Nov. 5, 1957 B. G. COPPING 2,812,085

CONVEYING AND UNLOADING APPARATUS

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Fig. 1

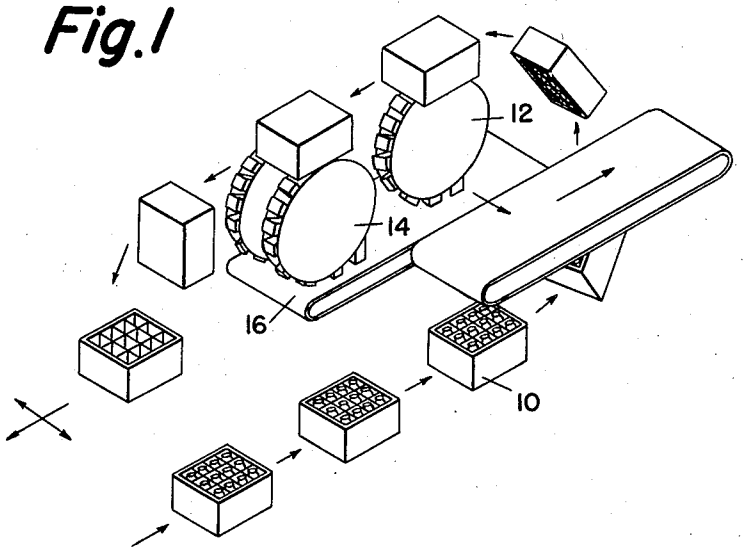


Fig. 8

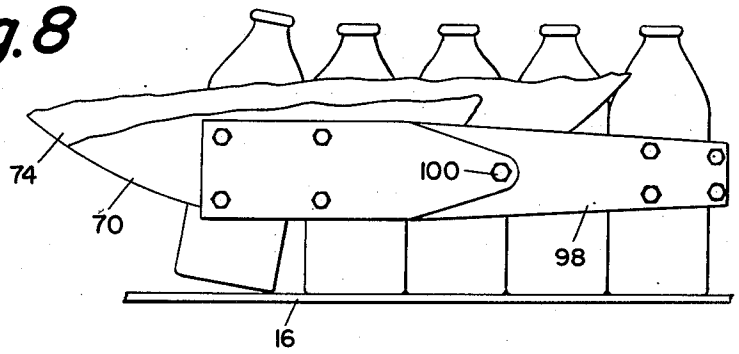
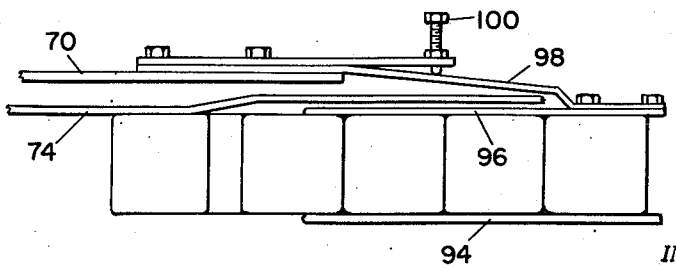


Fig. 9



INVENTOR.
BRIAN G. COPPING

BY

William J. Sweeney

ATTORNEY

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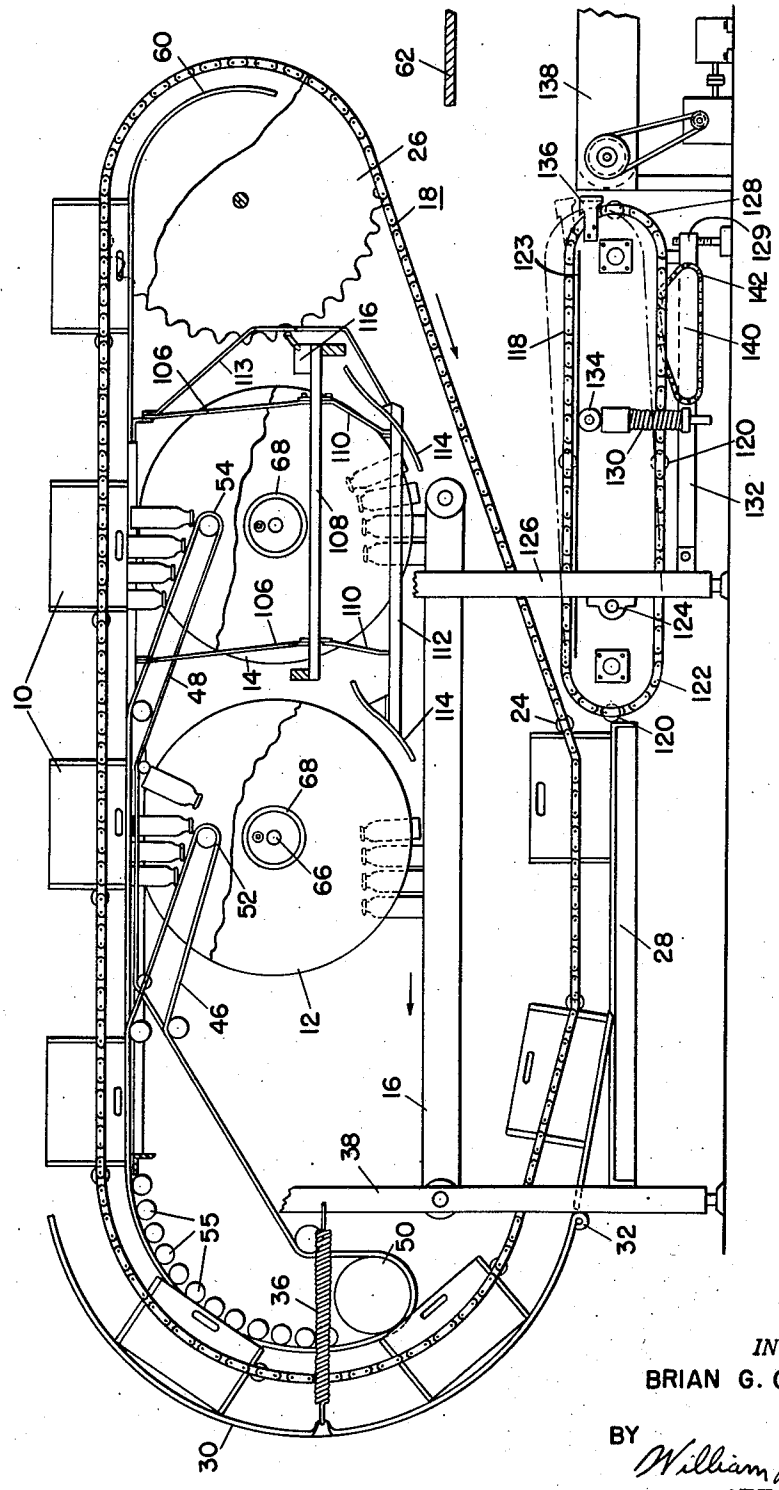


Fig. 2

INVENTOR.
BRIAN G. COPPING

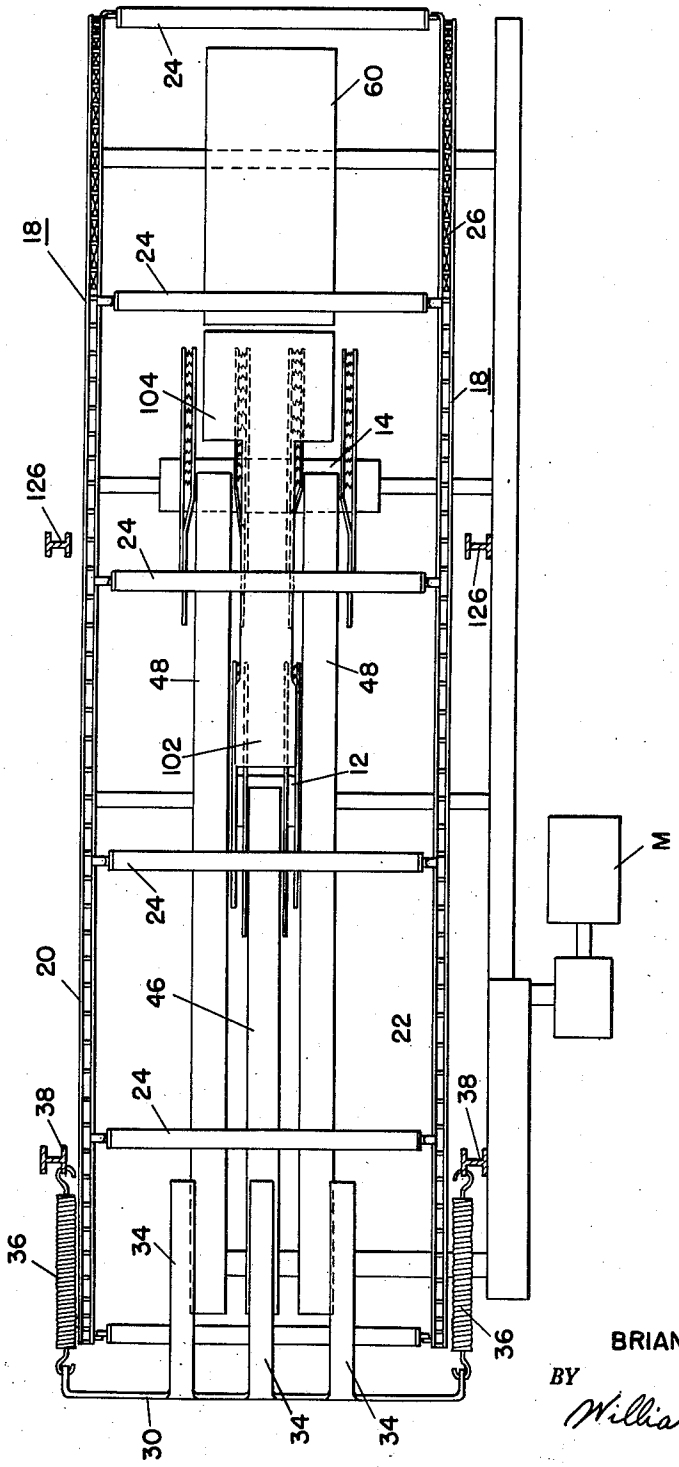
BY William J. Swezey
ATTORNEY

Nov. 5, 1957 B. G. COPPING 2,812,085

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Fig. 3



INVENTOR.
BRIAN G. COPPING

BY
William J. Swezey
ATTORNEY

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Fig. 6

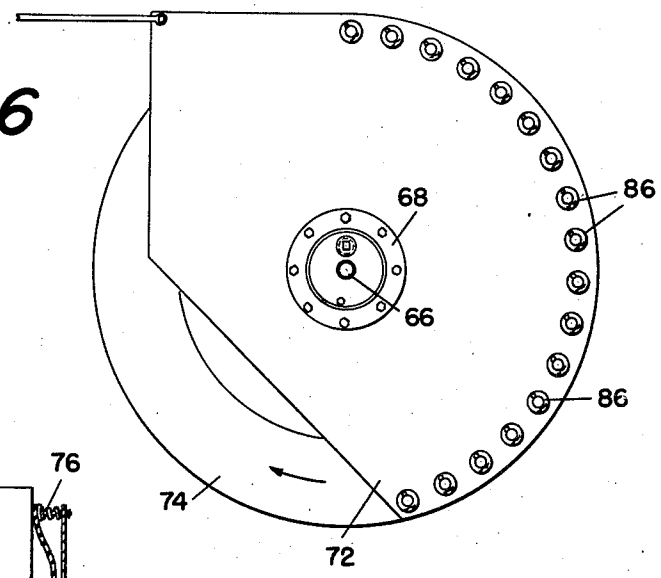


Fig. 5

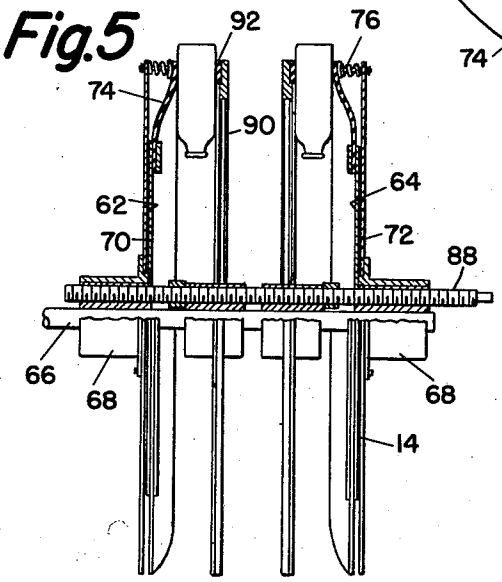


Fig. 4

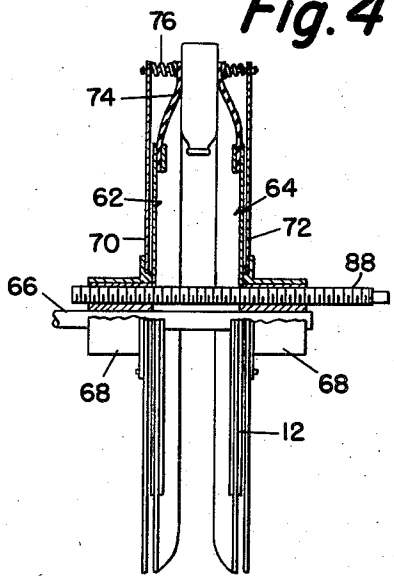
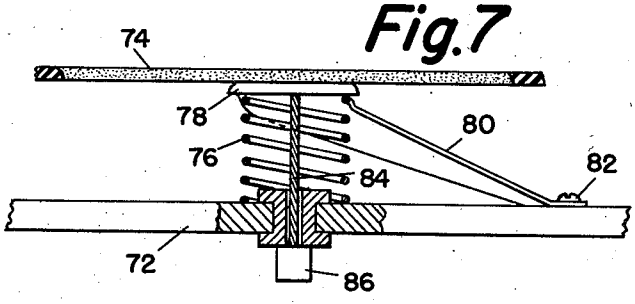


Fig. 7



INVENTOR.
BRIAN G. COPPING

BY
William J. Sweeney
ATTORNEY

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2,812,085

CONVEYING AND UNLOADING APPARATUS

Brian Gray Copping, Cuyahoga Falls, Ohio, assignor to Atkron, Inc., Cuyahoga Falls, Ohio

Application January 8, 1953, Serial No. 330,286

15 Claims. (Cl. 214—311)

This invention relates to conveyor mechanisms and particularly to conveyor mechanisms of the type adapted to unload bottles or similar articles (hereinafter referred to as bottles) from cases in which they are stored in a regular aligned arrangement.

The invention is particularly adapted for unloading empty bottles from a "full-depth" case, that is, a case in which the side walls extend upwardly for at least the height of the bottles.

In a case of this type the bottles are arranged in longitudinal rows, each consisting of from six to eight bottles, and the number of such rows in a case is usually three or four. For simplicity, the invention will be described as applied to a mechanism particularly adapted to unload bottles from cases having three rows.

Heretofore it has commonly been the practice to unload such cases by disposing the case containing the empty bottles beneath a mechanism provided with a plurality of gripping members, there being one such member for each bottle in the case. The bottles are lifted bodily from the case and disposed on a conveyor, while the empty case is carried away, usually automatically.

Such mechanism requires substantially perfect alignment between the bottles and the gripping members and sometimes fails to remove one or more of the bottles. These mechanisms are relatively complicated in construction and erratic in operation.

According to the present invention, cases containing the bottles to be removed are supplied to a substantially horizontal conveyor at spaced intervals. Suitable mechanism is provided for timing the entrance of the case to the conveyor, an arrangement is provided for inverting the cases and, when the cases are inverted, a selected row or rows of inverted bottles is removed from the case while the other rows in the case are maintained therein in inverted position, the case is then moved to a second position in which the remaining rows are removed and the empty case is reinverted to its normal position and removed from the mechanism by a suitable conveyor.

In the meantime, the rows of bottles removed from the case are grasped at their sides with their neck ends inverted, by a suitable rotary conveyor or wheel having its periphery below the inverted case, and are carried around by this wheel to a lower position almost diametrically opposite the position from which they are received from the case, at which lower point they are released from the wheel with their bottoms resting on a horizontal conveyor by which they are carried away from the uncasing mechanism.

The invention also contemplates the provision of an arrangement for stopping the mechanism in the event bottles become jammed in the inverted case as they enter the conveyor wheel and as they leave that wheel.

Another feature of the invention is the provision of a simple structure for timing the admission of the full cases to the lower horizontal portion of the main conveyor before they are inverted so as to ensure they are properly

spaced with respect to that conveyor which moves the cases through the unloading mechanism.

Still another object is to provide means adjacent the discharge end of the conveyor wheels for retarding the discharge of bottles from those wheels.

Other objects and advantages of the invention will be readily apparent from the following description and accompanying drawings wherein:

Fig. 1 is a schematic representation showing the path of movement of cases and bottles through a machine embodying the invention.

Fig. 2 is a side elevation of the machine.

Fig. 3 is a fragmentary top plan view of the machine of Fig. 2.

Fig. 4 is a sectional view on an enlarged scale through the center of the inner row transfer wheel or conveyor.

Fig. 5 is a sectional view on an enlarged scale through the transfer wheel or conveyor for the outer rows of bottles.

Fig. 6 is a side elevation of one of the transfer wheels showing a stationary plate associated therewith.

Fig. 7 is a fragmentary view partly in section on an enlarged scale showing one of the pressure members or shoes disposed between the flexible rim or flange of a rotary transfer wheel and its adjacent stationary plate.

Fig. 8 is a side elevation and Fig. 9 is a top plan view of a device disposed adjacent the bottom of each transfer wheel to retard the discharge of bottles from that wheel.

In the drawings, and referring to Fig. 1, a case **10** containing bottles to be removed therefrom, enters the mechanism at its lower side with the bottles in an upright position. The loaded case is carried upward by suitable mechanism, to be hereafter described, and is finally inverted so that the bottles tend to fall from it by gravity. Such a case contains bottles or similar articles disposed in rows and there may be either three or four rows in a case. When the case is inverted, the arrangement herein described regulates the discharge of separate rows from the case to suitable rotary conveyor wheels **12** and **14** which grasp the bottles by their sides as they fall, neck down, from the case, and carry them around to a lower position at which they are released from the wheels with their necks up and their bottoms resting on a suitable conveyor **16** which carries them away from the mechanism. In the meantime, the empty cases are reinverted and are likewise carried away from the mechanism in the direction of the arrow (Fig. 1) by a suitable conveyor **62** as indicated schematically in Fig. 2.

Referring to Figs. 2 and 3, the mechanism comprises a continuous conveyor belt **18** driven from a motor M by suitable connections (not shown), in a clockwise direction as indicated by the arrow in Fig. 2. This belt comprises a pair of parallel spaced chains **20** and **22**, joined at spaced intervals by cross-bars **24**. The chains are spaced from each other a distance slightly greater than the width of a case, while the cross-bars, hereafter sometimes referred to as pusher bars, are spaced from each other a distance slightly greater than the length of a case. The conveyor belt assembly is driven near the infeed end of the mechanism by sprocket wheels **26** which have teeth engaging the link belt portions **20** and **22** of the conveyor.

A platform having a generally horizontal lower portion **28** and a curved portion **30** extending upwardly from the aforesaid horizontal portion **28**, is disposed outside and around a portion of the movable conveyor. The curved portion **30** of this platform is hinged as at **32** to the lower portion **28** and serves as a guide for the bottoms of the loaded cases **10** as they move to their inverted position.

This platform is made preferably of several parallel straps **34** so that the cases will glide easily thereon. The upper end of the curved portion **30** is urged toward the center of the mechanism by springs **36**, only one of

which is shown, connected to the curved portion and the frame portion **38** of the mechanism.

The space between the side chains **20** and **22** and each pair of pusher bars **24** is large enough to receive a case with the case being urged forward by the force of the pusher bar behind it. As the case leaves the platform at its upper curved end, it is inverted and rests on means which maintain the bottles in the case as the latter passes along and from the curved portion **30** of the platform. This means, which comprises continuous belts **46** and **48**, also serves to convey inverted bottles from selected rows in the case to the respective transfer or conveyor wheels **12** and **14**. For a three row case, a single belt **46** is provided to convey bottles from the center row to the wheel **12**, while two belts **48** are provided to convey bottles from the outside rows to the conveyor wheel assembly **14**. These belts are parallel for a considerable portion of their length and extend around a pulley **50** disposed near the beginning of the curved portion **30** of the platform. The belts run parallel to the inverted case a short distance and then belt **46** descends diagonally to and around a pulley **52** suitably supported between the flanges of the inner row transfer or conveyor wheel **12**, while the belts **48** continue parallel to the case a longer distance to a point where they too descend diagonally to and around small pulleys **54** supported between parallel flanges of the outer rows transfer or conveyor wheel assembly **14**. Pulley **50** is driven from motor M by suitable connections (not shown). This pulley drives belts **46** and **48** in a clockwise direction and their speed is synchronized with that of the main conveyor **18**. Between the pulley **50** and the beginning of the upper horizontal portion of the mechanism, the belts run over a series of parallel rollers **55** which tend to maintain the bottles in the case until the case is fully inverted. As the inverted case moves along the horizontal portions of the belts the three rows of bottles are maintained in the case with their necks down and supported by the belts. This condition is maintained until the inner row reaches the sloping portion of belt **46**. Thereupon the bottles in this row are carried neck down to the wheel **12** where the bottles are grasped by their sides by the two opposite flanges of the wheel as will be hereafter described. The case **10** moves onward along the conveyor with the two outer rows maintained in the case with their necks resting on the horizontal portions of belts **48** until the case reaches the end of that portion whereupon the two outer rows are carried with their necks down by the downwardly sloping portion of belts **48** to the conveyor wheel assembly **14**, to be hereafter described.

The wheels **12** and **14** are driven synchronously and clockwise by suitable means which may be the motor M. These wheels carry the bottles around from their inverted position to a lower position in which they are reinverted, released from the wheels and deposited on a conveyor **16** which carries them away from the machine. In the meantime the emptied case is carried on past the wheels by the main conveyor and is guided by a platform **60** to a position in which it drops from the main conveyor in a reinverted position onto a conveyor **62** which carries it away from the machine.

Referring to Fig. 4, the wheel **12** is shown as comprising a pair of opposed discs **62** and **64** rotatably mounted on a drive shaft **66** which is in turn supported in stationary hubs **68**. These hubs each support a stationary plate **70** and **72**, the plate **70** being disposed outside and closely adjacent disc **62** and plate **72** being disposed outside and closely adjacent disc **64**. A flexible flange **74** is attached to the rim of each disc and extends outwardly from the periphery of the disc a considerable distance. This flange is made preferably of Neoprene or some other synthetic material not readily affected by oil. As will be noted in Fig. 4, this flange is dish-shaped and flares inwardly toward the center of the wheel so that its outer edge is spaced some distance from the stationary plate adjacent it. The outer ends of these flanges are urged toward the center of the wheel by separate springs **76** interposed at spaced intervals around a portion of the periphery of the stationary plates **70** and **72**. One end of each spring bears against a plate while the other end bears against the inner surface of a dish-shaped pressure shoe member **78** having a smooth outer surface bearing directly against the flange **74**. As the flange **74** rotates while the shoes **78** are stationary, it is desirable to apply a suitable lubricant to the outer surface of the flange. Each member **78** is supported from the adjacent plate by a flexible arm **80** extending diagonally from the member to the plate and attached to the latter by suitable fastening means such as the screw **82**. A flexible cable **84** connects the member **78** centrally to the plate. This cable, which extends through the plate and is held at its inner end by a stop member **86**, limits the inward travel of the pressure shoe member. It will be noted from Fig. 6 that the spring assemblies just described extend only a portion of the way around the periphery of the stationary plates, that is, from a point about vertically above the hub **68** to a point not quite vertically below the hub. It will also be noted that a substantial portion of the plate beyond the two points just mentioned is cut away so that no external force is exerted against the flange **74** at that portion. Thus, when an inverted bottle is carried between flexible flanges attached to two adjacent discs such as **62** and **64**, the sides of that bottle are grasped between adjacent flanges at the spring-pressed portions thereof and are rotated around in a clockwise direction by the wheel until the bottle is carried beyond the portions of plates **70** and **72** carrying springs **76**. Thereupon, the bottle, which has been reinverted, is released from the wheel and carried away by conveyor **16**. Means comprising a reverse-threaded bolt **88** extends through adjacent hubs **68** to permit adjustment of the distance between adjacent disc and plate assemblies and thus allow the wheel to carry bottles of varying width. The structure shown in Fig. 5 for the wheel assembly **14** is basically similar to that just described for wheel assembly **12**, except provision is made for two separate parallel wheel assemblies coaxially mounted on a single shaft and spaced from each other a distance equal to that of the inner row of bottles. In this example, only one disc having a flexible flange **74** is shown for each assembly, the cooperating disc **90** extending out to the periphery of the flexible flange on the opposite disc and the disc **90** having a resilient surface **92** at its periphery to cooperate with the spring-pressed flange of the adjacent disc. It should be obvious from the foregoing description that the combinations of discs used in Fig. 4 for removing one row of bottles could be used in place of the combination described for wheel **12** and vice-versa.

It is desirable to keep a few bottles in the discharge end of the conveyor wheels to stabilize the following bottles as they approach the point of discharge. To this end I provide the arrangement shown in Figs. 8 and 9 in which the bottles being discharged from the wheel, the latter being indicated by the flexible flange **74**, are releasably clamped between a fixed plate **94** disposed above the conveyor belt **16** and a plate **96** mounted on a flat spring **98**, the plate **96** extending between the flange **74** and the bottles, and the other end of the spring **98** being attached to the adjacent fixed plate such as the plate **70**. Screw means **100** is provided for adjusting the tension on spring **98**. Occasionally bottles become jammed as they leave the inverted case. Jamming may also occur as they descend with the conveyor wheels because a bottle may become tilted or otherwise misaligned in the wheel. It is necessary, therefore, that a safety mechanism be provided for stopping the drive motor when such a jam occurs.

I provide a plate **102** (Fig. 3) adjacent and beneath the case at the point of departure of the inner row of bottles from the case. This plate lies between the horizontal portions of conveyor belts **48** and is an extension of

a plate **104** which is similarly disposed adjacent the point of departure of the bottles in the two outer rows from the case. These plates, which are rigidly united, are supported by a pair of upwardly projecting leaf springs **106** which are attached at their lower ends to a fixed support bar **108**. A pair of similar leaf springs **110** depend from bar **108** and are attached to a transversely movable horizontal rod **112**. This rod carries a curved shoe **114** at each end, which shoe is disposed adjacent the lower portion of a conveyor wheel in a position to be contacted by any misaligned bottle in the wheel. A flat spring member **113** is attached at its upper end to plate **104** and at its lower end to rod **112**. Its central portion is arranged to contact and maintain closed a switch **116**. Any time the plates **102** and **104** or rod **112** are moved to the right (Fig. 2) by a misaligned botlte, the central portion of spring **113** will move away from the switch **116** whereupon the latter will open to break a circuit (not shown) to the drive motor M.

Cases containing bottles to be unloaded are fed into the main conveyor **18** in timed relation from an infeed conveyor by the following arrangement: A continuous conveyor **118** driven synchronously with the main conveyor **18** by any suitable means, is provided. This infeed conveyor has cross-bars **120** joining two parallel roller chains, one of which chains is indicated at **122**. The cross-bars **120** are spaced apart the same distance as those on the main conveyor. Each cross-bar pushes a loaded case ahead of it along a stationary platform **123**. The frame of conveyor **118** is mounted about a pivot **124** supported on an upright **126**. The infeed conveyor is unbalanced about this pivot so that its infeed end **128** tends normally to drop below the horizontal. It is maintained horizontal by a stop member **129** and a spring member **130** which tends to partially offset this unbalance. One end of spring **130** is attached to the frame portion **132** and the other end is connected to the conveyor frame as at **134**. A stop or barrier member **136** is attached to and movable with the infeed end **128** of the conveyor **118**. When the conveyor is in its horizontal position as shown in full lines in Fig. 2, cases may pass freely from an auxiliary conveyor **138** directly onto the infeed conveyor **118** where they are picked up by the pusher bars **120** and carried on to the main conveyor **18**.

In order to time the entrance of cases onto the infeed conveyor and to space them properly, I provide means for tilting the infeed end **128** of this conveyor upwardly at predetermined intervals so that the stop member **136** is interposed in the path of a case coming from the auxiliary conveyor **138**. This position of the infeed conveyor is indicated by dotted lines in Fig. 2.

The conveyor is so tilted by the contact of the pusher bars **120** of the infeed conveyor with a cam-like member **140** as these bars pass under the frame of the conveyor on their way to the infeed end **128**. The cam-like member **140**, which may take the shape shown in Fig. 2, preferably comprises a hardened steel plate. If the pusher bars **120** are rotatably mounted they may contact the plate directly. However I prefer to make the bars non-rotatable and in this event it is desirable that a hardened roller chain **142** be disposed around the periphery of the cam plate to reduce wear. The time at which the rise occurs, the duration of the rise and the rate of rise and fall can be varied depending on the position and shape of the cam-like member.

Since the position and motion of the pusher bars on the main conveyor and those on the infeed conveyor are always in proper relation to each other, a case which has been properly timed onto the infeed conveyor by the cam and stop member arrangement will automatically be timed correctly for the main conveyor.

It is believed that the operation of the mechanism is readily apparent from the foregoing description.

While only one embodiment of the invention has been shown and described it is apparent that the invention is not so limited and that other forms might be adopted within the scope of the following claims.

I claim:

1. Means for removing bottles and similar articles from a case containing separate rows of such articles in a uniform aligned pattern, said means comprising, a continuous movable main conveyor having two horizontal portions spaced one above and in alignment with the other, the lower horizontal portion being adapted to receive and move the loaded case in its normal position and the upper horizontal portion being adapted to move the loaded case in an inverted position, means for driving said conveyor, a stationary case supporting and guiding platform extending around and substantially parallel to but spaced from said conveyor, said platform being of less length than the conveyor and adapted to support on its horizontal portions the cases moved by the conveyor, said conveyor having a portion adapted to engage an end of the case and move it along said platform, said arrangement being adapted to invert said case to permit bottles contained therein to drop by gravity from the case, movable support means for controlling the release of bottles from the inverted case in predetermined sequence, rotatable conveyor means for receiving the released bottles in an inverted position from the release-controlling means and moving them from an inverted to a non-inverted position and for thereafter releasing said bottles with their bottom ends resting on a substantially horizontal conveyor, and means for directing the emptied cases to another conveyor by which they are removed from the mechanism.

2. Structure according to claim 1 in which the continuous main conveyor comprises two flexible members disposed parallel to but spaced from each other in the same horizontal plane a distance slightly greater than the width of a case, and a plurality of transverse members connected between said flexible members, said transverse members being spaced from each other a distance slightly greater than the length of a case to be carried therebetween.

3. Structure according to claim 1 in which the conveyor means for moving bottles from their inverted to their non-inverted position comprises separate rotatably driven conveyors having parallel horizontally-aligned axes, said conveyors being disposed between the upper and lower horizontal portions of the case conveyor.

4. Structure according to claim 3 in which a separate movable support means is provided to carry inverted bottles from the case to each of said rotatable conveyors.

5. Structure according to claim 3 in which means are associated and disposed adjacent the upper horizontal portion of the case conveyor near the point of discharge of bottles from the case for stopping said conveyor in the event a bottle becomes jammed as it falls from the case.

6. Structure according to claim 3 in which movable means is disposed adjacent the lower end of each rotatable conveyor for stopping the main conveyor in the event a bottle becomes jammed or misaligned in the conveyor during its passage to the lower portion thereof.

7. Structure according to claim 3 in which the rotatable conveyors each comprise a pair of discs attached to and rotatable with a shaft disposed at the center of the discs, said discs being adjustably spaced from each other, a flexible flange member attached to the inner surface of at least one of said discs adjacent the periphery of the disc, said flange member extending outwardly beyond the periphery of the disc to which it is attached, a stationary plate having a generally circular configuration disposed outside and spaced slightly from each disc, each of said plates having a cut-away portion adjacent its lower end, and resilient means disposed at spaced intervals around the curved peripheral portion of the stationary plate adjacent a disc having a flexible flange member, said resilient means comprising a plurality of spaced pressure-producing shoe members each having a surface bearing

against the adjacent surface of said rotatable flexible member whereby said flexible member is urged toward an adjacent disc to grasp an inverted bottle therebetween and carry it downwardly to the cut-away portion of said stationary plates.

8. Structure according to claim 7 in which separate resilient means are attached to one of said plates adjacent the lower part of said cut-away portion to retard the discharge of bottles from said conveyor wheel.

9. Structure according to claim 1 in which the portion of the platform for guiding the case from its lower horizontal position to its upper inverted position comprises a curved portion hingedly attached to the lower horizontal portion of said platform and in which resilient means is provided attached to said curved portion for urging said portion against the bottom of said case.

10. Structure according to claim 1 in which a portion of the platform adjacent the lower horizontal portion of the main conveyor comprises a separate continuous infeed auxiliary conveyor.

11. Structure according to claim 10 in which said auxiliary conveyor is unbalanced so that its infeed end normally tends to drop below a horizontal plane, and resilient means tending to move said unbalanced end upwardly to the horizontal plane.

12. Structure according to claim 11 in which means is provided adjacent the infeed end of the auxiliary conveyor for controlling the admission of cases to said conveyor.

13. Structure according to claim 12 in which said admission controlling means includes a member having a cam-like contour, said member being disposed adjacent and beneath the infeed end of said auxiliary conveyor.

14. Structure according to claim 13 in which the cam-like member is surrounded by a continuous roller chain.

15. Structure according to claim 14 in which the auxiliary conveyor comprises two horizontally-spaced parallel flexible continuous members, transverse members joining said flexible members at spaced intervals, said transverse members being spaced apart a distance equal to that of like members on the main conveyor, a stop member operated by said cam-like member, said transverse members contacting the upper surface of said cam-like member at periodic intervals in their passage toward the infeed end of said auxiliary conveyor whereby to deflect the unbalanced end of said auxiliary conveyor together with said stop member, upwardly and prevent admission of a case to said auxiliary conveyor at periodic intervals.

References Cited in the file of this patent

UNITED STATES PATENTS

469,399	Farnen et al.	Feb. 23, 1892
881,042	Alvey	Mar. 3, 1908
2,362,517	Woodberry	Nov. 14, 1944
2,526,309	Welch	Oct. 17, 1950
2,633,971	Albertoli et al.	Apr. 7, 1953