machine taken along the line 4—4 of Figure 3.

Figure 5 is a top plan view of the lower or final half of the machine.

Figure 6 is a sectional view of the final half of the machine, taken along the line 6—6 of Figure 5.

Figure 7 is an isometric view of the can-tilting portion of the conveyor.

Figure 8 is a plan view of the plate which forms the platform for the upper tiers of containers.

Figure 9 is an edge view of the plate shown in Figure 8.

Figure 10 is a vertical sectional view along the line 10—10 of Figure 7 looking in the direction of the arrows.

Figure 11 is an isometric view of the carton transfer and inverting apparatus.

Figure 12 is a detail view of the manner in which the connecting legs of the receiving and discharge cradles of the carton transfer and inverting device are pivoted.

Figures 13 through 16 are diagrammatic views showing the operation of the carton transfer and inverting apparatus.

Figures 1 and 2 illustrate substantially the entire operation of the machine. A suitable conveyor 10 brings the cartons to a transfer and inverting station A. While the cartons are being conveyed to station A, the tops of the cartons may be opened and the top flaps folded aside in any suitable manner. The conveyor 10 may be

intermittently or continuously power operated in any well-known manner. The terminal end of the conveyor 10 delivers to the first or receiving table 12 of the carton transfer and inverting mechanism, the construction and operation of which are illustrated in Figures 11 through 16 inclusive. At the station A, and in a manner hereinafter described, the cartons are inverted onto a second or discharge table 14, and are stacked thereon in several rows, depending on the size of the cartons, each row comprising containers in upper and lower tiers, the containers being in upright position and stacked one upon another in the usual manner in which they are found in conventional cartons.

From the table 14, the containers are moved onto a plurality of runways of the conveyor B, either by hand or by suitable mechanism, the conveyor comprising the usual endless belt arrangement, there being a belt for each row of containers received from the table 14. The conveyor B may be operated by suitable continuous or intermittently operated power mechanism. In this conveyor, means are provided to separate the rows of containers having more than one tier, as they are conveyed toward station C.

At station C, means are provided to separate the upper tiers of containers from their lower tiers, thus further deploying the containers into individual lines. The lines of containers are thereafter moved to a station D where, by conventional means, the individual containers are turned or twisted from upright to horizontal rolling position, and they thereafter drop into a final conveyor section E through which they roll to the discharge end of the apparatus. At the discharge end, the containers finally enter a machine F which may be of conventional form for the further treatment which is to be performed.

More specifically, the containers may arrive on the conveyor 10 in cartons having four longitudinal rows of containers, each row comprising two tiers, the respective containers of the upper tier being positioned on those of the lower tier in upright relation. At the station A, the cartons of containers are inverted, the containers of the carton being stacked on the table 14 in the same manner as described above, that is, in four rows of two tiers each. From station A, the whole bulk of the containers of a carton are moved onto the conveyor B, and as this conveyor consists of four belts with suitable separating walls, the containers are definitely separated into four individual rows. At station C and by means hereinafter described, the upper tiers are separated from the lower tiers, thus forming eight separate lines of containers. The containers of the eight lines are twisted in the well-known manner at station D and they then roll into the final conveyor section E where they are reformed into four lines of containers rolling on their horizontal axes. The containers are dropped or fed into the painting or other treating machine individually and in four lines.

While we have illustrated a machine designed to operate on cartons of containers as described above, it may be made to accommodate cartons containing a greater or lesser number of containers, or containers arranged in the cartons in a different manner from that described.

Referring to Figures 2, 3, and 4, the conveyor B is mounted on suitable supporting standards 18 and comprises four separate belts 20 which are supported in the container runways by freely mounted rollers 22 laterally pivoted between side plate 24 of the structure. As indicated in Figures 1 and 4, the belts 20 are driven from a shaft 25 which is in turn driven by an electric motor 26, the conveyor belts being guided by guide rollers 27, 28, and 29, mounted laterally across the structure, these parts being suitably carried on the frame in any well known manner. The rollers 22 which extend throughout the conveyor path provide rotating support for the conveyor belts. Conventional speed regulating devices may be provided for the conveyor and any switch or the like may be provided to stop and start the conveyor as necessary in order to control the speed and movement of the containers.

As illustrated in Figure 4, each container path is separated initially by longitudinal plates 30, and there are side wall plates 32 on each side of the conveyor. These plates define between them respectively the paths or channels of movement of the rows of containers and provide definite separation between the rows. Intermediate the working length of the conveyor belts 20, the separating plates 30 increase in height as at 34, extending upwardly to the height of the side walls 32, so that definite separation is provided between the containers of upper tiers of adjacent rows as well as between those of lower tiers.

After containers of a carton have been inverted at station A they are stacked on the roller table 14 as shown in Figure 3 with the inverted carton covering them. When sufficient space is clear at the initial end of the conveyor B, an attendant moves the box 38 covering the containers to the left as viewed in Figure 4 from its full to its dotted line position, at the same time lifting the box slightly over the plates 30. The plates 30 pass between the four longitudinal rows of containers in the cartons. When the inverted carton with its containers has been moved onto the conveyor up against the last of the containers already in movement on the conveyor, the carton is removed and the rows of the containers move on with the conveyor.

When the containers reach the point where the plate 30 increases in height as at 34, a spacer or separator is provided not only between the containers of the lower tiers but also between those of upper tiers.

It will be noted from Figures 1 and 4 that the conveyor is suitably inclined, and beyond the guide roller 29 (Figure 4) the conveyor takes the form of a simple bottom plate 40, with the side and separating plates continuing to define each channel of movement. The movement of the containers hereafter is by gravity along the incline and by pressure of following containers as moved by the belts of the initial stage of the conveyor. The belts transfer the double tiers of containers onto the inclined plate 40 and their movement is thereafter caused by the gravity action of the incline as well as the pressure of succeeding containers. However, it would be possible to continue the conveyor belt throughout the further stages of the machine. As the stacked containers pass onto the inclined bottom plate 40, any tendency they may have to creep upwardly is restrained by retainer plates 42 having upwardly curved forward ends and which are pressed downwardly by springs 44 carried between the retainers and cross bracket members 46 which are suitably secured across the frame of the machine, there being a spring pressed retainer 42 mounted above each row of containers as shown in Figure 3. The cross brackets 46 are rigidly carried between upright rods 48

rigidly secured to the frame of the machine outside of the side walls **32** of the conveyor as shown in Figure 1. The cross brackets **46** are rigidly bolted to and between opposite rods **48**, and there are short rods attached to each retainer plate **42** which extend upwardly and are bolted for yielding movement through the lower flanges of the brackets **46**, a spring being carried on each short rod between the bracket and the upper faces of the guide plate **42**.

When the rows of containers in multiple tiers have been caused to move onto the inclined lower supporting plate **40**, it is desired to separate upper from lower tiers in order to further deploy the containers for individual treatment. To accomplish these purposes, we have provided means in the path of the moving containers for vertically separating the tiers of each row into independent lines, this being done by laterally tilting the containers of the upper tiers, and while tilted and still supported by corresponding containers of the lower tiers, forcing them in their movement onto an upper supporting platform which effects the separation.

Referring to Figures 5, 6, 7, and 10, the tilting operation is accomplished by distortion or bending of the side channel walls which define the paths of movement for each of the rows of containers. Referring to Figure 5, the upper portion of the outer wall on the near side of the conveyor is shown bent inwardly as at **50** throughout an arc of relatively small radius. The shape of this indentation is substantially of inverted cone form as shown in Figure 6, the apex of the cone being in a horizontal plane near that which would pass through the bottoms of the containers in the upper tiers. Each of the separating wall between rows of containers is likewise bent as at **52**, **54**, and **56**, and the far wall of the conveyor is similarly bent outwardly as at **58**. Because of the conical form of the indentations, the metal of the walls is displaced to an increasing degree from normal vertical as the upper edge of the wall is approached, as best shown in Figure 10. The arc of the upper edge of each wall respectively, as referred to above, is of greater length than that of the adjacent wall, but the centers of these arcs substantially coincide. For this reason, the distorted paths are of increasing length from the near to the far side of the machine, as viewed in Figure 5. As stated in connection with distortion **50**, the shape of each separating plate and wall where distorted is similar to that of a section of an inverted cone.

With this arrangement, and when the containers move downwardly through their inclined channels, the distortions in the upper portions of their guiding plates cause the containers of the upper tiers to be tilted laterally of their paths of movement, as shown in Figures 7 and 10, and their upwardly tilted bottom sides are forced over the receiving edge **60** of an upper container supporting platform or plate **62**.

Referring to Figure 8, the upper platform is shown comprising a flat plate **62** which is suitably secured to extend entirely across the paths of movement of the rows of containers from one side wall of the apparatus to the other, although the top platform could take the form of separate plates welded between each of the guiding walls **50**, **52**, **54**, **56**, and **58**. The upper platform plate at its engaging edge **60** is provided with cut-away portions **70** (Figure 8) corresponding in number to the number of rows of containers accommodated by the conveyor, the deepest side **72** of each cut-away portion being on a side of a channel toward which the containers are tilted, and being substantially at right angles to the edge **60**. The other side of each cut-away portion is angular as at **74** to present an engaging edge to the tilted containers which approaches being at right angles to the direction of their movement at the time they are forced up onto the upper platform. By reason of this construction, the upper platform may be said to present extending tongue portions **76** which are adapted to engage beneath the tilted side of a container as it is forced onto the platform, thus facilitating the passage of the container up onto the upper platform **62** over the edge **74**.

As illustrated in Figure 5, when the containers have passed through stage C, the side walls of the channels which define the paths of movement of the rows of the containers diverge outwardly as at **80**. The lower tiers of containers move through lower inclined channels while the upper tiers of containers pass along in their upper inclined channels. The provision of the upper supporting platform as a unitary plate extending across all four channels is a matter of constructional convenience, and specific details of its arrangement are not necessary.

In Figure 7, certain of the containers have been removed to more clearly illustrate the operation of the apparatus in tilting the containers and moving them on to their upper platforms. In the left-hand channel illustrated, all of the containers of both tiers are in place, while in the other channels certain containers of the upper tiers have been omitted for illustrative purposes. In the right-hand channel, a container **82** is shown approaching the distorted part of the channel, and the containers which would be normally ahead of **82** have been omitted to show how the containers in the bottom tier pass under the upper supporting plate **62**. In the second channel from the left, the container **84** is shown at a further stage of its movement, same having passed between the distorted portions **52** and **54** of the upper guide plate. It will be noted that this container has not been tilted sufficiently to rest against wall **54**, its center of gravity still urging it toward upright position while it is kept tilted by wall portion **52**. The container **84** is tilted from its upright position while still resting on the corresponding container below it in the lower tier, and its right hand upwardly tilted lower edge (Figure 7) is positioned so as to pass above the extending tongue **76** of that portion of the upper platform which is within this channel. When free of the influence of the distorted wall **52**, the tendency of the container **84** will be to right itself and in so doing to move up onto the upper platform **62**. In the third channel from the right a further stage of progress is illustrated wherein the right-hand or tilted bottom edge of the container **86** has already moved up onto the receiving edge of that portion of the upper platform between the channel walls **54** and **56**.

Referring again to Figure 7, it will be understood that the action of the tilted containers, when free of the influence of the distorted wall **52** and upon returning to their upright positions as they move forwardly, will be to roll over the edge **74** of the receiving platform on their curved forward portions of their bottom edges, said containers being guided in this rolling action by the return bend in the side wall defining their path of movement opposite to the distorted wall **52**.

Referring to Figure 6, it will be observed that

the four rows of containers have now been vertically separated into independent lines so that there are now eight lines of containers moving toward the treating apparatus. As shown in Figures 6 and 7, there is in each line a conventional can-twisting device 90 comprising generally spirally disposed bars or slats 92 which cause the containers in their movement therethrough, to be changed from substantially upright position to substantially horizontal position with their axes extending laterally across the overall path of movement of the containers. The terminal end of the twisting device joins with a further gravity conveyor which leads to the treating machine. There are four openings 94 in the entrance end of the final conveyor section to receive the ends of each of the twisting devices for the four upper lines of the containers. At these openings, the containers roll along a short plate 96 and drop off of the final edge thereof onto the floor 98 of the final conveyor section, there being metal spring members 100 which guide the containers from the upper lines downwardly to join those of the lower lines. Similarly, the lower twisting devices lead to four openings 102 respectively below openings 94 and through which the lower lines of containers roll directly onto the floor 98 of the final conveyor mechanism. By this arrangement, upper and lower lines of rolling containers are joined together into the same rolling line which passes toward the treating machine.

Adjacent the outlet end of the final conveyor mechanism, there is an oscillating top plate 104 of any convenient construction which is biased downwardly by a suitable spring 106 attached to the frame of the apparatus, the forward end of the plate 104 being suitably pivoted as at 108. By means of a lever mechanism shown in Figure 1, which is operated by a cam 110 rotated by power taken from the treating apparatus, the spring-held plate 104 is reciprocated about its pivot 108 to force any containers which may be riding in a double bank downwardly onto the floor 98 of this section of the conveyor in order that they may pass uniformly to the final end of the conveyor section. As shown in Figure 5, the final conveyor section is composed of four channels separated by suitable longitudinal walls 112, the containers rolling out of each channel in single lines.

The container transfer and inverting mechanism at station A (Figure 2) is shown in detail in Figures 11 through 16. The device itself is shown in Figure 11, while Figures 13 through 16 are diagrammatic illustrations of its manner of operation.

The transfer and inverting device is mounted on a rectangular supporting open frame 120 having side and end members as shown in Figure 11, and it comprises receiving and discharge cradles which are adapted to be tilted toward and from one another to accomplish the transfer and inversion of a carton. The receiving cradle is shown on the right in Figure 11, including a rectangular frame 124 which constitutes a base or platform together with the freely movable rollers 126 mounted between the end members of the frame. The cartons with their open ends presented upwardly are fed onto the platform from the conveyor 10. The receiving cradle rests on the frame 120 by means of wheels 128 which are pivoted to brackets 130 depending from opposite side members 131 of the frame 124, these wheels being adapted to ride in trackways 132 extending longitudinally along the frame 120 as later described. The platform formed by the frame 124 and rollers 126 is one leg of the transfer device, and it is normally in the horizontal position of Figure 11. The pivot wheels 128 are mounted on the side frame members 131 closer to their inner than to their outer ends, to insure stability of a carton when received on the cradle platform.

The discharge cradle is shown at the left in Figure 11, and it likewise includes a rectangular frame 134 carrying freely movable rollers 136 and forming therewith the discharge base or platform. This platform is pivoted intermediate the ends of its side members 135 as at 140 to a fixed bracket 142 attached to the frame member 120, and it comprises the other leg of the carton transfer and inverting device. It is also normally in the horizontal position of Figure 11. The fixed pivot 140 is closer to the inner than to the outer ends of side frame members 135 to insure the stability of a carton when on the platform.

The inner end of the frame of the discharge platform carries normally vertically disposed connecting members 144 at each side thereof as best shown in Figure 12, while the frame member 131 of the receiving cradle also has opposite upwardly extending inner end connecting members 146 which normally lie along the outside of the members 144 and in substantially the same vertical plane laterally of the direction of transfer. The upper ends of the members 144 and 146 are pivoted together as at 148, and around their pivot is a free roller 150 which assists in the easy transfer of the carton from one cradle to the other. The upright members 144 and 146 constitute the connecting legs of the receiving and discharge cradles, and cause one cradle to tilt the other.

The manner of operation of the transfer mechanism is shown in Figures 13 through 16. In Figure 13, the carton is shown as it is received on the rollers 126, and it will be noted that the leg 146 is of such length and rollers 128 are of sufficient diameter so that the lower edge of the carton is at an elevation above the discharge platform 134. The carton having arrived at the transfer point, the combined transfer and inverting operation is manually controlled by an attendant pulling outwardly on handles 149 and giving them a slight upward tilting movement around the pivot rollers 128. These movements cause the rollers 128 to move to the right along tracks 132 as viewed in Figure 13, and the separation of pivot point 128 from pivot point 140 permits downward movement of the upper pivot 148. When pivot 148 starts to move downwardly (Figure 14), the weight of the carton is exerted on the roller 150 which extends around the pivot 148, and thus the downward movement of the pivot 148 is accelerated and the operator is assisted in the transfer of the carton by the weight of the carton itself. When the device has completely collapsed as shown in Figure 15, the upper pivot 148 is a substantial distance below the frame 120 and pivots 128 and 140, and the platforms 124 and 134 of the cradles are in a substantially vertical position, whereas the connecting legs 144 and 146 are in substantially horizontal position below the frame 120. In this position, legs 144 and 146 form with the roller 150, the lower support for the end of the carton. It will be evident that the members 124, 134, 144 and 146 move downwardly around their pivots between the side rails of the frame 120.

When a carton has reached the position shown in Figure 15, the operations described above are reversed to invert it onto the discharge platform 134. To accomplish this reverse operation, the attendant pulls outwardly on handles 149 as viewed in Figure 15, at the same time exerting a downward pivotal motion around the pivot consttiuted by the rollers 128. As the leg 124 moves outwardly and pivots around its intermediate pivot 128, the pivot 148 and roller 150 are moved upwardly around fixed pivot point 140 until the entire mechanism is above the frame 120 but with the carton inverted in the discharge cradle as shown in Figure 16. During this return operation, and by reason of the fact that the inner leg 144 of the discharge cradle is of greater length than the inner leg 146 of the receiving cradle, the carton will be held on the discharge cradle, as the roller 150 will support the carton to the right of its center line as viewed in Figure 15 thus tilting it to the left as viewed in that figure.

By means of the handle 154, force may be applied to tilt the discharge cradle upwardly and downwardly around its pivot to assist in the operations previously described.

As shown in Figure 11, the discharge cradle may carry a side guard 152 which acts as a barrier to prevent cartons from falling off of the cradle. This guard has a curved end 153 which engages one of the side frame members 131 of the receiving cradle when the cradles are tilted upwardly, and acts as a spacer to prevent the cradles from excessive tilting toward one another. The handle 154 on the discharge cradle may also serve as a barrier for the cartons. The receiving cradle also carries side guards 155 to properly position and retain cartons thereon.

It will be apparent that we have evolved methods and designed apparatus of marked simplicity for handling containers for the purposes described. It will also be evident that various changes may be made in the methods and apparatus without departing from the invention.

We claim:

1. Apparatus for handling lots of superimposed containers which are arranged in upright position one upon another in a row, comprising conveyor means defining a path of movement for the upright containers in a direction substantially parallel to that of the row, said conveyor means having a lower supporting platform on which the containers of a lower tier are carried, an upper supporting platform for an upper tier of containers having a container receiving end in said path of movement, and means adjacent the container receiving end of said platform for successively tilting the containers of the upper tier laterally of said path of movement and during a limited period of such movement, the receiving end of said upper supporting platform having an extending tongue to engage beneath the tilted portions of the containers of the upper tier to effect their transfer to said upper platform when said containers return to their upright positions.

2. Apparatus for handling lots of superimposed containers which are arranged in upright position one upon another in a row, comprising conveyor means defining a path of movement for the upright containers in a direction substantially parallel to that of the row, said conveyor means having a lower supporting platform on which the containers of a lower tier are carried, an upper supporting platform for an upper tier of containers having a container receiving end in said path of movement, and means adjacent the container receiving end of said platform for successively tilting the containers of the upper tier laterally of their direction of movement and during a limited period of such movement to such position that one side edge of the bottom of a container of the upper tier is supported on the top of the corresponding container of the lower tier with the opposite side edge of the bottom of such container spaced from the top of said corresponding container of the lower tier, the receiving end of said upper supporting platform having an edge which is diagonally disposed with respect to the direction of movement of said container whereby to receive the said supported side bottom edges of the containers of the upper tier to effect their transfer to said upper platform when said containers of the upper tier return to their upright positions.

3. Apparatus for handling lots of superimposed containers which are arranged in upright position one upon another in a row, comprising conveyor means defining a path of movement for the upright containers in a direction substantially parallel to that of the row, said conveyor means having a lower supporting platform on which the containers of a lower tier are carried, said conveyor means having deflectors in said path of movement for tilting a container of the upper tier laterally of its direction of movement and for thereafter returning it to its normal upright position, and an upper supporting platform for containers having receiving means which passes between said containers when that of the upper tier is tilted to effect transfer of the container of the upper tier to the upper platform.

4. Conveyor apparatus for a row of superimposed containers stacked one on another, comprising a bottom platform on which the containers of the lower tier move, and side guide plates which define the path of movement of the containers in the upper tier, said guide plates having curved portions positioned to successively engage and tilt the containers of the upper tier laterally of their direction of movement and to thereafter cause their return to upright positions, and an upper supporting platform having means to engage beneath the tilted portions of the containers of the upper tier to effect their transfer to the upper platform as they are returned to upright positions by said guide plates.

5. Apparatus for deploying lots of superimposed containers which are stacked in substantially upright position in rows having upper and lower tiers with the bottoms of the containers of the upper tier resting on the tops of the respective containers of the lower tier, comprising a conveyor providing for bodily moving the containers in a forward direction at substantially right angles to their upright axes, a platform for supporting the containers of the upper tier having an engaging edge positioned in the path of movement of the containers at an elevation just above the tops of the containers of the lower tier, and tilting means located in the path of movement of the containers immediately in advance of the engaging edge of said supporting platform for successively tilting the upper ends of the containers of the upper tier laterally of their path of movement to an angle sufficient to elevate one side bottom edge of said upper tier containers above the engaging edge of said platform as said containers approach and pass

said engaging edge, said tilting means providing for the return of the containers of the upper tier to their upright positions as they pass said engaging edge whereby to transfer and support the containers of the upper tier on said platform.

6. Apparatus for deploying lots of superimposed containers which are stacked in substantially upright position in rows having upper and lower tiers with the bottoms of the containers of the upper tier resting on the tops of the respective containers of the lower tier, comprising a conveyor providing for bodily moving the containers in a forward direction at substantially right angles to their upright axes, a platform for supporting the containers of the upper tier having an engaging edge positioned in the path of movement of the containers at an elevation just above the tops of the containers of the lower tier, and tilting means located in the path of movement of the containers immediately in advance of the engaging edge of said supporting platform for successively tilting the upper ends of the containers of the upper tier laterally of their path of movement to an angle sufficient to elevate one side bottom edge of said upper tier containers above the engaging edge of said platform as said containers approach and pass said engaging edge, and means adjacent the engaging edge of said platform for returning the containers of the upper tier to their upright positions and simultaneously rolling them up onto said platform along the tilted portions of their forward bottom edges.

7. Apparatus for handling lots of superimposed containers which are arranged in upright position one upon another in a row, comprising conveyor means defining a path of movement for the upright containers in a direction substantially parallel to that of the row, said conveyor means having a lower supporting platform on which the containers of a lower tier are carried, an upper supporting platform for an upper tier of containers having a container receiving end in said path of movement, and means adjacent the container receiving end of said platform for tilting the containers of the upper tier laterally of said path of movement and for retaining same in tilted position for a limited period of their

movement, said upper supporting platform having means at the receiving end thereof to engage beneath the tilted portions of the containers during said limited period of movement to separate them from the containers of the lower tier.

8. Apparatus for handling lots of superimposed containers which are arranged in upright position one upon another in a row, comprising conveyor means defining a path of movement for the upright containers in a direction substantially parallel to that of the row, said conveyor means having a lower supporting platform on which the containers of a lower tier are carried, and an upper supporting platform for an upper tier of containers having a container receiving end in said path of movement, said conveyor means having side walls throughout a portion of its length to guide and support the stacked containers, said walls having means adjacent the container receiving end of said platform for tilting containers of an upper tier laterally of their path of movement and for retaining same in tilted position for a limited period of their movement, said receiving end of said upper platform being positioned to receive the tilted containers to separate them from the containers of the lower tier.

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