July 21, 1964 B. J. NIGRELLI ETAL 3,141,274

CASE LOADER

Filed Jan. 10, 1963 3 Sheets-Sheet 1

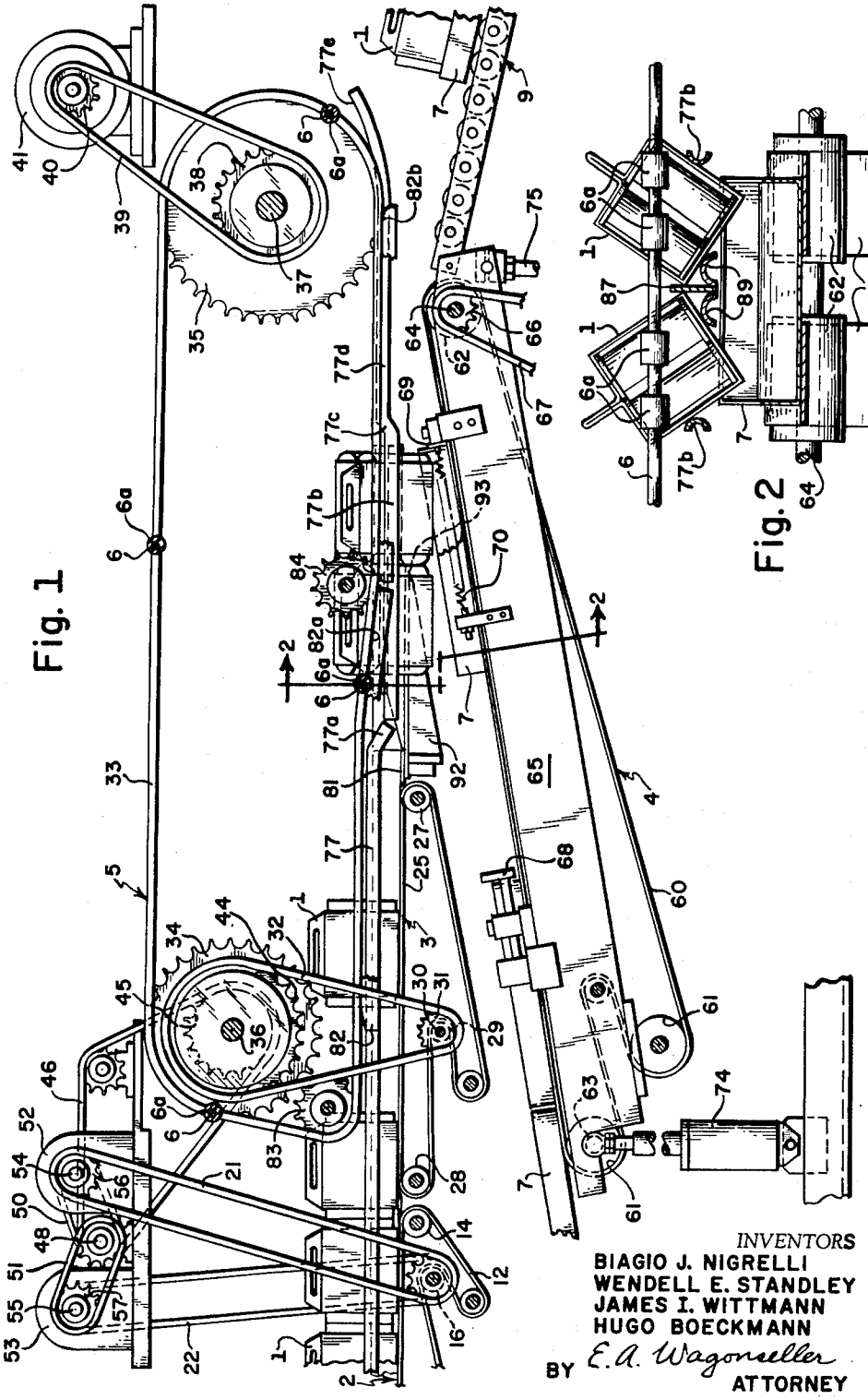


Fig. 1

Fig. 2

INVENTORS
BIAGIO J. NIGRELLI
WENDELL E. STANDLEY
JAMES I. WITTMANN
HUGO BOECKMANN
BY E. A. Wagoneller
ATTORNEY

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CASE LOADER

Filed Jan. 10, 1963 3 Sheets-Sheet 2

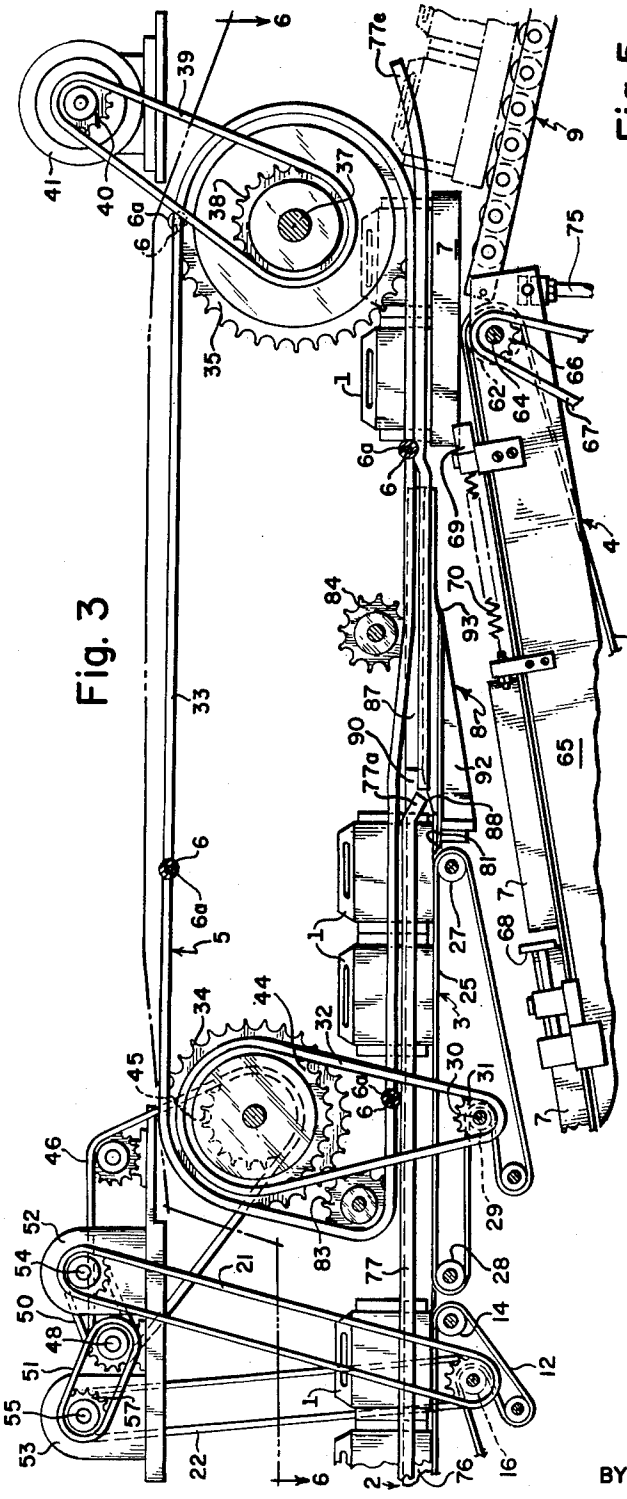


Fig. 3

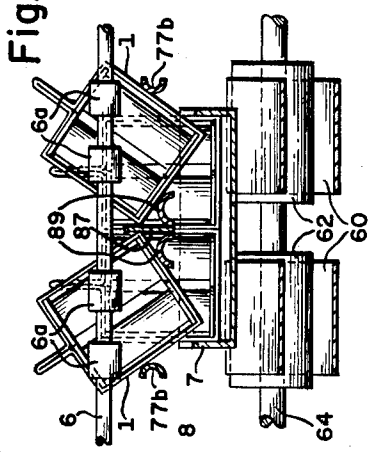


Fig. 5

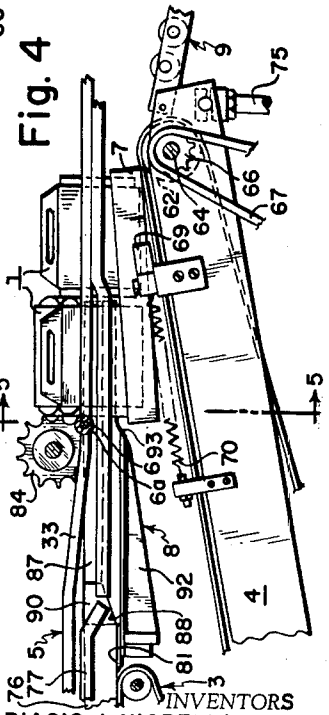


Fig. 4

INVENTORS
BIAGIO J. NIGRELLI
WENDELL E. STANDLEY
JAMES I. WITTMANN
HUGO BOECKMANN

BY E. A. Wagonseller
ATTORNEY

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CASE LOADER

Filed Jan. 10, 1963

3 Sheets-Sheet 3

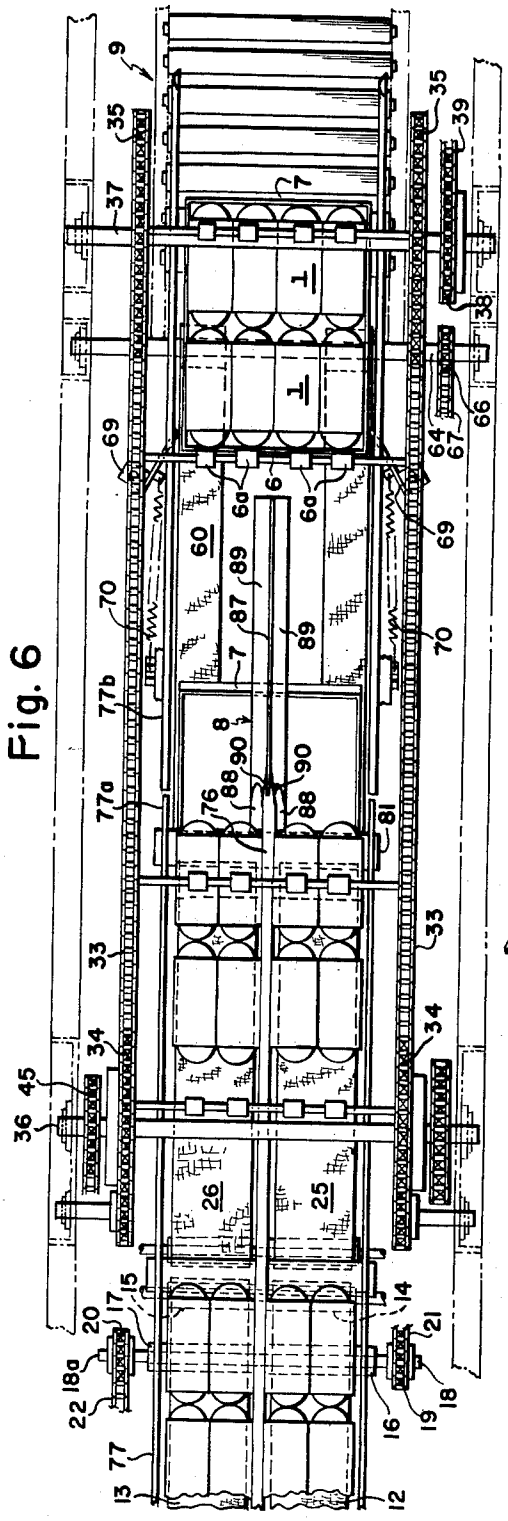


Fig. 6

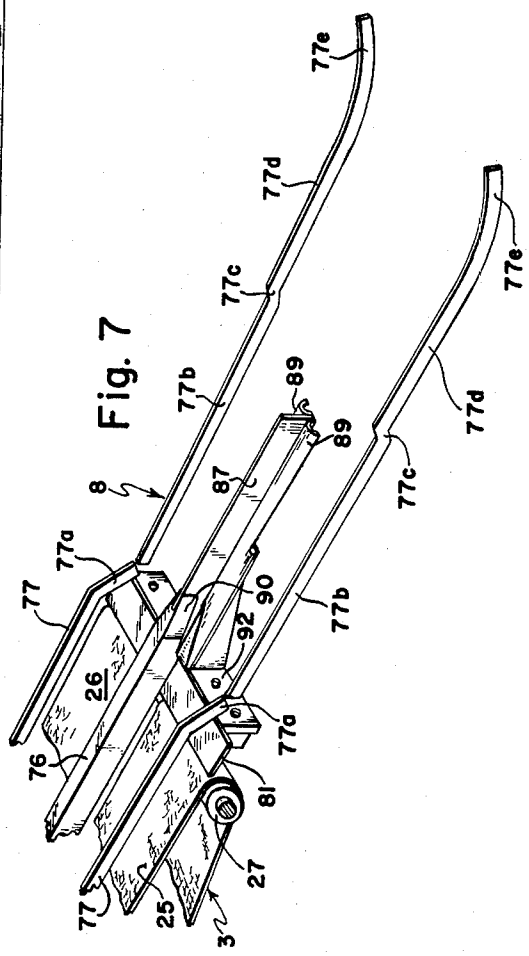


Fig. 7

INVENTORS
BIAGIO J. NIGRELLI
WENDELL E. STANDLEY
JAMES I. WITTMANN
HUGO BOECKMANN
BY E. A. Wagonseller
ATTORNEY

United States Patent Office 3,141,274 Patented July 21, 1964

3,141,274

CASE LOADER

Biagio J. Nigrelli, Northbrook, Wendell E. Standley, Lake Forest, and James I. Wittmann and Hugo Boeckmann, Park Ridge, Ill., assignors, by mesne assignments, to Johns-Nigrelli-Johns, Inc., Skokie, Ill., a corporation of Illinois

Filed Jan. 10, 1963, Ser. No. 250,543
21 Claims. (Cl. 53—48)

The present invention relates to loading or filling portable receptacles, such as the loading of a group of articles or packages into an open-top case or tray formed of paperboard or similar material.

The principal object of the present invention is to provide a continuously operating case loading mechanism designed to load groups of upstanding articles automatically into a succession of open-top cases or trays in a rapid, accurate and safe manner.

Another object of the invention is to provide a novel arrangement of guide elements over which groups of one or more pairs of upstanding articles, arranged side-by-side, may be moved, such guide elements being operatively associated with a case conveyor disposed at an angle to the guide elements, whereby advancing the article group, first along and subsequently off the end of the guide elements, will act to propel an open-top case to the article discharge point and then will deposit the article group into the case.

A further object of the invention is to provide a highly efficient form of article guide means over which the upstanding articles, in side-by-side arrangement, may be advanced and forced off the end of the guide to be deposited rapidly and accurately into a case moving below the guide, such case having internal dimensions fitting relatively closely about the articles which are deposited within the case.

A still further object of the invention is to provide a novel loading method by which a group consisting of a pair, or a succession of pairs, of upstanding articles, arranged side-by-side, may be advanced in a continuous movement, tilted apart and caused to engage the leading wall of an open-top case which is to receive the group, thereby forcing the case to move beneath the article group, and finally depositing the article group into the case.

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

In the drawings—

FIGURE 1 is a somewhat schematic, side elevational view of a case loading machine for loading can packages into open-top cases, and showing a case at the loading station engaged and ready to be moved forward by the leading packages of a group comprising two pairs of packages;

FIGURE 2 is a vertical sectional view taken along line 2—2 of FIGURE 1, looking in the direction of the arrows, showing how the guide elements provide for tipping of the can packages to cause them to engage and advance a case preparatory to the delivery of the packages into the case;

FIGURE 3 is a view similar to FIGURE 1, showing a group of packages in place within the case and moving to the discharge point, and also showing a group of packages being moved to the point where the packages are tipped apart preparatory to loading;

FIGURE 4 is a fragmentary side elevation, showing the leading pair of packages in position within the case and the trailing pair still held tilted by the guide elements;

FIGURE 5 is a vertical sectional view taken on line 5—5 of FIGURE 4 looking in the direction of the arrows;

FIGURE 6 is a horizontal sectional view taken along line 6—6 of FIGURE 3; and

FIGURE 7 is a fragmentary perspective view showing details of the guide elements over which the packages are propelled to the loading point.

The present invention may be used advantageously in the packaging of pairs of articles within open-top cases, containers or trays and, while the invention is illustrated to show the loading of two pairs of articles, it may be employed to advantage in the loading of single pairs or more than two pairs. In its preferred form the invention utilizes a feeding conveyor means on which two rows of articles are advanced in abutted relation. This conveyor delivers the articles onto a receiving conveyor. The feeding conveyor is controlled in a manner to cause separation of the articles in the direction of their travel. The articles are carried on the receiving conveyor to a plate aligned horizontally with the conveyor surface. The articles move partially onto the plate and come to rest briefly. The following pair of articles, spaced from the leading pair, will move up against the first pair of articles and both pairs of articles, arranged in abutted relation, will remain momentarily at the end of the receiving conveyor.

An overhead push-rod conveyor, having suitably spaced rods, then acts to advance the group of two pairs of articles. The delivery of the articles onto the receiving conveyor is timed so that a push rod enters the space created behind every other pair of articles carried on this conveyor. The push-rod entering into the space behind a trailing pair of articles will, in the usual case, reach and engage such trailing articles momentarily after such articles abut the leading pair of articles. As the push-rod continues its travel the two pairs of abutting articles are propelled onto a loading device which first causes the leading pair of articles to tilt away from each other as they advance. The outer lower edges of the articles are guided to move downward somewhat below the plane of the bottoms of the articles advanced on the receiving conveyor and plate at its discharge end. This causes the leading articles to engage the leading wall of an open-top tray or case releasably held at a small upward inclination below the path of travel of the articles. The tray is then propelled forward on an inclined path for a short distance and then brought to a position substantially parallel with the path of the conveyed articles. The articles, comprising the first pair pushed from the loading device, are free to settle or drop into the tray. This action is followed immediately by the trailing articles being tilted apart and then propelled to the discharge point of the loading device and deposited within the tray at the rear of the previously deposited articles.

A number of details of the mechanism herein disclosed are similar to those shown in the patent to Nigrelli et al., No. 3,053,025. These include features such as the base frame, the frame structure for supporting the overhead push-rod conveyor, and the control means for feeding cases or trays to the loading point.

Referring more particularly to the drawings, the articles to be loaded into the trays are shown as packages of six filled cans held within suitable open-end cartons somewhat shorter than the can rows whereby the end cans project from the ends of the cartons. The invention is equally well adapted for loading open-end packages in which the cartons extend to the ends of the can rows, or for loading packages with closed ends. The cases into which the groups of articles are loaded are herein shown as somewhat shallow trays which may be constructed of corrugated or solid fibre board. The packages or articles 1 are advanced in abutted relation on a delivery conveyor indicated as a whole at 2. The articles are transferred to a receiving conveyor, indicated as a whole at 3. The

delivery conveyor is preferably operated at a slower speed than the receiving conveyor and is otherwise controlled to create spaces between the conveyed articles on the receiving conveyor. A case or tray conveyor, indicated as a whole at **4**, is arranged to receive a supply of trays held in abutted relation and fed singly to the loading station in position to receive a group of articles.

A push-rod conveyor, indicated as a whole at **5**, is supported at a level above the receiving conveyor **3**. The push-rods **6**, **6** of this conveyor are suitably spaced and the lower run of the conveyor is guided to bring the rods into a path in which they will bear against the upper part of the trailing vertical faces of articles advanced by the receiving conveyor **3**. As herein shown, the trays **7**, **7** are designed to contain four articles and for this purpose the push-rods are so spaced and the speed of the conveyor **5** is such that a push-rod enters the space created between every second pair of articles carried on the receiving conveyor **3**.

The push-rods **6** propel the article groups from the end of conveyor **3** onto a loading device, indicated as a whole at **8**, which guides the articles causing them to tip apart and at the same time lowers their outside bottom edges. This causes portions of the leading faces of the articles to engage inside the front wall of the tray which is located at the loading station. The tray will be propelled by the advancing articles and, as the first pair of articles is pushed to the discharge point of the loading device, it is deposited into the tray. The articles forming the second pair are tipped apart in like manner and enter the tray as soon as they reach the discharge point. As they are dropped into the tray, the articles return to upright position and come to rest with their bottom surfaces positioned flat on the tray bottom.

After the trays are loaded they are discharged from conveyor **4** and are received upon a suitable conveyor **9**, herein shown as comprising a series of anti-friction rolls.

The delivery conveyor **2**, as herein disclosed, comprises two separate belts **12** and **13** arranged side-by-side and each arranged to carry a single row of articles in abutted relation. The belts **12** and **13** at their discharge end pass around separately mounted rolls **14** and **15** and around driving rolls **16** and **17** which are mounted on aligned but separate shafts **18** and **18***a*. See FIGURE 6. Sprockets **19** and **20** are secured on the ends of the respective shafts **18**, **18***a*. Around sprockets **19** and **20** pass driving chains **21** and **22**, driven by gearing to be described in due course.

The receiving conveyor **3** comprises two belts **25** and **26** passing over front and rear rolls **27** and **28** and over a common driving roll **29** mounted on shaft **30** having a sprocket **31** thereon around which passes a sprocket chain **32**, driven from gearing to be described below.

The push-rod conveyor **5** comprises a pair of sprocket chains **33**, **33** which carry the rods **6**, **6**. These chains pass around rear sprockets **34**, **34** and forward sprockets **35**, **35** mounted respectively on shafts **36** and **37** journalled at their ends in suitable bearings. The shaft **37** has a sprocket **38** fixed thereon over which passes a chain **39** which is driven by a sprocket **40** on the shaft of a motor **41** mounted on suitable supporting frame members.

In order to drive the receiving conveyor belts **25** and **26**, a sprocket **44** is fixed on shaft **36**. The chain **32** is arranged to pass around sprocket **44** to drive the sprocket **31**. The gear ratio is preferably such that the belts **25** and **26** will have the same lineal speed as the push-rod conveyor.

For the purpose of driving the delivery conveyor belts, a sprocket **45** is secured on the other end of shaft **36** from sprocket **44**. A chain **46** passes over sprocket **45** to a sprocket (not shown) on short shaft **48**. The shaft **48** is mounted in bearings (not shown) and has secured thereon a pair of small sprockets over which sprocket chains **50** and **51** pass to drive similar sprockets of clutches (not shown) arranged within the respective casings **52** and **53**. Short shafts **54** and **55**, driven respectively by these clutches have sprockets **56** and **57**, respectively, fixed thereon over which pass the chains **21** and **22** which drive the separate belts **12** and **13** of the delivery conveyor. The gear ratio is such that the belts **12** and **13** are driven at a lineal speed approximately one-half of the speed of the receiving conveyor belts **25** and **26** and the push-rod conveyor chains **33**. The clutches within the casings **52** and **53** are combined with suitable brake devices, and controls are employed to release the brakes and engage the clutches at intervals timed with the passage of the push-rods **6** on conveyor chains **33**. After the discharge of every second article from the separate belts of conveyor **2**, these belts are stopped and held for a brief interval to assure the creation of an adequate space between alternate groups of two successive articles for entry of a push-rod **6** within such space.

The details of the control mechanism for the belts of the delivery conveyor **2** are disclosed in pending application of Wendell E. Standley et al., Serial No. 270,310, filed April 3, 1963.

Due to the controls and slower speed of the delivery conveyor, the packages, arranged in abutted relation on the belts **12** and **13**, and transferred to the faster running belts **25** and **26**, will be received in spaced relation on these belts. Between alternate groups of two successive articles, the spaces between the articles as shown herein, will be approximately equal to three article lengths measured in the direction of travel. The timing is preferably such that a push-rod **6** will move into the space between articles at a distance of at least one-half an article length behind the article which such push-rod is to contact. The tray conveyor **4** is arranged in an upwardly inclined position beneath the article conveyor. While a single belt may be employed, two side-by-side belts **60**, **60** are herein illustrated, passing around rear roll **61** and front roll **62** mounted on shafts **63** and **64**, rotatable in bearings in side frame members **65**. Shaft **64** has a sprocket **66** fixed at one end over which passes a sprocket chain **67** connected with a suitable drive, not shown. During use of the machine, conveyor **4** is in continuous operation. Trays in abutted relation are delivered onto the belts **60** by a conveyor, not shown, ahead of conveyor **4**. The line of abutted trays is held by a stop **68**, controlled to release the trays singly and timed with the push-rod conveyor. The construction of the stop member **68** may be the same as that shown in the above mentioned Patent 3,053,025. As each tray is released it advances on the moving belt until it comes into contact with a pair of yieldable stops **69**, **69**. Each stop comprises a finger pivotally mounted on the frame on a vertical pin. The finger is free to swing forwardly but is held from rearward movement in a position at right angles to the conveyor. A coil spring **70** is connected to the stop at one end and to the conveyor frame at the other end to hold it in position. The belts **60**, sliding beneath the tray, will not produce sufficient force to move the tray ahead and displace the stops, but the stops are readily displaced when greater force is applied to the tray as will appear as the description proceeds. The speed at which the conveyor belts **60** are driven is approximately the same as, but not greater than the speed of the push-rod conveyor chains **33**. For practical purposes, the speed at which the conveyor belts **60** are driven may be slightly less than that of the chains **33**.

The side frame members **65** of the tray conveyor **4** extend somewhat beyond the belt roll **62** at the discharge end and suitable provision is made to connect roller conveyor **9** onto the frame members **65**. Conveyor **9** is preferably inclined downward so that the filled trays will be advanced by gravity. If desired, driven or live rolls may be employed instead of a gravity conveyor.

Suitable means are employed for vertical adjustment of the tray conveyor to adapt the mechanism for trays or containers of varying depths. For this purpose fluid pressure cylinder and piston mechanisms are provided, as

indicated at 74 and 75, located at opposite ends of the conveyor.

The details of the loading mechanism will now be described. As best illustrated in FIGURES 6 and 7, a central guide or separator is provided between the two advancing rows of articles. This is formed by a bar 76 which extends longitudinally between the conveyor belts 12 and 13 of conveyor 2 and belts 25 and 26 of conveyor 3. Side guide bars or rails 77, 77 are arranged at the sides of the conveyors 2 and 3 above the level of the belts in guiding relation with the mid-portions of the sides of the conveyed articles.

At the discharge ends of the belts 25 and 26 of conveyor 3 there is arranged a dead plate 81 over which the articles must pass. As viewed in FIGURE 3, when the article leaves the end of the conveyor belt and moves onto the plate 81, it will come to a stop as soon as the friction of the belt moving below the trailing part of the article is overcome by the friction of the plate. Thus the first pair of each group of four articles to be transferred from conveyor 2 to conveyor 3 will move onto the plate 81 and come to a stop. The second pair of articles will follow at approximately one article length and will move against the first pair. This moves the first pair of articles ahead slightly and the group of four articles will be at rest for a short interval until the push-rod 6, which has entered the space behind the trailing articles, moves into contact with such articles and begins to propel the group.

It is to be noted that the push-rods bear centrally against the rear faces of the articles along a contact area approximately aligned with the center of gravity of the articles. The push-rod conveyor chains 33 are guided along guide rails 82 which support the chains from beneath. At the receiving end of the push-rod conveyor the chains are held adjacent the guide rails by idler sprockets 83. At a point in advance of the forward edge of the plate 81 the guide rails have a short section extending downwardly at a small angle, as indicated at 82*a*. Beyond this section is an additional section 82*b* extending in parallelism with the first section 82 but on a lower level. At the juncture between sections 82*a* and 82*b* there are provided idler sprockets 84 serving to keep the chains against the guide rails. As shown, the sprockets 35 for the chains 33 have a greater diameter than that of sprockets 34 to compensate for the lower level of the chains 33 at the discharge end of the conveyor.

Among the essential features of the process of delivering the articles into the trays are to tip the articles apart, keeping their lower inner corners in close relation to each other, and bringing the outer lower corners of the articles down within the area enclosed by the tray side walls. In order to assure the prompt tipping or turning of the articles they are preferably partially rotated as they advance. In other words, the lower inner corners are preferably raised and the lower outer corners are lowered through corresponding distances and the change in the positions of the centers of gravity of the articles is kept at a minimum.

As best shown in FIGURE 7, at a point approximately at the outer edge of the dead plate 81, each of the side rails 77, 77 has a short, downwardly inclined section 77*a* communicating with a straight section 77*b* paralleling the first side rails 77, but at a lower level. This arrangement, taken with other structure allows the articles to tilt or rotate outwardly. In approximate lateral alignment with the inclined side rail sections and on each side of the center bar 76 are upwardly inclined guide surfaces 88, 88 which, as herein shown, are formed at the ends of guide rails 89, 89. A relatively thin center plate 87 is secured along its lower edge between the rails 89, 89 and extends rearwardly to join with the forward end of the bar 76. The juncture of the bar 76 and center plate 87 is aligned approximately above the inclined guide surfaces 88 of the rails 89, and the end portion of the bar 76 is preferably tapered to the meeting point with the plate 87 as indicated at 90, 90. The guide rails 89, 89 and center plate, as herein illustrated, form a cantilever construction and are of a length somewhat in excess of the total length of the package group measured in the direction of travel. These rails may conveniently be secured to, or formed as a part of, a bracket 92 suitably bolted on the main frame of the machine.

The tapered surfaces at the end of bar 76 tend to control the lateral movement of the lower article corners as the articles advance beyond such tapered surfaces. As soon as the articles have completely cleared the parts which cause them to tilt, they tend to assume the positions shown in FIGURE 2 in which the lower inner corners of the articles bear against the center plate 87, the bottoms of the articles bear against the rails 89, and the sides bear against the rails 77*b*.

As shown in FIGURES 1 and 3, the side guide rails 77*b* extend forwardly beyond the ends of the guide rails 89, 89 and terminate below the upward curve of the push-rod chains 33 as they pass around the sprockets 35, 35. At points approximately in line with the ends of rails 89, 89 the side guides are curved upwardly as indicated at 77*c* and continue forwardly as horizontal sections indicated at 77*d*. The end portions of the side rails are preferably curved upwardly as indicated at 77*e*. The sections 77*d*, extending on a higher level than the sections 77*b* are provided for the purpose of adapting the mechanism for handling articles, such as can packages, of somewhat greater height than the articles illustrated. The center of gravity of the taller articles is higher and the positions of the sections 77*d* enable them to facilitate the prompt return of the taller articles to vertical positions. This enables the taller articles to be loaded into trays at a machine speed comparable to that for the articles illustrated.

In FIGURE 1 a group of articles is shown supported in tilted position on the central, cantilever rails 89 and side rail sections 77*b* with the leading faces of the group approximately in line with the ends of rails 89 and with the leading lower corner face portions of the article group approximately in contact with the inner surface of the leading wall of the tray. At this point the tray has been held by the spring-loaded, releasable stops 69 with the conveyor belts 60 slipping beneath the empty tray.

As shown in FIGURE 3, a group of articles projecting over the dead plate 81 and extending partially over the inclined guide surfaces 88 will remain in this position for a short interval until the oncoming push-rod 6 reaches the rear faces of the articles and begins to propel them. The inside lower corners of the leading articles of the group move along the inclined guide faces causing these corners to rise and at the same time the articles begin to pass the inclined side guide sections 77*a* which allows the outside walls of the articles to swing outward and downward. This movement continues until the two leading articles assume a fixed tilt and thereafter move without additional rotation, supported on one side by the rails 89, contacting the under surface of the articles, and on the other side by the rail sections 77*b* contacting the article side walls. The following two articles will thereafter be moved in the same manner as the leading articles, thus bringing all articles into supported position as shown in FIGURE 1.

The tray when propelled by the leading faces of the articles will first displace the spring loaded stops 69 and continue to move along the conveyor 4. As the tray conveyor belt travels at the same speed or very slightly slower than the speed of the push-rods, the tray will tend to drag somewhat on its belts and this will tend to keep the leading faces of the articles in firm engagement with the tray wall. In addition, the tension of the springs of stops 69 will cause them to bear with some degree of

friction along the tray side walls and create a further resistance to the forward movement of the tray.

After the leading articles have propelled the tray to a point where the trailing ends of these articles have cleared the cantilever guide rails 89, the articles swing back toward each other and drop into the tray. While the articles are dropping they are guided laterally by the side rails. The pressure exerted along the upper edge of the leading tray wall by the faces of the articles tends to cause the trailing end of the tray to begin to swing upward toward a position in which the leading article faces are in flat contact with the leading tray wall. If desired, the movement of the trailing end of the tray may be controlled by forming a curved contour line as indicated at 93 on the underside of the bracket 92.

After the leading articles have been loaded, the positions of the articles and tray will be substantially as shown in FIGURE 4. Upon further advance of the article group and tray and approximately at the time the mid-portions of the leading articles are at the crest of the incline of the conveyor 4 the two trailing articles will clear the cantiliver guide rails whereupon they will drop into the tray to complete the loading. It is to be noted that the push-rod will still be in propelling relation with the trailing articles along a contact line spaced above the edge of the tray rear wall. The push-rod will remain in propelling condition until the end of the tray has passed the crest of belt roll 62 and the tray has begun to advance by gravity on roller conveyor 9.

The push-rods 6 are preferably provided with short sleeve sections 6*a*, 6*a* formed of rubber or other suitable material, and positioned to engage the article ends in areas inside the contour of the top, bottom and side walls of the article. This arrangement is desirable in handling packages of cans enclosed within open-top wrappers in which the top, bottom and side walls extend the full length of the can rows. The sleeve sections 6*a* will thus bear only upon the cans and will not tend to tear or deform the edges of the carton walls.

From the foregoing it is apparent that the present invention provides a tray or container loading device and method to effect the delivery of one or more pairs of upstanding articles in side-by-side relation rapidly and accurately into trays in a substantially continuous operation. By tilting the articles laterally away from each other and keeping their inner lower corner edges in close relation, the distance between the outer lower edges is less than the combined width of the articles when arranged in side-by-side contact. Thus the tipped-apart articles may readily be inserted partially within a close fitting tray without requiring a high degree of accuracy as would be necessary if the articles were to be inserted in a group into the tray without tipping them.

The articles to be loaded may be grouped on the receiving conveyor 3 in any desired manner without affecting the loading of the trays. For example, a group of four or more articles could be formed prior to their delivery upon the receiving conveyor and delivered to such conveyor in such groups. It is also not necessary in carrying out the invention that the article groups be brought to a stop before the groups are advanced by the push-rod.

While it is preferred to employ a belt conveyor to deliver trays to their loading station, it is obvious that the trays could be delivered by hand into loading position and that a support means may be employed at the loading station along which the tray is merely slid instead of resting upon a moving belt.

It is to be understood further that the mechanism as disclosed may be employed to load containers with hinged cover flaps, such flaps are merely folded outwardly of the container and so held while loading. No part of the mechanism will obstruct the passage of containers with hinged cover flaps opened to outwardly extended position.

For simplicity of description various elements of the invention are referred to as being horizontal and others are referred to as inclined to the horizontal. It is desired that references to vertical, inclined or horizontal positioning of parts be considered in a relative rather than a limited sense.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. The method of loading a group of two upstanding, uniform size articles into an open-top tray or case, which comprises advancing the article group in a fixed path along a cantilever support with the articles arranged in upright position, side-by-side, supporting an open-top, rectangular, four-wall tray closely beneath such path at a small angle converging upwardly toward such path in the direction of movement, tilting the articles laterally outward away from each other during their advance to bring their leading lower portions into engagement against the inside surface of the leading wall of the tray to propel the tray, continuing to advance the article group and tray and concurrently raising the trailing end of the tray to bring it into approximate parallelism with the path of travel of the articles, and finally moving the articles off the cantilever support to let them drop into the tray and assume a supported position on the tray bottom.

2. The method of loading a group of two pairs of upstanding, uniform size articles into an open-top tray, which comprises advancing the article group in a fixed path along a cantilever support with the articles in the pairs arranged in side-by-side upright position, with one pair in advance of the other, supporting an open-top, rectangular tray closely beneath such path at a small angle converging upwardly toward such path, tilting the articles in the advance pair laterally outward away from each other during advance of the group to bring the leading lower portions of the advance pair into engagement against the inside surface of the leading wall of the tray to propel the tray, continuing to advance the article group and tray and concurrently raising the trailing end of the tray to bring it into approximate parallelism with the path of travel of the articles, and moving the pairs of articles successively off the support to drop successively into the tray.

3. The method of loading a group of two pairs of upstanding, uniform size articles into an open-top tray, which comprises propelling the article group by a pushing element in a fixed path along a cantilever support with the articles in the pairs arranged in upright, side-by-side position with one pair in advance of the other, supporting an open-top, rectangular, four-wall tray closely beneath such path at a small angle converging upwardly toward such path, successively tilting the articles in the leading and trailing pairs laterally outward and downward away from each other during the advance of the group, first to bring the leading lower portions of the leading pair into engagement against the inside surface of the leading wall of the tray to propel the tray, continuing to propel the article group and tray and concurrently raising the trailing end of the tray to bring it into approximate parallelism with the path of travel of the articles, moving the leading pair of articles off the end of the support to drop into the tray, the tilted trailing pair, after the leading pair drops into the tray, serving to propel the tray by contact of the leading lower portions of the trailing articles with the trailing surfaces of the leading articles, and finally moving the trailing pair of articles off the end of the support to drop into the tray behind the leading pair of articles.

4. The method of loading a group of two upstanding, uniform size articles into an open-top, rectangular tray dimensioned to receive the articles in close fitting rela-

tion, which comprises advancing two such articles along side-guides and central cantilever guides to support the articles in positions inclined away from each other and with their adjacent lower edges in close relation, concurrently advancing a rectangular, open-top tray in position beneath the articles with the lower portions of the leading faces of the articles in close relation to the inside surface of the leading wall of the tray and with the inclined outer walls of the articles in close relation respectively to the upper edges of the two opposite lateral tray walls, and continuing the advance of the tray and the articles in such positions until the articles are moved beyond the central guide, thereby allowing the articles by action of gravity to tilt back toward each other and drop into the tray in upright position.

5. The method of loading a group of two upstanding, uniform size articles into an open-top, four-wall, rectangular tray dimensioned to receive the group of articles in close fitting relation, which comprises advancing such open-top tray on a conveying means, advancing a pair of such upstanding articles arranged laterally of the direction of movement and in registration above the open top of the tray, supporting the articles in tipped-apart positions during their advance with their lower inner edges in close relation and their opposite lower edges disposed below the inner edges, relatively moving the tray and article group into positions during their advance to bring the inclined outer side walls of the articles into close relation to the upper edges of the tray side walls, and discontinuing the prior support of the articles during further advance to allow the articles to slide downward by gravity along the edges of the tray walls and into upright, side-by-side position on the bottom of the tray.

6. In a mechanism for loading rectangular, four-wall, open-top trays, the combination of an elongated cantilever guide means for a group of upstanding articles arranged side-by-side in pairs with one pair in advance of the other and in abutted relation thereto, a conveyor including a pushing element to engage the trailing articles of the group to advance the group along the cantilever guide means and past the end thereof, said guide means including a flat, generally horizontal section and an elongated central guide member communicating with the flat section to support the inner adjacent bottom portions of each pair of laterally related articles, side-guide members on each side of the central guide and spaced sufficiently therefrom to cause tilting of the articles outwardly by gravity and allow the lower outer portions of the articles to assume positions below the level of the flat section of the cantilever guide means, a tray support on which an open-top tray, having internal dimensions closely fitting the article group, may be supported for advancing movement, said tray support being inclined upwardly in the direction of movement of the conveyor to locate the upper edge of the leading wall of the tray within the path of the lower face portions of the leading articles in the advancing group to propel the tray by means of the articles, said tray support having a portion extending beyond the end of the central guide member and on which portion the advancing tray will be caused to travel when the leading pair of articles has been pushed off the end of the central guide member and deposited within the tray.

7. In a mechanism for loading four-wall, rectangular, open-top trays, the combination of an elongated cantilever guide means for a group of at least one pair of upstanding articles arranged side-by-side, a conveyor including a pusher element to engage the articles to advance them along the cantilever guide means and past the end thereof, said guide means including a flat, generally horizontal section and a central guide member communicating with the flat section, and having an upwardly inclined portion over which the adjacent bottom edges of the laterally related articles will move to tilt the top portions of the articles outwardly away from each other, such central guide member having a straight, generally horizontal portion beyond the inclined portion to hold the articles tilted as they advance, side-guide means on each side of the central guide and spaced sufficiently therefrom to allow the lower outer portions of the articles to assume positions below the level of the straight portion of the central guide, a tray support on which an open-top tray, having internal dimensions closely fitting the article group, may be supported for advancing movement, said tray support being disposed below the central guide and being inclined upwardly in the direction of movement of the conveyor to locate the upper edge of the leading tray wall within the path of the lower face portions of the articles to propel the tray by means of the articles, said tray support having a portion extending beyond the end of the central guide and on which portion the advancing tray will be caused to travel when the pair of articles has been pushed off the end of the central guide by the article conveyor and deposited within the tray.

8. In a mechanism for loading four-wall, rectangular, open-top trays, the combination of an elongated cantilevel guide means for a group of at least one pair of upstanding articles arranged side-by-side, a conveyor including an element to engage the articles to advance them along such guide means and past the end thereof, said guide means including a flat, generally horizontal section and a central guide member communicating with the flat section and having an upwardly inclined portion over which the adjacent bottom edges of the laterally related articles will move to tilt the top portions away from each other, said central guide member having a straight, generally horizontal portion beyond the inclined portion to hold the articles tilted as they advance, side-guide means on each side of the central guide and spaced sufficiently therefrom to allow the lower outer portions of the articles to assume positions below the level of the flat section of the cantilever guide means, a tray support on which an open-top tray, having internal dimensions closely fitting the article group, may be supported for advancing movement, said tray support being disposed below the cantilever guide means and being inclined upwardly in the direction of movement of the conveyor to locate the upper edge of the leading tray wall within the path of the lower face portions of the articles to propel the tray by means of the articles, said tray support having a portion extending beyond the end of the central guide member on which portion the advancing tray will be caused to travel when the articles have been advanced beyond the end of the central guide and deposited within the tray.

9. A tray loading mechanisim, as defined in claim 7, in which a thin, vertically positioned, elongated plate is disposed symmetrically along the central guide member against which plate the adjacent lower edges of the articles may slide during their advance.

10. A mechanisim for loading rectangular, four-wall, open-top trays with upstanding articles, comprising in combination, conveying means for advancing pairs of articles in side-by-side relation, tray conveying means for such open-top trays arranged below the article conveying means at an angle inclined upwardly in the direction of movement, means for releasably holding a tray with its trailing wall below the plane of article movement and with the upper portion of its leading wall arranged to be engaged by the lower face portions of the leading articles, a loading device arranged to receive conveyed articles for discharge into a tray releasably held on the tray conveyor, the article conveying means including a pusher element for propelling the articles along the loading device, such loading device including a central, forwardly extending cantilever guide member for supporting the side-by-side articles along their adjacent bottom portions, and including forwardly extending side guides, said side guides being disposed outwardly of the central guide and at such level with respect

thereto to allow the articles of each conveyed pair to tip outwardly away from each other and to bring the lower face portions of the articles into a path to cause them to engage the inside surface of the leading wall of a tray held by the releasable holding means to propel the tray by the conveyed articles, said tray conveying means having a portion extending beyond the end of the central guide member and the releasable tray holding means, whereby the articles propelled by the pusher element beyond the end of the central guide member continue their entry into the tray initially in outward tipped arrangement and move to upright position therein, resting on the tray bottom wall as the tray is propelled on the tray conveying means.

11. A mechanism for loading rectangular, four-wall, open-top trays with upstanding articles, comprising, in combination, a receiving conveyor, means for arranging two side-by-side related pairs of articles, one behind the other, on the receiving conveyor, an article group conveyor including spaced propelling elements, means for driving the article group conveyor to engage and propel an article group off the receiving conveyor, a cantilever tray-loading device operatively positioned at the discharge end of the receiving conveyor, a tray loading station comprising a conveyor arranged below the loading device and on which a tray at the loading station on such conveyor may receive articles discharged from the loading device, means included in said loading device for guiding successive, side-by-side pairs of conveyed articles into juxtaposed, outwardly tipped position to bring their lower portions into closer relation than the distance between the tray side walls, said article group conveyor extending beyond the discharge end of the cantilever loading device, whereby the article groups may be pushed off the loading device and deposited within the tray.

12. A mechanism as defined in claim 11, in which the tray conveyor is inclined upwardly at a small angle in the direction of travel, and spaced closely below the cantilever tray-loading device, whereby the lower face portions of the tipped-apart, leading articles of an article group to be loaded will engage inside the leading wall of the tray to be loaded and propel the tray as the articles are advanced along the cantilever loading device.

13. A mechanism as defined in claim 12, in which there are provided yieldable means located at the sides of the tray conveyor along the path of tray movement, said yieldable means being adapted to bear frictionally upon the sides of an advancing tray with a retarding action to cause the leading articles in a propelled article group to bear firmly against the leading tray wall as the articles are propelling the tray.

14. In a mechanism for loading rectangular, four-wall, open-top trays, the combination of an elongated cantilever guide means for a group of upstanding articles arranged side-by-side, the loading mechanism being adapted for use with a conveyor arranged to engage and advance article groups along the guide means and past the end thereof, said guide means including a flat, generally horizontal section and a central guide member communicating with the flat section to support the inner adjacent bottom portions of the pairs of laterally related articles, and side-guide members on each side of the central guide and spaced sufficiently therefrom to cause tilting of the articles by gravity as the articles are propelled off the horizontal section and to allow the lower face portions of the articles to assume positions below the level of the horizontal section.

15. In a mechanism for loading four-wall, rectangular, open-top trays, the combination of an elongated cantilever guide means for a group of upstanding articles arranged side-by-side, the loading mechanism being adapted for use with a conveyor arranged to engage the articles to advance article groups along the guide means and past the end thereof, said guide means including a flat, generally horizontal section and a central guide member communicating with the flat section and having an upwardly inclined portion over which the adjacent bottom portions of the laterally related articles may move to tilt the top portions of the articles outwardly away from each other, the central guide member having a straight, generally horizontal portion beyond the inclined portion to hold the articles tilted as they advance, and side-guide means on each side of the central guide to limit the tilting of the articles, said side-guides being spaced sufficiently from the central guide member to allow the lower face portions of the articles to assume positions below the level of the straight section of the central guide member.

16. In a mechanism for loading four-wall, rectangular, open-top trays, the combination of an elongated cantilever guide means for a group of upstanding articles arranged side-by-side, the loading mechanism being adapted for use with a conveyor arranged to engage the articles and advance them along the cantilever guide means and past the end thereof, said guide means including a flat, generally horizontal section and a central guide member extending beyond the flat section, said central guide member having an upwardly inclined section communicating with the flat section over which inclined section the adjacent bottom portions of the laterally related articles may move to tilt the top portions of the articles outwardly away from each other, such central guide member having a straight, generally horizontal portion beyond the upwardly inclined section to receive contact by the bottom portions of adjacent articles and hold them tilted as they advance, a thin elongated plate element, disposed in a vertical plane, extending symmetrically longitudinally of the central guide member to receive contact by the adjacent lower portions of the articles advancing along the central guide member, separating means located upstream with respect to the upwardly inclined section of the central guide member for laterally spacing the adjacent articles moving over the flat, horizontal section, said separating means being tapered symmetrically adjacent said upwardly inclined section to provide surfaces intersecting respectively the opposite surfaces of the thin plate element, whereby the lower adjacent portions of the advancing articles, as they move over the upwardly inclined surfaces, will move toward each other to come into contact with opposite sides of the thin plate element and thereby effect lateral, outward rotation of the respective articles about axes located inside their cross-sectional areas taken transversely to the direction of movement, and side-guide members spaced laterally from the central guide member at each side thereof to receive contact by the outwardly inclined sides of the articles and limit their tilting.

17. In a mechanism for loading a rectangular, four-wall, open-top tray, the combination of a cantilever support and guide member on which a group of two upstanding, rectangular shaped articles, arranged in side-by-side relation, may advance to and be discharged off its free end, an elongated tray support for conducting open-top, rectangular trays therealong, such trays being of the type having upstanding walls to receive the articles in close fitting relation, the tray support being operatively arranged beneath and at a small converging angle to the cantilever guide member and extending beyond the free end thereof to conduct trays past the end of such guide member and receive articles into the tray as the tray advances, yieldable tray-retaining means for releasably holding a tray in an initial loading position on the tray support with the upstanding leading wall of the tray located adjacent the discharge end of the cantilever guide member and disposed transversely of the path of travel of the tray, said cantilever guide member including adjacent its discharge end supporting surfaces for the side-by-side related articles arranged at an inclination to each other to cause such articles to assume an inclina-

tion outwardly away from each other with their lower adjacent corner portions in close juxtaposition, means for moving groups of side-by-side related, upstanding, rectangular articles along and off the discharge end of the cantilever guide member, such guide member at its discharge point being related to the leading tray wall so as to cause the lower leading portions of the articles being discharged to engage inside the leading tray wall and cause advance of the leading portion of the tray past the yieldable retaining means, whereby, upon further advance, the articles will drop into the tray after such articles are discharged from the cantilever support member.

18. A tray loading mechanism, as defined in claim 17, in which means is provided for forming a segregated group of articles to be delivered into a single tray.

19. The method of loading a group of upstanding, uniform-size, rectangular shaped articles arranged in side-by-side relation, into an open-top tray, which comprises advancing such article group in a fixed path along and toward the discharge end of an elongated cantilever support with the articles grouped in upright, side-by-side relation and with the leading edge of the group disposed at right angles to the path of travel, providing a tray supporting and conveying surface extending at a small, forwardly converging angle beneath the article support and beyond its discharge end, yieldably retaining on the tray supporting surface a four-wall, rectangular, open-top tray below the article discharge end of the cantilever

support, with its upstanding leading wall disposed at right angles to the path of article travel on the article support, and spaced forwardly of the discharge end of such cantilever support, tilting apart the side-by-side related articles of the article group, keeping their lower inner corners in close relation, moving such article group toward and beyond the discharge end of the article support to cause its leading, lower portion first to enter inside the tray and engage against the upper, inner face portion of the leading wall to overcome the yieldable tray retention and move the tray with the article group, and continuing the movement of the article group and tray, causing the article group to move past the discharge end of the cantilever support and to drop into the tray.

20. A method of loading trays, as defined in claim 19, which includes forming a segregated group of articles prior to the advance of the article group into contact with the tray.

21. A tray loading mechanism, as defined in claim 17, in which the tray support includes a gravity conveyor section extending beyond the tray loading point to receive and advance a loaded tray thereby to clear the loading point to receive an empty tray.

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