April 16, 1968 B. J. NIGRELLI ET AL 3,377,774

CASE LOADER FOR MULTIPLE ARTICLES

Filed July 19, 1965 4 Sheets-Sheet 1

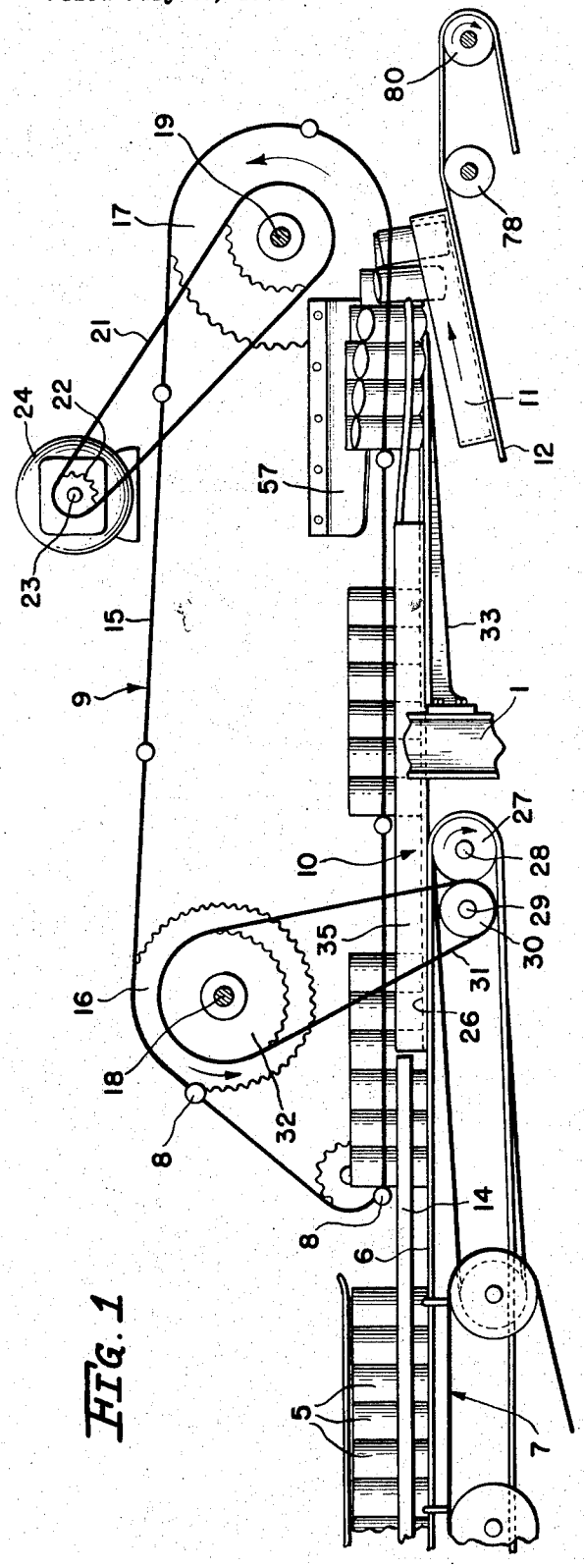


FIG. 1

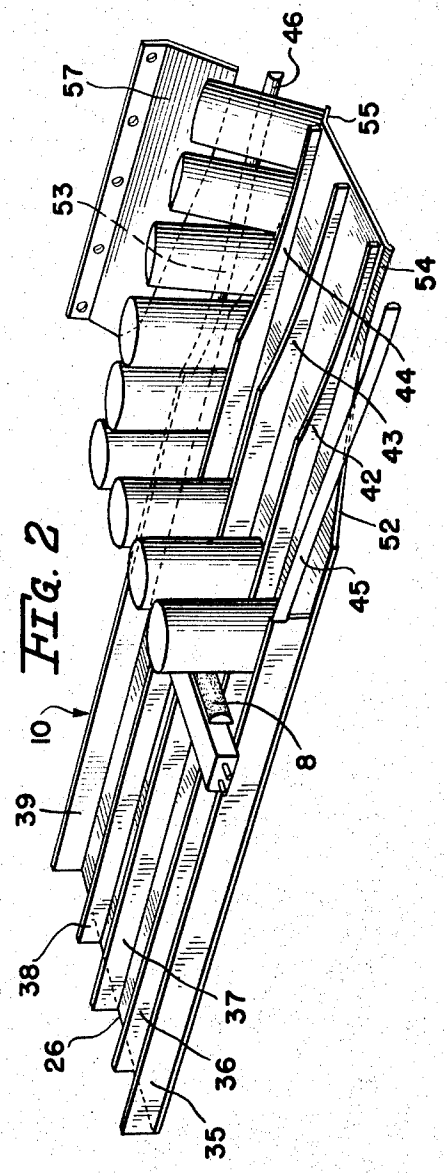


FIG. 2

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CASE LOADER FOR MULTIPLE ARTICLES

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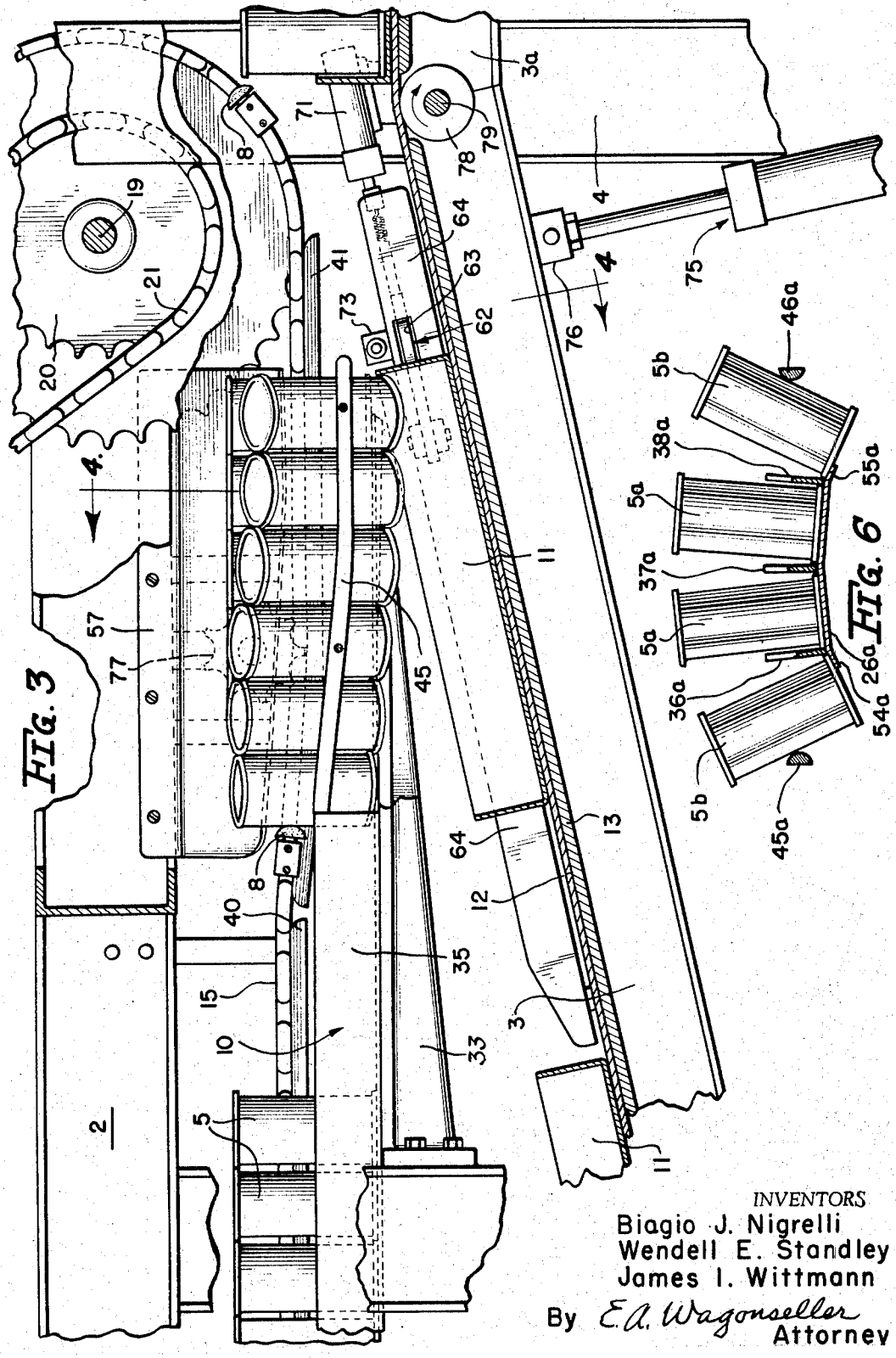


FIG. 3

FIG. 6

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CASE LOADER FOR MULTIPLE ARTICLES

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FIG. 4

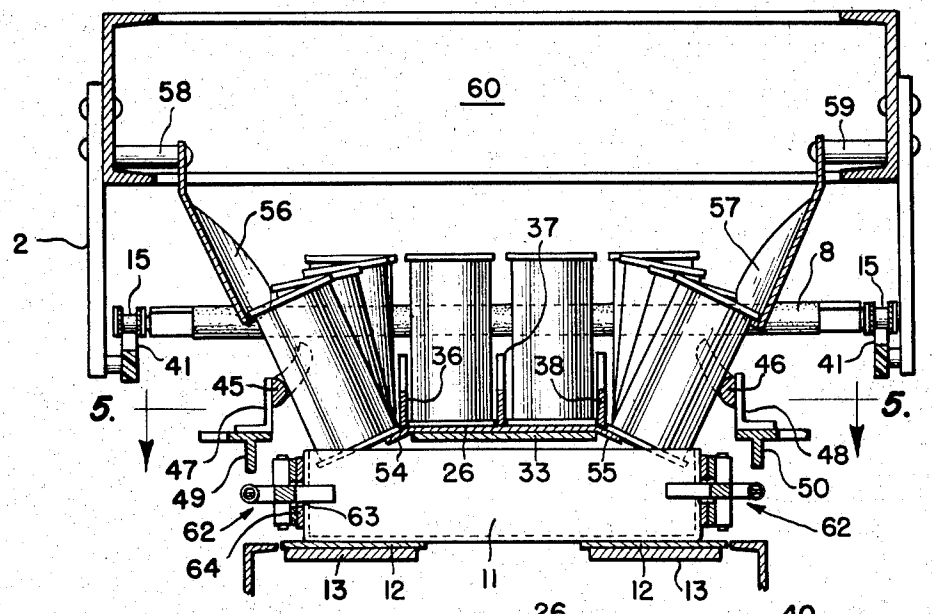
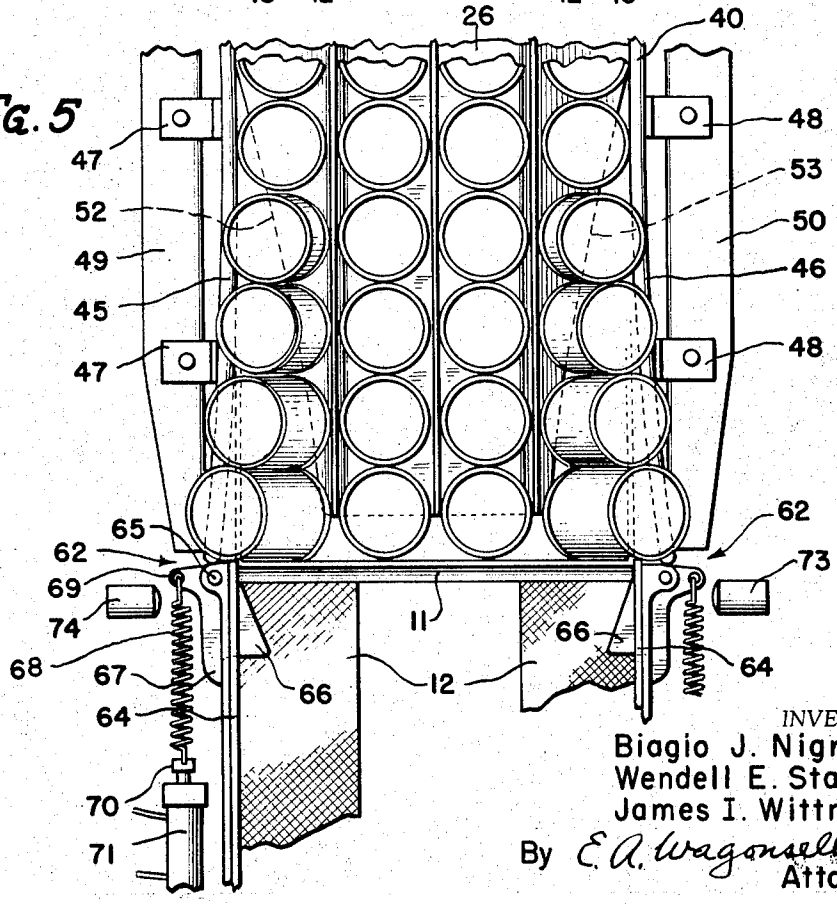


FIG. 5



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CASE LOADER FOR MULTIPLE ARTICLES

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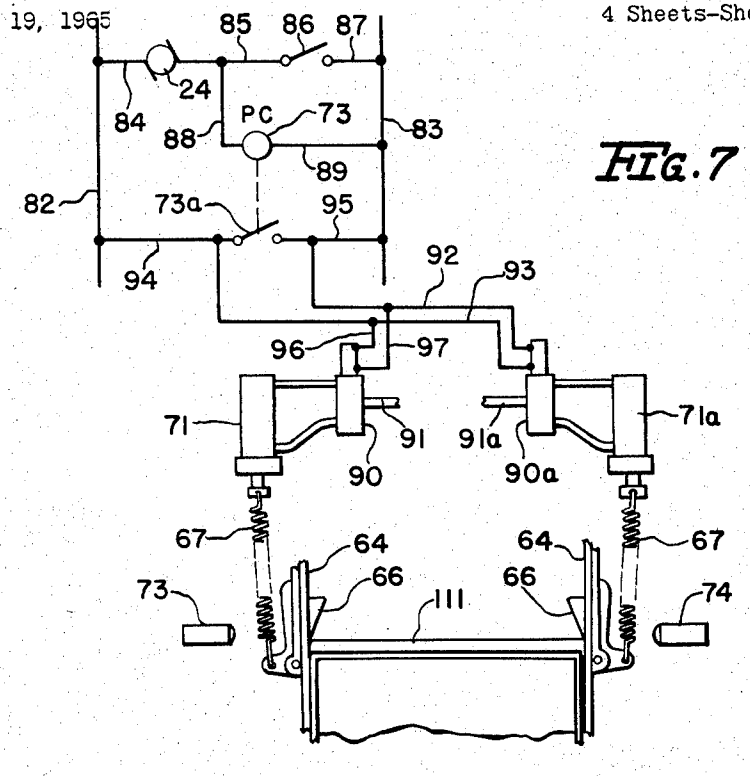
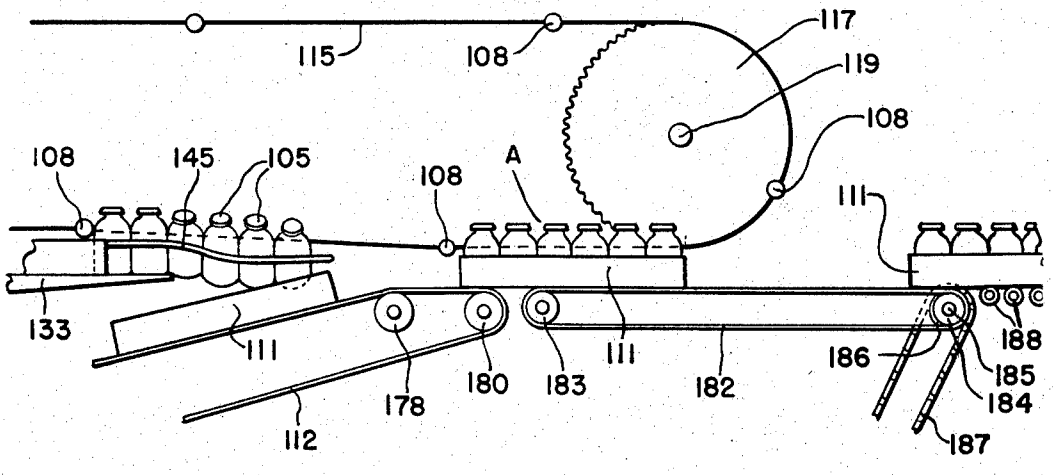


FIG. 7

FIG. 8



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3,377,774

CASE LOADER FOR MULTIPLE ARTICLES

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Filed July 19, 1965, Ser. No. 472,775
12 Claims. (Cl. 53—250)

ABSTRACT OF THE DISCLOSURE

The mechanism herein disclosed is employed to load open-top cases with articles such as cans. The case to be loaded is located below and at a small angle to the path of the articles with the leading wall of the case intersecting such path, so that, as the articles are advanced, they engage the leading case wall and propel the case as the articles enter the case. The articles are tilted laterally away from each other as they enter the case, thereby facilitating the entry of the articles and permitting the use of a case having dimensions closely fitting the article group.

The present invention pertains to loading of cases such as paperboard containers, with or without cover flaps, including shallow trays, and more particularly for the loading of such cases with a group of separate upright articles such as cans, jars, packages and other upright articles of cylindrical or other specific shapes.

The invention is particularly related to and in some respects is an improvement over the mechanism disclosed in United States Patent No. 3,141,274, disclosing the loading of six-packs into cases.

A principal object of the present invention is to segregate a group of a predetermined number of loose articles which may be of generally cylindrical form, typified by round cans or jars, into a rectangular group and propel the article group against the leading wall of a case to advance the case and in so doing load the article group into the case. The loaded case is then further propelled to clear the way for another empty case to be similarly loaded.

An additional object of the invention is to provide an improved case holding means to keep the case in proper alignment and to offer a certain degree of resistance to an empty case so that the leading articles of a group may bear firmly against the case to keep the leading row of articles in close contact with the leading case wall.

Additional and more specific objects and advantages of the present invention will become apparent as the description proceeds.

In the drawings—

FIGURE 1 is a simplified, schematic side elevation of a machine made in accordance with the present invention showing segregated groups of articles, such as cylindrical cans, being advanced and introduced into an empty case positioned on a conveyor which serves to advance a supply of empty cases to the loading station;

FIGURE 2 is a fragmentary perspective view of the cantilever loading device which guides the article group into a waiting empty case at the loading station;

FIGURE 3 is a fragmentary detail view in side elevation showing the leading articles of a group being pushed off the cantilever guide and beginning to enter the empty case;

FIGURE 4 is a fragmentary cross-sectional view, taken along line 4—4 of FIGURE 3, showing how the articles appear with respect to the empty case just before the leading articles move off the guide and drop into the case;

FIGURE 5 is a fragmentary plan view taken along 5—5 of FIGURE 4;

FIGURE 6 is a schematic sectional view similar to FIGURE 4 showing a modified form of cantilever guide

in which the center two lines of articles are tipped apart to somewhat conform to the tipping of the outer two lines of articles;

FIGURE 7 is a schematic view showing the wiring system for control of the removable stop mechanism for cases being loaded; and

FIGURE 8 is a fragmentary, schematic, side elevational view of a modified form of case loader, including a speed-up conveyor section.

For simplicity of description and illustration the present application discloses the loading of cylindrical cans and jars into open top trays. It is desired that references to loading cans into trays be considered entirely in a generic sense and that the invention applies generally to loading upright articles into open top containers, and is not limited to loading a particular shape of upright article into a particular form of open-top container.

A group of cans or similar articles, in the present instance indicated as a group of twenty four cans, is segregated in a suitable manner into a group, herein shown as a group four cans wide and six cans long. While the usual practice is to load four cans abreast, it is within the contemplation of this invention that can groups may be loaded having only two cans or three cans arranged abreast. The segregating mechanism, herein indicated, is described in detail in U.S. Patent No. 3,194,382. The segregated group is advanced, leaving a space separating the group from the accumulation of cans on a conveyor and a push rod conveyor is arranged so that a push rod will enter the space and advance the group over a slide plate or dead plate. Below the dead plate is arranged a support in the form of a conveyor over which open-top trays may be advanced to a loading station. The arrangement for controlling the feeding of cases or trays in a somewhat similar construction is illustrated in detail in Patent No. 3,053,025. The cases or trays could be fed to the loading station in this manner or they could be fed to such a station manually.

As herein shown, a tray at the loading station rests on a constantly driven belt conveyor which may slide beneath the tray and the tray is disposed at a small angular relation to the line of travel of the can group. The cans are propelled toward the tray over a cantilever support or guide means and as the leading cans reach the end of the guide they are tipped outwardly, bringing a portion of the lower ends of the leading cans into contact with the leading or front wall of the tray and causing the tray to advance while the leading cans and following cans drop into the tray. Suitable stop means will retain the tray in position at the loading station so that the leading cans will remain in firm contact with the leading wall of tray. The filled tray is then advanced beyond the loading station to clear space for the next group to be loaded.

Referring more particularly to the drawings, the machine is supported on a suitable main frame, fragments of which are indicated at **1** and **2** in FIGURES 1, 3 and 4 for the can conveyor portion, and at **3** and **4** in FIGURE 3 for the tray conveyor portion.

The cans **5**, **5** are first advanced in abutted relation and in rows of two or more on a conveyor **6** in the form of a plurality of narrow chains in side by side relation. The cans are segregated into groups by a grouping device, indicated as a whole at **7**, which may be of the type disclosed in detail in Patent No. 3,194,382. After the cans are segregated the main body of abutted cans may be held at rest or retarded to create a space within which a push rod, indicated at **8**, may enter. The push rods are supported on a conveyor, indicated as a whole at **9**, and constructed substantially as disclosed in detail in said Patent No. 3,194,382.

The groups of loose cans from conveyor **6** are transferred to a cantilever guide member, indicated as a whole

at 10. From this guide member the cans are deposited within a tray 11 carried forward by belts 12, 12 running over plates 13, 13 supported on belt frame 3. For practical purposes the belts 12, 12 and plates 13, 13 are spaced to support the outer edge portions of the trays, but for simplicity they will be referred to as a single belt and plate.

The can groups are guided laterally by side guide bars one of which is shown at 14 in FIGURE 1.

The push rod conveyor 9 comprises a pair of spaced sprocket chains 15, 15 passing around front and rear sprockets 16 and 17 mounted respectively on shafts 18 and 19. Shaft 19 has a sprocket 20 fixed thereon, driven by a sprocket chain 21 passing over a sprocket 22 fixed on a shaft 23, driven by a motor 24. The push rods 8, 8 on chain 15 are suitably spaced so as to be synchronized with the spaces formed between the groups of cans caused by operation of the grouping device 7 so that the push rods 8, 8 are designed to advance successive groups of cans.

As the can groups are propelled by the push rods they are transferred to the floor plate 26 extending across the width of the conveyor 6 and for this purpose the floor plate may be tapered at its rear end to a very thin edge over which the cans may readily pass. The floor plate 26 may alternately be arranged at a level with the surfaces of the chains comprising conveyor 6 and have its rear end terminated at the place where the chains pass down around their sprockets 27. The sprockets 27 are mounted on a shaft 28 which is driven by means of a pair of meshing gears, similar to the construction shown in Patent No. 3,194,382, one of which is fixed on shaft 28 and the other fixed on shaft 29. This latter shaft has fixed thereon a sprocket 30 driven by a sprocket chain 31 passing over a sprocket 32 fixed on shaft 18.

The floor plate 26 is supported on a suitable cantilever bracket 33 secured to the upright main frame section 1 as shown in FIGURE 1. As the cans arrive upon the floor plate 26 the separate rows are guided by upstanding guide plates 35, 36, 37, 38 and 39.

Arranged above the upper edges of the guide plates at each side of the cantilever member 10 are located guide bars 45 and 46 and the downwardly bent bars 41, 41 which guide the chains 15, 15 in their can propelling movement.

The guide plates 36, 37 and 38 may extend to the discharge edge of the cantilever floor plate 26 and are suitably cut away along tapered lines at 42, 43 and 44, as shown in FIGURE 2.

At a location spaced rearwardly from the discharge end of the floor plate 26, the vertical guide plates 35 and 39 are terminated and from the ends of the guide plates there are provided side guide bars 45 and 46 secured on suitable brackets 47 and 48 attached to parts 49 and 50, respectively, on the machine main frame as best shown in FIGURES 4 and 5.

Beginning a suitable distance back from the discharge edge of the floor plate 26 of the cantilever guide, the floor plate sections between vertical guide plates 35 and 36 at one side and between plates 38 and 39 at the other side are cut away along somewhat tapered or curved lines as shown at 52 and 53 so that their outer and discharge ends terminate at or near the end of the floor plate. At the terminal portions of the tapered sections and a short distance back therefrom the tapered end portions are preferably bent somewhat downward, as indicated at 54 and 55 respectively. See FIGURES 2 and 4.

The side guide bars 45 and 46 are flared somewhat outwardly, as shown, beginning a suitable distance back from the leading edge of the can group, as best shown in FIGURE 5. By the arrangement of the outwardly flaring guide bars 45 and 46 and the cut-away sections along curved lines 52 and 53 the outer two rows of cans are caused to tip outwardly by gravity, the degree of tipping being increased as the cans are advanced. At the same time the inner lower edges of the outer two rows of cans are supported respectively on the downwardly bent edges of the tapered sections as indicated at 54 and 55 along guide rails 36 and 38, as shown in FIGURES 2 and 4.

In order to support the tipped cans more accurately there are preferably arranged elongated, downwardly extending, guide plates 56 and 57 which may be approximately as long as the flared guide bars 45 and 46 and generally follow the contour of such guide bars so that the advancing cans will bear uniformly upon the guide bars and the guide plates 56 and 57. These guide plates, as shown in FIGURE 4, are held by rods 58 and 59 secured to a suitable transverse member 60 on the main frame section 2.

As shown in FIGURES 3, 4 and 5, the tray 11 is advanced on the constantly operating belt conveyor 12 until it is brought to rest by stop members, indicated as a whole at 62, 62. These stop members are arranged to enter partly into the path of the trays and engage the front edge portions of the leading tray walls by passing partially through openings 63, 63 formed in tray guide plates 64, 64.

Each stop member is in the form of a bell crank and is pivoted at 65 on a bracket fixed on the tray guide plate 64. An inwardly tapered cam-like portion 66 swings readily through the opening 63 in the tray guide plate and it is against this tapered surface 66 that the leading tray end comes to rest. In order to limit the movement of the tapered portion through the opening 63 a projecting portion 67, extending beyond the opening, strikes the outer surface of the tray guide plate 64. A coil spring 68 is secured at one end in a laterally extending arm 69 projecting outwardly of the stop in line with its pivot 65. The opposite end of the coil spring is connected with a movable rod such as a piston rod 70 operating in a cylinder 71. The spring 68 is normally under tension so that the tapered portion 66 of the stop will be rather firmly held inwardly in the path of the tray.

Means are provided for quickly releasing the tension on the springs 68 when the tray 11 is ready to be moved forward. For this purpose fluid within the cylinders 71 will be quickly released to allow the pistons to move in the direction of the stops 62 to release tension on the springs 68 and allow the tapered portions 66 of the stops to swing outwardly of their openings 63. If desired, a slight degree of tension may be allowed to remain on the springs so that the stops may bear against the sides of the tray as the tray is advanced.

In order to operate the piston and cylinder mechanism to relax tension on the springs 68 a trip switch is preferably provided. As herein shown this trip switch is in the form of a photo-electric cell 73 having a light source 74, the beam of which extends just ahead of the leading edge of the tray at the point where the tray is held by the stops 62. As soon as the tray advances by pressure of the first pair of cans on its leading wall the tray passes through the beam and interrupts it. This actuates a pair of suitable solenoid valves, described below, which open ports at the ends of the cylinders above the pistons to release the fluid at these ends of the cylinders and allow the rods 70 to move outward under tension of the springs. Reestablishment of the light beam actuates to reverse the solenoid valves to readmit fluid above the pistons in cylinders 71, again placing tension on the springs and moving the portions 66 of the stops back into holding position. Control of the piston and cylinder mechanisms through the use of solenoid valves is illustrated schematically in FIGURE 8.

As shown in FIGURE 3, the position of the tray on its support or belt 12 is such that when the two outer leading cans reach the end of the cantilever guide they are tilted sufficiently so that their outer leading lower end portions strike the leading wall of the tray and begin to propel the tray forward. For the purpose of effecting this with exactitude the angle of the frame 3 of the tray conveyor may be slightly adjusted up or down by the cylinder and

piston mechanism **75** connected to the frame pivotally by bracket **76**.

After the leading row of cans is pushed off the cantilever guide and falls into the tray the push rod continues to propel the remaining cans of the group until all rows of the group are deposited into the tray. The push rod **8** propels the filled tray a short distance along the conveyor belt and then passes up around the sprockets **20**, leaving the filled tray to be propelled thereafter by the belt **12**. Guide bars **41**, **41** which support the chain **15** are preferably bent downward along a slight curve to maintain the push rod in a desirable relationship with the center of gravity of the can group and for this purpose the chains **15**, **15** may be held against the downwardly curved guides **41** by idler sprockets, one of which is shown in FIGURE 3, engaging the upper surfaces of the chains.

As the filled tray leaves the loading station on belt **12** the belt passes over a roll **78** mounted on a shaft **79** located approximately at the point where the tray conveyor frame **3** is pivoted to its adjoining frame section **3***a*. The belt **12** passes then over a driven roll **80**. See FIGURE 1. From this point the loaded tray may be conveyed on any suitable form of conveyor to a desired destination.

The tray belt is preferably driven through gearing, not shown, synchronized with other gearing driving the push rod conveyor **9** so that the belt **12** will be driven very slightly slower than the speed of conveyor **9**, whereby there will be a slight resistance or lag to the forward movement of the tray on belt **12** as the cans are deposited within the tray. Thus, if desired, the tapered stop surfaces **66**, **66** need not exert any retarding influence on the trays by bearing on the tray side walls.

As shown in fragmentary sectional FIGURE 6, good results are obtained by providing a raised portion extending longitudinally and centrally of the floor plate **26***a*, sloping downward from the central vertical guide **37***a*. This causes the two central rows of cans **5***a*, **5***a* to tip somewhat outward as the two outer rows of cans **5***b*, **5***b* are supported in a more accentuated manner on rods **45***a* and **46***a* and on the downwardly bent edge portions of **54***a* and **55***a*, similar to edge portions **54** and **55**, as best shown in FIGURE 2. Additional supporting plates for the upper edges of the cans, similar to plate **56** and **57**, are also preferably employed, but are omitted in FIGURE 6 for the purposes of simplicity.

In the modified form of the invention, shown in FIGURE 8, the mechanism as illustrated is particularly adapted to handle the loading into tray groups of jars with tapered necks having projecting caps thereon. The jars **105**, **105** are grouped in the manner indicated in FIGURE 1 and the groups are advanced by push rods **108** on an overhead conveyor chain **115**, also similar to the construction shown in FIGURE 1. The jars are propelled forward over a cantilever guide means, parts of which are shown at **133** and **145**, substantially identical in general form to the cantilever guide means, shown as a whole at **10** in FIGURE 2, except that its size may be reduced if it is desired to handle small sized jars.

The trays **111** are brought to the loading station on a support member, herein shown as a belt conveyor **112**, passing over roll **178** and around roll **180**, all of which are similar to the equivalent parts **12**, **78** and **80** shown in FIGURE 1. The jars of each group are progressively tilted at the end portion of the cantilever guide and the leading jars engage the leading wall of the tray **111** to propel it past retention means acting to hold the tray at the loading station. The retention means may be similar to the removable stop members shown in FIGURES 3, 4 and 5, but is omitted in FIGURE 8 for simplicity of illustration.

The overhead chain conveyor **115** passes around a pair of sprockets, one of which is shown at **117**, mounted on shaft **119** and driven by a suitable motor and driving connections, not shown, similar to the construction illustrated in FIGURE 1. In this modified construction, however, the shaft **119** is located a substantial distance downstream of the end of the conveyor belt roll **180** and extends over a receiving conveyor aligned with the discharge end of the belt **112**. This receiving conveyor, as herein illustrated, comprises a belt **182** passing around a roll **183**, located adjacent the roll **180**, and extends forwardly, passing around a head roll **184** mounted on a shaft **185** having a sprocket **186** fixed thereon which is driven by a sprocket chain **187**, and which, in turn, is driven by a motor or by any other suitable driving means, not shown.

The receiving conveyor belt **182** is driven at a speed in excess of the speed of the push rod conveyor so that it will accelerate the movement of the loaded tray **111** and cause it to advance ahead of its push rod **108** and move into the clear away from such push rod before it begins its upward movement around its sprocket wheels **117**. By this arrangement the push rod **108** will discontinue acting to propel the loaded tray as soon as a major portion of the tray is transferred onto the conveyor **182**, and the engagement of the push rod beneath the overhanging caps of the last row of jars will thus be avoided. Such an engagement, if allowed to occur, would tend to displace the last row of jars from the tray. The loaded tray, designated at A in FIGURE 8, illustrates the action of the speed-up conveyor **182** in advancing the tray ahead of its push rod. The loaded trays leaving conveyor **182** may be transferred to any other suitable form of conveyor such as indicated by rolls **188**. If desired, a suitable inclined chute may be substituted to receive loaded trays from the end of conveyor belt **112**.

The control mechanism for the removable stop members, indicated as a whole at **62**, is illustrated schematically in FIGURE 7. Main power conductors **82** and **83** are provided, connected to a suitable power source. Current to motor **24** passes through conductors **84**, **85**, switch **86** and conductor **87**. The photo-cell unit **73** is connected through conductor **88** to conductor **85** and through conductor **89** to main conductor **83**.

The cylinder and piston mechanisms which control the tension on springs **67** may be operated through either a single solenoid valve or separate valves. In the present instance, the cylinders **71**, **71***a* are shown connected to separate solenoid valves **90** and **90***a* having conduits **91**, **91***a* connected to a suitable fluid pressure source. The solenoid valves may be of any suitable type, but, in the present instance, single-acting, spring-return type valves are employed. The solenoid winding for valve **90***a* is connected through conductors **92** and **93** to respective conductors **94** and **95**, connected in turn to the main line conductors **82** and **83**. Conductors **94** and **95** are joined by a normally open switch element **73***a* forming a part of the photo-cell unit. The solenoid winding for solenoid valve **90** is connected through conductors **96** and **97** to conductors **92** and **93**. Closing of the switch **73***a* thus will actuate both solenoid valves **90** and **90***a* simultaneously to cause fluid to be released on the piston rod side of the piston, allowing tension to be released on the springs **67**, **67** to permit the advancing tray readily to move the inclined surface portions **66**, **66** of the stops from their tray holding position.

Obstruction of the beam of the photo-cell unit causes switch element **73***a* to close and while the switch remains closed the tension on the springs stays released. Opening of the switch by reestablishment of the beam causes the spring actuated solenoid valve to be reversed, allowing fluid to flow into the cylinders on the piston rod side, thus again tensioning the springs and causing the inclined surface portions **66**, **66** to return to tray-holding position.

While the present description sets forth preferred forms of the invention, numerous changes may be made in the mechanism as disclosed without departing from the spirit of the invention, and it is therefore desired that the present disclosure be considered in all respects as illustrative and not restrictive, reference being had to the appended

claims rather than to the foregoing description to indicate the scope of the invention.

We claim:

1. In a mechanism for loading four-wall rectangular, open-top cases, the combination of an elongated cantilever guide means for a rectangular group of loose upright articles, such as cans, arranged in the manner of a leading row of three or more articles abreast followed by a sufficient number of similar rows so as to completely fill the case, a conveyor including a push rod to engage behind the trailing articles of the group and propel the entire group forward and past the end of the cantilever guide means, said guide means having a central, generally flat section for the center articles of the rows and having at the sides of the flat section a portion to support only the interior edge of an article bottom and having a tapered, cut-away section below the exterior of the article bottom, each side adjacent each cut-away section having supported therealong an outwardly disposed guide bar means to engage the medial part of an advancing article and control the outward tilting of the article as it passes along the tapered, cut-away section, so such article as it advances will assume a constantly increasing degree of outward tilt and so that the lower, outward portions of the outside articles of the row will assume positions below the level of the flat central section of the cantilever guide means, a case support upon which an open-top case, having internal dimensions closely fitting the article group, may be supported for advancing movement, said case support being disposed below the cantilever guide means and being inclined thereto at a small converging angle in the direction of movement of the articles on the cantilever guide to locate the upper edge portion of the leading case wall within the path of the lower face portions of the outwardly tilted leading articles at each side of the cantilever guide to propel the case by means of the lower surfaces of the outwardly tilted articles, said case support having a portion extending beyond the end of the cantilever guide on which portion the advancing case may travel when the article group has been completely deposited within the case.

2. The invention as defined in claim 1 in which the case support is in the form of a constantly operating belt conveyor arranged to advance cases in the direction of the articles propelled on the cantilever guide means, a first belt roller means for supporting the belt beyond the point where the leading article rows drop into the case on the belt, and a second belt roller means beyond the first belt roller to conduct the belt at an angle to the first position of the case and in a direction substantially parallel with the movement of the group of articles passing along the cantilever guide means, whereby the case, when passing the end of the cantilever guide means, will be in substantial parallelism with such means.

3. In a mechanism for loading four-wall, rectangular, open-top cases, the combination of an elongated cantilever guide means for a rectangular group of loose, upright articles arranged in the manner of a leading row of three or more articles abreast followed by a sufficient number of similar rows so as to completely fill the case, a conveyor including a push rod to engage behind the trailing articles of the group and propel the entire group forward and past the end of the cantilever guide means, said guide means having a central, generally flat section for the center articles of the row and having at the sides of the flat section a portion to support only the interior edge of the article bottoms and having a tapered, cut-away section below the exterior of the article bottoms, each side adjacent the cut-away section having supported therealong an outwardly disposed guide bar means to control the outward tilting of the individual articles as they pass along the tapered, cut-away section so each article as it advances will assume a constantly increasing degree of tilt and so that the lower, outward portions of the articles of the row will assume positions below the level of the flat central section of the cantilever guide means, a conveyor upon which an open-top case, having internal dimensions closely fitting the article group, is supported for advancing movement, said conveyor being located below the cantilever guide means and being inclined thereto at a small angle converging in the direction of article movement on the cantilever guide to locate the upper edge of the leading case wall within the path of the lower face portions of the outwardly tilted articles at each side of the cantilever guide to propel the case by means of the lower surfaces of the leading, outwardly tilted articles, said conveyor having a portion extending beyond the end of the cantilever guide to carry away the filled cases, means for constantly driving the conveyor in an advancing movement to urge the cases forward but permit the conveyor surface to slip beneath the cases, case stop means disposed just in advance of the discharge end of the cantilever guide to hold the case in readiness to receive the articles, and means to render the stop means ineffective to further retain the case after the leading articles have engaged the leading wall of the case and started to propel it.

4. The invention as defined in claim 3 in which the stop means for a case held at rest on the conveyor comprises a pivoted element, one at each leading edge of the case, a pivot for each such element located outside the path of the case, an angular, inwardly directed cam surface on such element located in the path of the case but removable when the element is swung outwardly on its pivot, tension means associated with the element for yieldingly holding the cam surfaces in the path of the case and means for releasing the tension on the tension means to allow the angular cam surfaces to swing readily out of the path of the case.

5. The invention as defined in claim 3, in which the stop means for a case held at rest on the conveyor comprises a displaceable case engaging element, one adjacent each leading edge of the case, releasable holding means for each case engaging element which, when released, allows the engaging elements to be displaced by advancing movement of the case, and means for releasing the holding means for the case engaging elements to enable the case to displace such elements when the case is propelled past such elements by pressure of the articles delivered into the case.

6. The invention as defined in claim 3, in which the stop means for a case held on the conveyor comprises a pivoted bell crank element, one being located at each side of the leading edge of the case, one leg of the element comprising an angular, inwardly directed surface portion located in the path of the case and displaceable to allow the case to pass when such element is swung outward, the outer leg of the bell crank element projecting outwardly of the case and having connected thereto a tension spring for normally holding the element so that the inwardly directed angular surface is held in case holding position, the tension spring being connected at its opposite end to a movable holding device normally held in spring-tensioning position, and means for moving such holding devices in a direction to release tension on the springs to readily permit the case to displace the case holding bell crank elements.

7. The invention as defined in claim 6, in which the movable holding device for releasing tension on the springs comprises movable rod elements combined with control means for extending or retracting said rods, switch means arranged in the path of the advancing case a short distance ahead of the case before it starts to be propelled by the articles, said switch means being operatively connected to the movable rod elements to actuate the control means for the rods and cause extension of the rods to release tension on the springs theretofore holding the bell crank elements in case holding position.

8. The invention as claimed in claim 7, in which the switch means is in the form of a photo-electric cell having

its beam projected in a position slightly ahead of the leading edge of a case held at rest on the conveyor so that the case, just following its advance, interrupts the beam to cause actuation of the control means for the rods to move them in a direction to release tension on the springs holding the bell crank elements.

9. The invention as defined in claim **1**, in which longitudinally extending, guide plate elements are supported above and somewhat outwardly spaced and in conformity with the article guide bar means to guide the outer upper edges of the articles as they move along the cantilever guide means.

10. In a mechanism for loading four-wall, rectangular, open top cases, the combination of an elongated cantilever guide means for a rectangular group of loose, upright articles arranged in the manner of a leading row of four articles abreast followed by a sufficient number of similar rows so as to completely fill the case, a conveyor including a push rod to engage behind the trailing articles of the group and propel the entire group forward and past the end of the cantilever guide means, said guide means having a central section for the center two rows of articles, such central section being arranged with its mid-portion at a slightly higher level than its outer portions to cause the articles in the two center rows to tilt outwardly away from each other, the cantilever guide means having at the sides of the central section a portion to support only the interior edges of the article bottoms and having a tapered, cut-away section below the exterior of the article bottoms, each side adjacent the cut-away section having supported therealong an outwardly disposed guide bar means to engage the median part of the articles and control the outward tilting of the articles as they pass along the tapered, cut-away section so each article as it advances will assume a constantly increasing degree of outward tilt and so that the lower, outward portions of the outside articles of the row will assume positions below the level of the central section of the cantilever guide means, a case support upon which an open-top case, having internal dimensions closely fitting the article group, may be supported for advancing movement, said case support being disposed below the cantilever guide means and being inclined thereto at a small angle converging in the direction of movement of the articles on the cantilever guide to locate the upper edge of the leading case wall within the path of the lower face portions of the outwardly tilted articles at each side of the cantilever guide to propel the case by means of the lower surfaces of the leading outwardly tilted articles, said case support having a portion extending beyond the end of the cantilever guide on which portion the advancing case may travel when the article group has been completely deposited within the case.

11. In a mechanism for loading four-wall, rectangular, open-top cases with a rectangular group of loose upright articles, such as cans, arranged in the manner of a leading row comprising at least two articles abreast, followed by a sufficient number of similar rows so as to completely fill the case, the combination of an elongated, cantilever guide means, a conveyor including a push rod to engage behind the trailing articles of the group on the cantilever guide means and propel the entire group forward and past the end of the cantilever guide, said cantilever guide having an intermediate, elongated part extending in the direction of article movement, said intermediate part having at each longitudinal edge thereof a tapered, cut-away section below the exterior of the article bottom leaving portions at the sides of the intermediate part adjacent the cut-away sections serving to support only the interior edge of an article bottom, each side adjacent each cut-away section having supported therealong an outwardly disposed guide bar means to engage the median part of an advancing article and control the outward tilting of the article as it passes along the tapered, cut-away section, so such article as it advances will assume a constantly increasing degree of outward tilt and so that the lower, outward portions of such advancing articles will assume positions below the level of said intermediate part of the cantilever guide means, a case support upon which an open-top case having internal dimensions closely fitting the article group, may be disposed for advancing movement, said case support being located below the cantilever guide means, and being inclined thereto at a small converging angle in the direction of movement of the articles on the cantilever guide to locate the upper edge portion of the leading case wall within the path of the lower face portions of the outwardly tilted leading articles at each side of the cantilever guide to propel the case by means of the lower surfaces of the outwardly tilted articles, said case support having a portion extending beyond the end of the cantilever guide on which portion the advancing case may travel when the article group has been completely deposited within the case.

12. In a mechanism for loading four-wall, rectangular, open-top cases with a rectangular group of loose, upright articles having laterally projecting upper rim portions, such as tapered-neck jars with overhanging caps thereon, said articles being arranged in the manner of a leading row comprising at least two articles abreast, followed by a sufficient number of similar rows so as to completely fill the case, the combination of an elongated cantilever guide means, a conveyor including a push rod to engage behind the trailing articles of the group and propel the entire group forward and past the end of the cantilever guide means, said guide means having an intermediate elongated part extending in the direction of article movement, said intermediate part having at each longitudinal edge thereof a tapered, cut-away section below the exterior of the article bottom leaving portions at the sides of the intermediate part adjacent the cut-away sections serving to support only the interior edge of an article bottom, each side adjacent each cut-away section having supported therealong an outwardly disposed elongated guide bar means to engage the median part of an advancing article and control the outward tilting of the article as it passes along the tapered, cut-away section, so such article as it advances will assume a constantly increasing degree of outward tilt and so that the lower, outward portions of such advancing articles will assume positions below the level of said intermediate part of the cantilever guide, a case support upon which an open-top case, having a wall height substantially less than the height of the articles and having internal dimensions closely fitting the article group, may be supported for advancing movement, said case support being disposed below the cantilever guide means, and being inclined thereto at a small converging angle in the direction of movement of the articles on the cantilever guide to locate the upper edge portion of the leading case wall within the path of the lower face portions of the outwardly tilted leading articles at each side of the cantilever guide to propel the case by means of the lower surfaces of the outwardly tilted articles, said case support having a portion extending beyond the end of the cantilever guide on which portion the advancing case may travel when the article group has been completely deposited within the case, overhead elongated conveying means including a sprocket at its discharge end rotatable on a horizontal axis, a sprocket chain arranged to travel around said sprocket, a push rod on the sprocket chain arranged to travel in a path above the case wall level and bear directly upon the rearmost row of articles loaded into the case to propel the loaded case along the case support, an elongated receiving conveyor having its supporting surface substantially aligned with and arranged to receive cases from the case support along which the loaded case is propelled by a push rod on the sprocket chain of the overhead conveying means, said sprocket at the discharge end of said overhead conveying means

being located at a substantial distance downstream from the receiving end of the receiving conveyor, and means for actuating said receiving conveyor to cause the travel of cases thereon at a speed greater than the speed of the overhead conveyor to advance a case thereon ahead of its pushrod, whereby the trailing row of articles in the case will be removed from contact by the push rod before it begins its travel up around said sprocket, thereby assuring that the push rod will not displace articles in the trailing row by engaging under their laterally projecting upper rim portions.

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