United States Patent

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[72] Inventors Wendell E. Standley
Lake Forest;
John E. Karlovitz, Chicago; William C. Pfeil, Jr., Lincolnwood, all of, Ill.

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[73] Assignee Johns-Nigrelli-Johns, Inc.
Skokie, Ill.

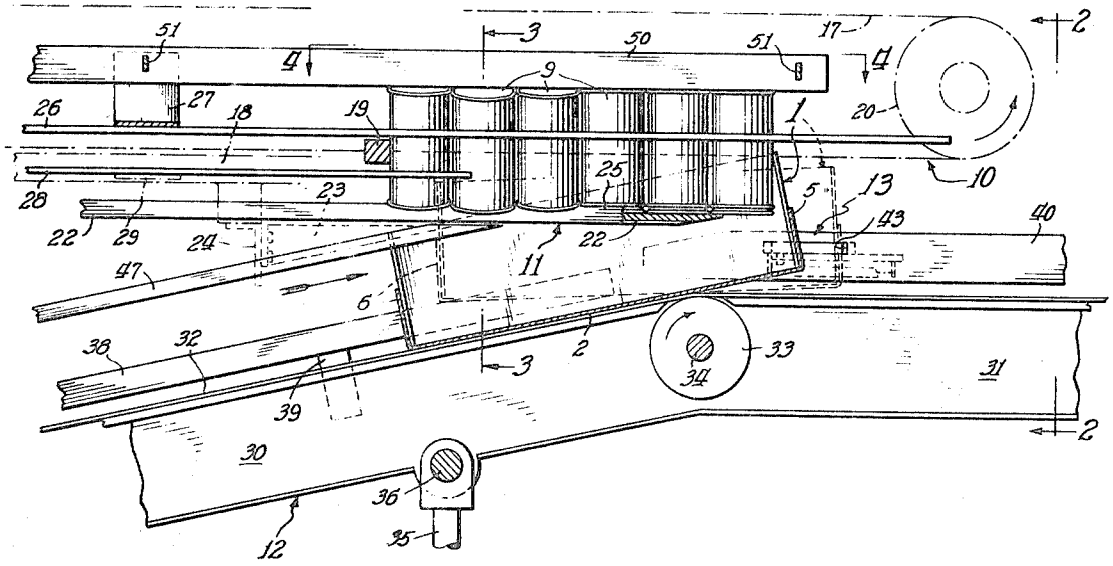
[54] CASE LOADER
2 Claims, 6 Drawing Figs.

[52] U.S. Cl. 53/250, 53/160
[51] Int. Cl. B65b 5/10, B65b 39/00
[50] Field of Search 53/160, 244, 250, 251, 159

[56] References Cited
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3,377,774 4/1968 Nigrelli et al. ..... 53/159 X

Primary Examiner—Theron E. Condon
Assistant Examiner—Robert L. Spruill
Attorney—Gary, Parker, Jueffner, Pigott & Cullinan

ABSTRACT: A loader for open top cases having regular height sidewalls, and having end walls in which the portions adjacent the corners are of regular height, but the central portions are of reduced height. The articles to be loaded are propelled past the end of a cantilever support to drop into the case. The cantilever support is in the form of a thin plate which is narrow enough to be accommodated between the regular height portions of the end wall. The outside leading articles will engage against the regular height end wall portions to advance the case as the articles are deposited therein.



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SHEET 1 OF 2

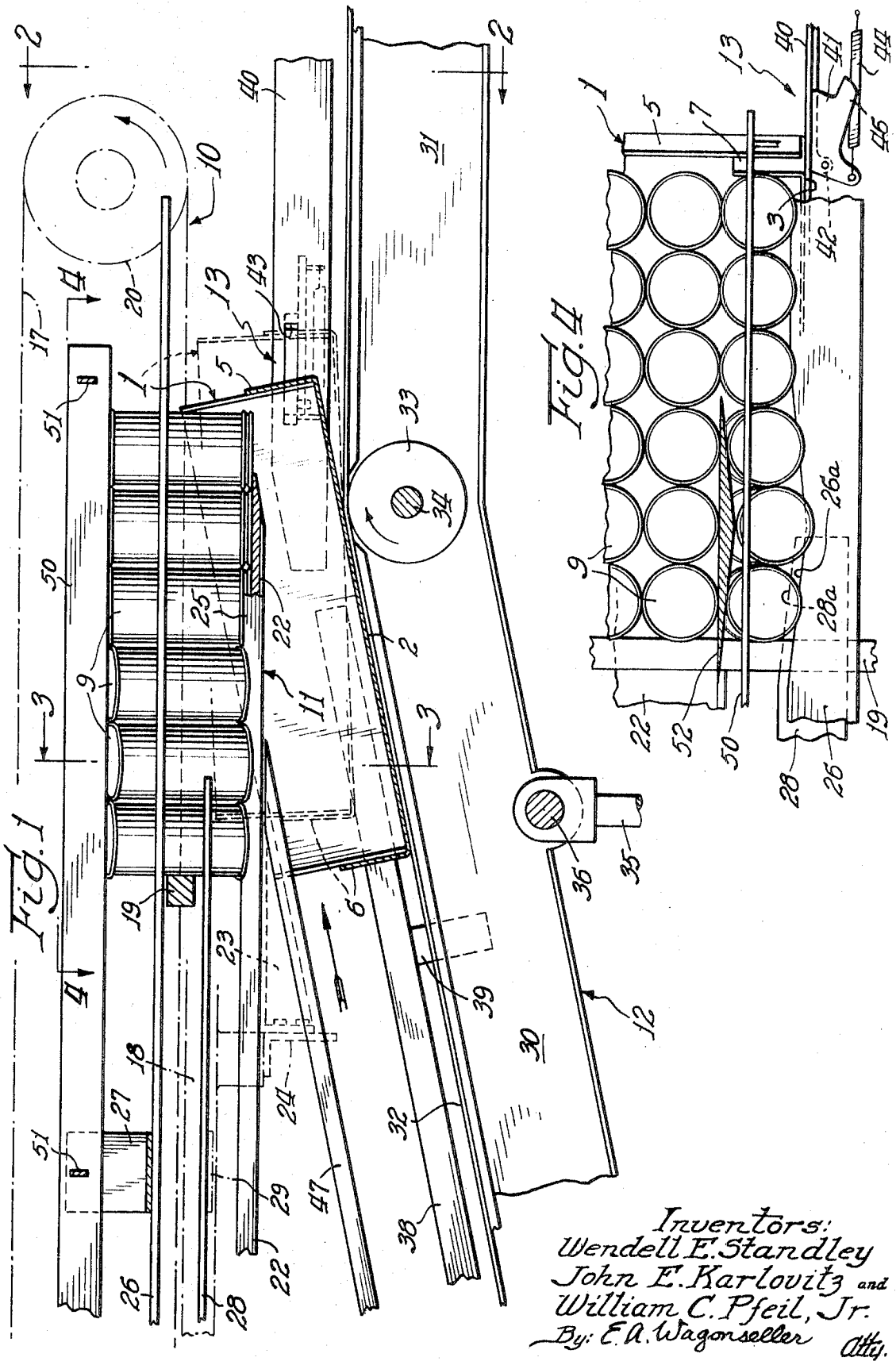


Fig. 1

Fig. 4

Inventors:
Wendell E. Standley
John E. Karlovitz and
William C. Pfeil, Jr.
By: E. A. Wagonseller Atty.

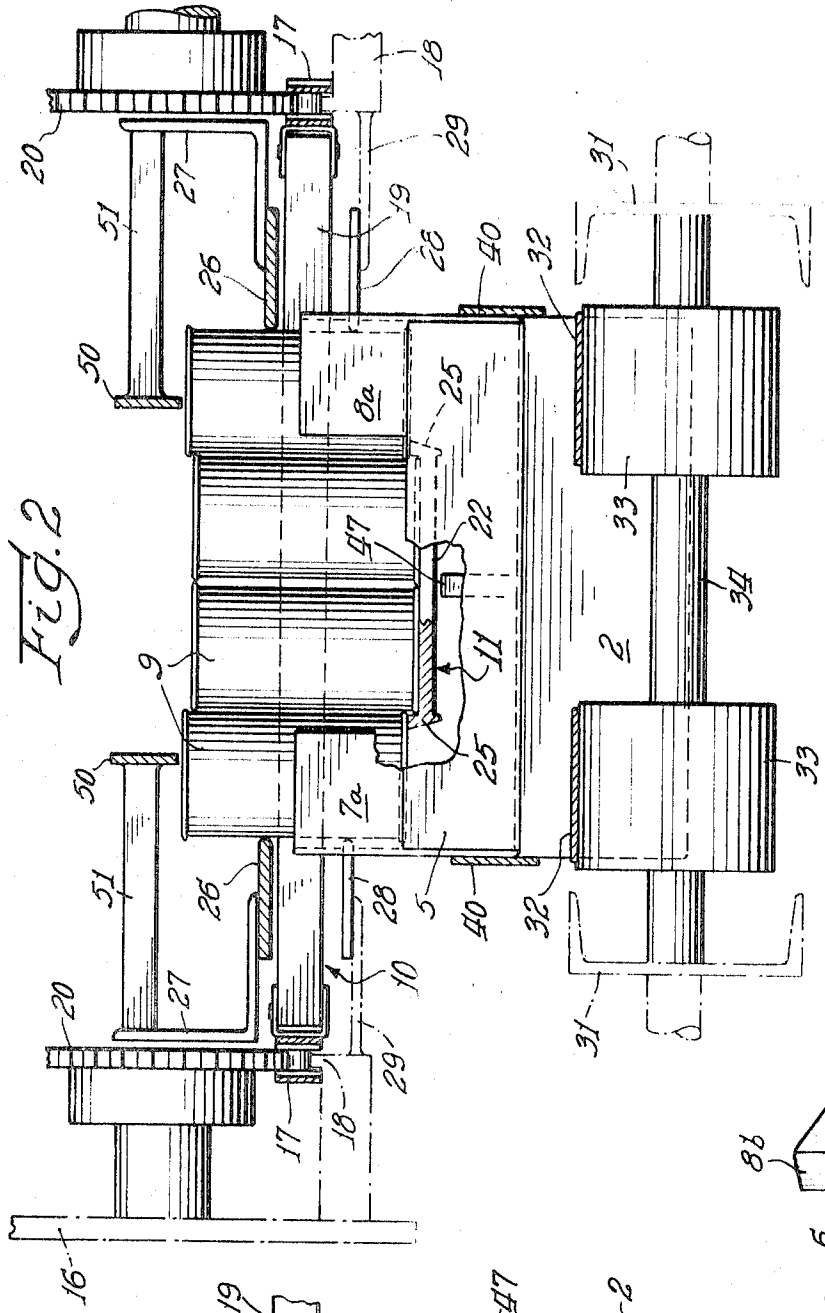


Fig. 2

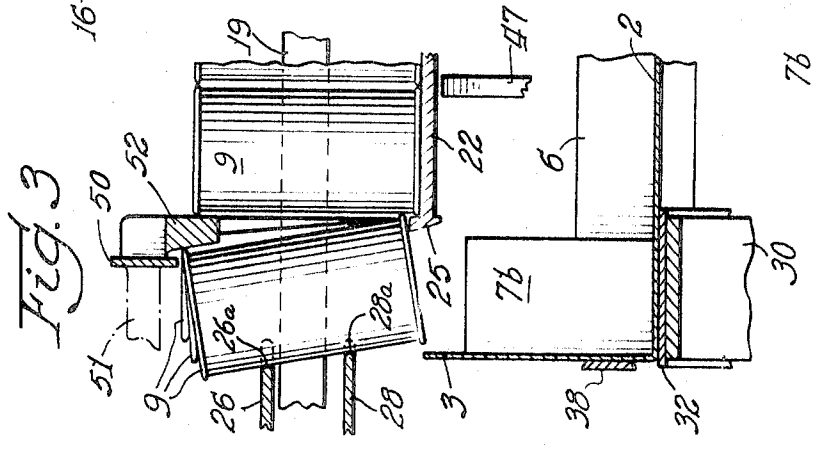


Fig. 3

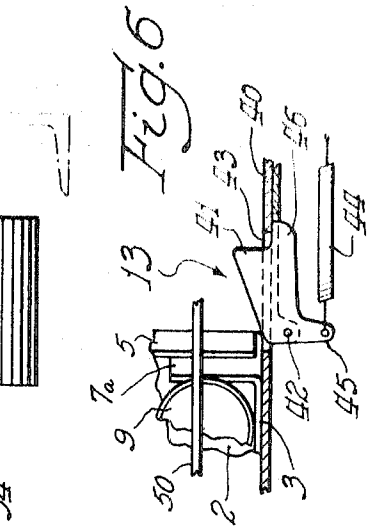


Fig. 6

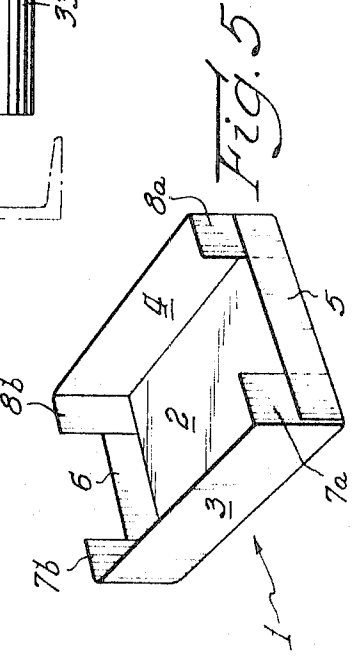


Fig. 5

CASE LOADER

The present invention pertains to the loading of opentop cases such as paperboard containers with or without cover flaps, and more particularly to the loading of such cases with groups of separate upright articles, such as cans and similar articles of cylindrical or other specific shapes. The invention is related to and in some respects is an improvement over mechanism such as disclosed in U.S. Pat. No. 3,377,774.

A principal object of the invention is to provide an effective, high-speed, article-group loading mechanism for loading cases of the type which have regular height sidewalls and with endwalls having a central section of reduced height and marginal or corner portions of a height comparable with that of the sidewalls.

An additional object is to provide improved article supporting and guiding mechanism for effectively guiding the articles into positions between the case sidewalls so that the entry of the articles within the case will be facilitated, thus permitting the use of cases having inside dimensions close to the dimensions of the article group to be contained in the case.

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

In the drawings

FIG. 1 is a somewhat schematic side elevational view, partly in section, of the case supporting and loading station of a machine made according to the present invention;

FIG. 2 is a vertical sectional view taken along line 2–2 looking in the direction of the arrows;

FIG. 3 is a fragmentary vertical sectional view taken along line 3–3 of FIG. 1, looking in the direction of the arrows;

FIG. 4 is a fragmentary plan view taken along line 4–4 of FIG. 1, showing the can group just before transfer of the cans to the empty case has begun;

FIG. 5 is a perspective view of a form of case which may be loaded by the mechanism herein disclosed; and

FIG. 6 is a fragmentary plan view showing the can stop member in retaining position.

For convenience, the mechanism of the present invention is illustrated and described as loading cylindrical cans, such as cans of beverage, but it is to understood that the use of the mechanism is not limited to articles such as cans, but is generally applicable to other specific shapes of upstanding articles.

As herein shown, a rectangular group of 24 cans is advanced along a support by a push rod conveyor to a loading station where an opentop case has been delivered by a suitable conveyor. At the loading point the cans are forced off the end of a cantilever member to cause them to drop into the case. The leading end of the case is yieldably held from advancing movement in a position where the leading cans will engage the leading case wall and advance the case as the cans are delivered therein.

Referring more particularly to the drawings, the preferred form of case for use with the disclosed mechanism will first be described. As shown in FIG. 5, the case, indicated as a whole at 1, may be made from a single blank of foldable paperboard, such as corrugated board. The bottom panel 2 of the case has sidewalls panels 3 and 4 hingedly supported on its opposite sides and end wall panels 5 and 6 hinged to opposite ends. The sidewalls 3 and 4 have hinged flaps 7*a*, 7*b* and 8*a*, 8*b* at their respective ends which are folded to form parts of the case end walls and are suitably connected by staples or adhesive to the respective end walls panels 5 and 6. It is to be noted that the width of the flaps 7 and 8 may be identical with the width of end panels 5 and 6 —that is, their vertical dimensions in the setup case. Thus, the case as shown can be formed from rectangular blanks with substantially no waste.

In general practice the case is made with a single cover flap carried by one of the walls 3 or 4; or it may be made with two half-size flaps, one each being hinged to walls 3 and 4. When the case is being loaded the cover flap or flaps will be held in

downwardly and outwardly inclined positions by guide rails, not shown, secured in any suitable manner on the machine frame.

The cans 9,9 will previously be formed in suitable groups, herein shown as a rectangular group of 24 cans arranged in rows six cans long and four cans wide. A pushrod conveyor, indicated as a whole at 10, is employed to advance the groups along a support, indicated as a whole at 11, to the loading station.

The cases 1 are preferably delivered to the loading station on a conveyor support means, indicated as a whole at 12, and are brought to rest in loading position by stop means, indicated at 13.

The pushrod conveyor 10 is supported on suitable frame members, not shown, and vertical frame members, one of which is indicated at 16. A pair of sprocket chains 17,17 supported on guide rails 18,18 (see FIG. 2), carry the ends of the spaced pushrods 19. The sprocket chains 17,17 pass around suitable driven head sprockets 20,20 rotatably mounted on frame members 16. Suitable tail sprockets (not shown) for chains 17 will also be employed. Full details of a similar push rod conveyor and drive means therefor are disclosed in U.S. Pat. No. 3,141,274.

The segregated groups of cans are advanced by the pushrods from the grouping section (not shown) onto the support 11, which essentially comprises a dead plate 22 secured to a bracket 23 supported on frame member 24. See FIGS. 1 and 2. The end of dead plate 22 extends over the case supporting belt conveyor 12 and terminates at the loading station to form a cantilever construction over the end of which the cans are dropped into the case. Details of similar cantilever loading constructions are disclosed in U.S. Pat. Nos. 3,141,274 and No. 3,377,774.

As shown in FIG. 2, the two center rows of cans are fully supported on the dead plate 22. The two outside rows are supported at their inner edge portions on flanges 25,25, formed on the longitudinal edges of the plate 22, and are additionally supported by side guide bars or plates 26,26 secured to frame members 27,27. See FIG. 2. The guide bars 26 extend along the can group path, and, as herein shown, are terminated adjacent the head sprockets 20,20 of the pushrod conveyor 10.

Supplemental side guide bars 28,28 may be employed to assist in accurate control of the outside rows of cans. These guide bars are secured to suitable frame members, as indicated at 29 in FIG. 2. The side guide bars 28,28 are terminated a short distance from the leading end of the case when in position at the loading station to avoid interference with the upper edges of the case walls.

The case conveyor 12 preferably comprises two frame sections 30 and 31 to support a pair of suitably driven belts 32,32 passing over rolls 33,33 rotatable on a shaft 34. In addition to supporting the belt rolls 33, the shaft 34 acts as a hinge element between the two conveyor frame sections 30 and 31. An adjustable supporting standard 35, hingedly connected to section 30 at 36, may be used at each side of the section 30 to support it at varying angles so that the case path may be adjusted in a desired manner with respect to the end of the cantilever member 22. In adjusting the end of conveyor section 30 up or down it is desirable to keep the section 31 approximately level.

The belts 32 may be driven by any suitable drive means and, in the use of the present mechanism, the belts are preferably constantly driven. The return runs of the belts 32 (not shown) may be supported in any desired manner, as by means of belt rolls secured to the frame sections 30 and 31.

The cases are fed in spaced relation onto the conveyor belts by any suitable well-known feeding means timed with the travel of the pushrods so that an empty case will arrive in position prior to the movement of the can group to the end of the cantilever support. Suitable means for feeding empty cases to a loading station are disclosed in U.S. Pat. Nos. 3,053,025 and 3,141,274.

As the cases advance on the conveyor belts they are preferably guided by side rails **38** (SEE FIG 1) supported on brackets **39** secured to the conveyor frame section **30**. Additional side guide rails **40** are supported on conveyor frame section **31**.

The conveyor section **30**, being disposed at a small angle to the article group path, is preferably adjusted to a position in which, as the case advances, the upper edges of the end wall panels **5** and **6** will move beneath the end of the cantilever member **22**.

As an empty case moves into loading position it is brought to a stop by a pair of yieldable stop members **13** which exert sufficient retention to hold the case as the belt continues to move beneath it, and which may be released readily by pressure of the cans as the leading outside cans bear against the leading wall portions **7** and **8** of the case.

As shown in FIGS. **4** and **6**, each stop member may comprise a bellcrank case-engaging element **41**, pivoted at **42** on a bracket secured on side guide rail **40**. A slotted opening **43** is formed in the guide rail through which the element **41** may move. A spring **44**, attached at one end to the arm **45** of the stop, tends to swing the stop inward. A projecting portion **46** arranged to engage the face of the guide rail limits the inward movement of the stop element. The construction of the stop member may take various specific forms.

As the case begins to advance, being propelled by the cans entering the case, the case-engaging portion **41** is displaced outwardly but will continue to bear against the case sidewall and exert some degree of retarding action, due to the spring tension, as the case is advanced.

In FIG. **6** the stop has been shown in case-retaining position, while in FIG. **4** the stop has been shown as just having moved to its released position in which it will merely bear frictionally on the case sidewall.

After the first row of cans enters the case, its leading end will tend to swing down about the angular hump in the belts **32** produced at the place where the belts pass over rolls **33** at the juncture of the angularly related frame sections. The altered position of the case is shown in broken lines in FIG. **1**. In order to control the swinging of the case, a guide bar **47** may be employed. This bar is secured to the frame below the cantilever bracket **23** and is inclined, as indicated, and its downstream end is preferably tapered to meet the under surface of the plate **22** at a point spaced from the end of the plate at a distance somewhat less than the length of the case to be loaded. Thus, as the case begins to receive its load and tips forward as it advances, the upper edge of the trailing end wall panel **6** will swing up against the bar **47** to control the downward swinging of the leading end of the case.

As soon as the wall **6** passes out of contact with the bar **47** the leading end portion of the case will be free to rest flat upon the portions of the belts traveling along conveyor section **31**.

Referring to FIG. **1**, it may be noted that the inclined, upper edges of the sidewalls intersect the plane defined by the dead plate cantilever member at a small angle. Thus, as the can group is advanced toward the waiting case, the curved, outer contours of the cans meet the inside edges of the sidewalls obliquely and tend to slide into the case with a spreading action. Therefore, in the event of any small disalignment of the case with the can group, the curvature of the entering can will tend to guide the individual cans safely within the case.

Referring to FIG. **2**, the outside rows of cans are supported somewhat higher than the center rows by reason of these cans moving along the upper surfaces of the flanges **25** on the plate **22**. By this arrangement the chimes of the outside cans do not bear against those of the inner can rows, thus slightly reducing the total width of the can group.

In order to facilitate the entry of the can group into the case and to reduce the need for exact positioning of the case relative to the path of the can group, means are provided to tip the cans in the outside rows outwardly immediately before each individual can begins to enter inside the adjacent sidewall. For this purpose the inside edge portions of the guide bars **26** are preferably formed with a relative gentle concave curvature, as indicated at **26*a*** in FIG. **4**. This curved part at its deepest point is located a sufficient distance back of the case stop **13** so that, when the leading can in each outside row reaches this point, the outer, bottom edge of the can will have swung downward and inward approximately to its maximum extent and, at approximately at the same time, the path described by this outer, bottom edge will intersect the plane defined by the upper edges of the sidewalls. Due to this action, the lower end of the tipped can clears the edge of the case wall as the can advances. This action is shown in FIG. **3**.

It is to be understood that each successive outside can will follow the same tipping pattern as it passes the curved part **26*a***. As shown in FIG. **1**, the first four cans of the row have entered the top part of the case; the fifth can is at the point of entering; and the last can in the row has just begun to tip and will reach the deepest point of the curve approximately as the case begins to swing toward level position.

The supplemental side guide bars are also formed with a curved portion **28*a*** conforming generally to the curvature formed in bar **26**. However, each bar **28** terminates approximately adjacent the deepest point of the curved part **26*a*** so that it will not extend far enough along the case path to be in a position to be engaged by the upper edge of the case wall as it swings toward horizontal position. As shown in FIG. **1**, the case is free to swing to horizontal position after the end wall panel **6** passes the end of the inclined guide bar **47**.

By the use of the guide bars **26** and **28** with their curved portions the cans in the outer rows will tip outward successively to facilitate entry of the cans within the case at the points where the cans are normally ready to enter. As soon as the individual cans have passed the deepest point of the curved portion their further advancing movement brings the cans back to upright positions as the cans reach the end of the curved portion. Shortly after the cans resume upright position they reach the end of the cantilever member and drop into the case.

Top can guide rails **50,50** are supported on bracket arms **51**, **51** secured to frame members **27**.

Lateral guide bars **52** (one of which is shown in plan in FIG. **4**) are preferably employed, particularly for high-speed operation, to cause the cans in the outside rows to tilt outwardly in a controlled or positive manner. These bars may be secured on the vertical faces of the top guide rails **50**. The functioning portions of the guide bars extend downwardly below the paths of the tops of the cans. The upstream end of each guide bar **52** is tapered to a thin edge so as to enter between the outside row and the adjoining row of cans. The bar is contoured to substantially follow the curved surface **26*a*** of side guide bar **26**. Thus, as the group advances, the cans in each outside row are tilted outwardly under full control of the lateral guide bar **52** on one side and the side guide bar **26** on the other. The downstream end of the bar **52** is tapered to a thin edge to follow the corresponding contour of the downstream part of the curve **26*a*** of the side guide bar **26**. The cans are thus controlled in their return to upright position as they advance.

To summarize the operation—the can groups are advanced in spaced relation along the support **11** to the loading station, at which a case **1** has been delivered and held at a small angle to the can group path while the case conveyor continues to operate. The cans are propelled off the end of the cantilever member **22** and, by such action, the leading cans in the outside rows engage the end walls panels **7*a*** and **8*a*** to propel the case as the cans drop therein. The case will tip toward a horizontal position as soon as the cans begin to enter. The forward movement of the case is restrained by the frictional action of the case stops **13** so that the cans will bear firmly against the leading case wall and assure the successful loading of the final row of cans. The loaded case is then carried to a desired point by the continuously operating case conveyor.

For convenience of description, the can group support means and the off-bearing conveyor section have been referred to as being horizontal, and the case delivery section

has been referred to as being inclined. It is desired that the positions of the various parts be understood as relative only, and that the case delivery conveyor could be horizontal and the can group support could be inclined or both could be inclined.

It is apparent that, before the cans reach the end of the cantilever member, the outside cans of the row are well within the confines of the sidewalls, and, as the leading cans engage the normal-height end wall sections, the case will tend to begin its tipping action as well as to begin the advance of the case, thus moving forward the top edge of the central end wall panel sufficiently to assure adequate space for reception of the center cans of the leading row.

While only a single embodiment of the invention has been disclosed, it will be understood that modifications can be made therefrom. Accordingly, it is desired that the invention be limited only by the claims which follow.

We claim:

1. In a mechanism for loading rectangular, open top cases with upstanding generally cylindrical articles of uniform size, such cases being of the type having interconnected side and end walls in which the sidewalls are of a height comparable to that of the articles to be loaded into the case and in which at least the leading end wall of an advancing case is formed with a central open area, the portions of the end walls adjacent the leading corners of the case being comparable in height to the sidewalls and the height of the central portion of the leading end wall being substantially less than that of the end wall portions adjacent the corners of the case, the combination of

an elongated, cantilever support means for a rectangular group of uniform, upstanding articles arranged in more than two laterally related rows and a sufficient number of rows to completely full the case,

a conveyor comprising a push rod to engage behind the article group and propel it along and past the discharge end of the cantilever support,

a case support upon which an open top case of the type described may be supported for advancing movement with its end walls in leading and trailing positions and with the end wall having the central open area disposed in leading position,

stop means associated with the case support for yieldably retaining an empty case with its leading end wall positioned adjacent the discharge end of the cantilever support,

the case support being disposed below the cantilever support and being inclined thereto at a small angle converging in the direction of advancing movement of the articles,

the discharge end section of the cantilever support having a width less than the width of the end wall opening in the case to be loaded but having a width sufficient to support minor portions of the bottoms of the articles in the respective outside rows of the article group, whereby the free outer end of the cantilever support is disposed at a height above the case support just sufficient to clear the free upper edge of the central portion of the case wall as the case is advanced, and whereby the front surface of the leading article in each of the outside rows as the article group is advanced will engage the upper edge of the respective corner portions of the leading end wall and initiate the advance of the case past the stop means as the leading article row is pushed off the discharge end of the cantilever support and drops into the case, and

additional guide means arranged above and adjacent each edge of the article group path, such additional guide means each comprising an elongated element supported in fixed position generally parallel with the article group path and having a narrow upstream end portion positioned to enter between the outside row and the adjacent inner row of articles as the group is advanced past such elongated element,

said elongated element having a surface extending downstream from its narrow end which is progressively contoured outwardly of the article path in general conformity in length and extent with the outward contour of the side guide means to cause the individual articles to tip outwardly in a controlled manner as the article group advances.

2. The invention as defined in claim 1, wherein the elongated element adjacent its downstream end portion is progressively curved inwardly of the article path in general conformity with the inward curve in the side guide means, to cause individual articles to tip back to normal upright position in a controlled manner as the article group advances.