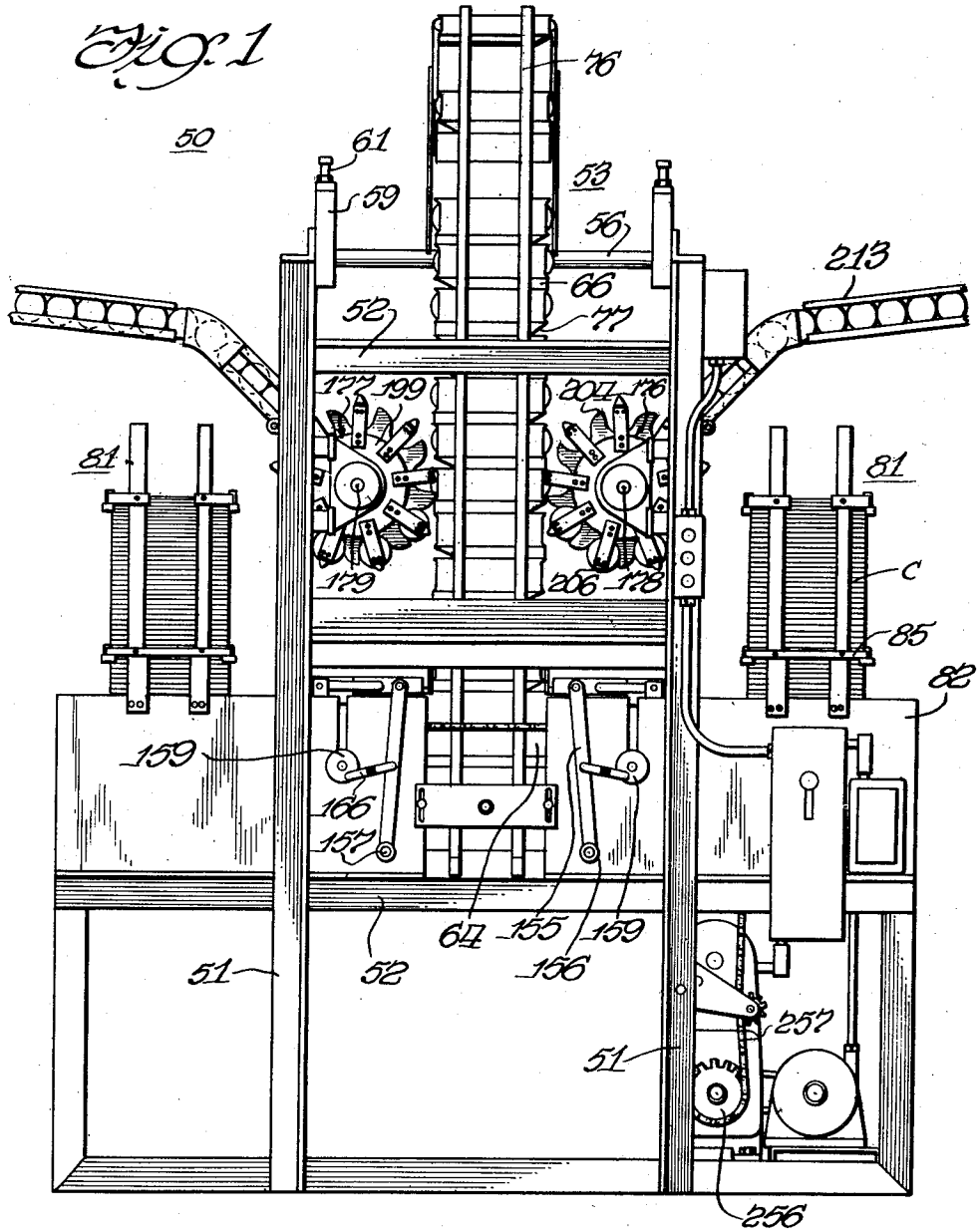
Nov. 20, 1956 B. J. NIGRELLI 2,770,935

CARTON LOADING MACHINE

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Fig. 1



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CARTON LOADING MACHINE

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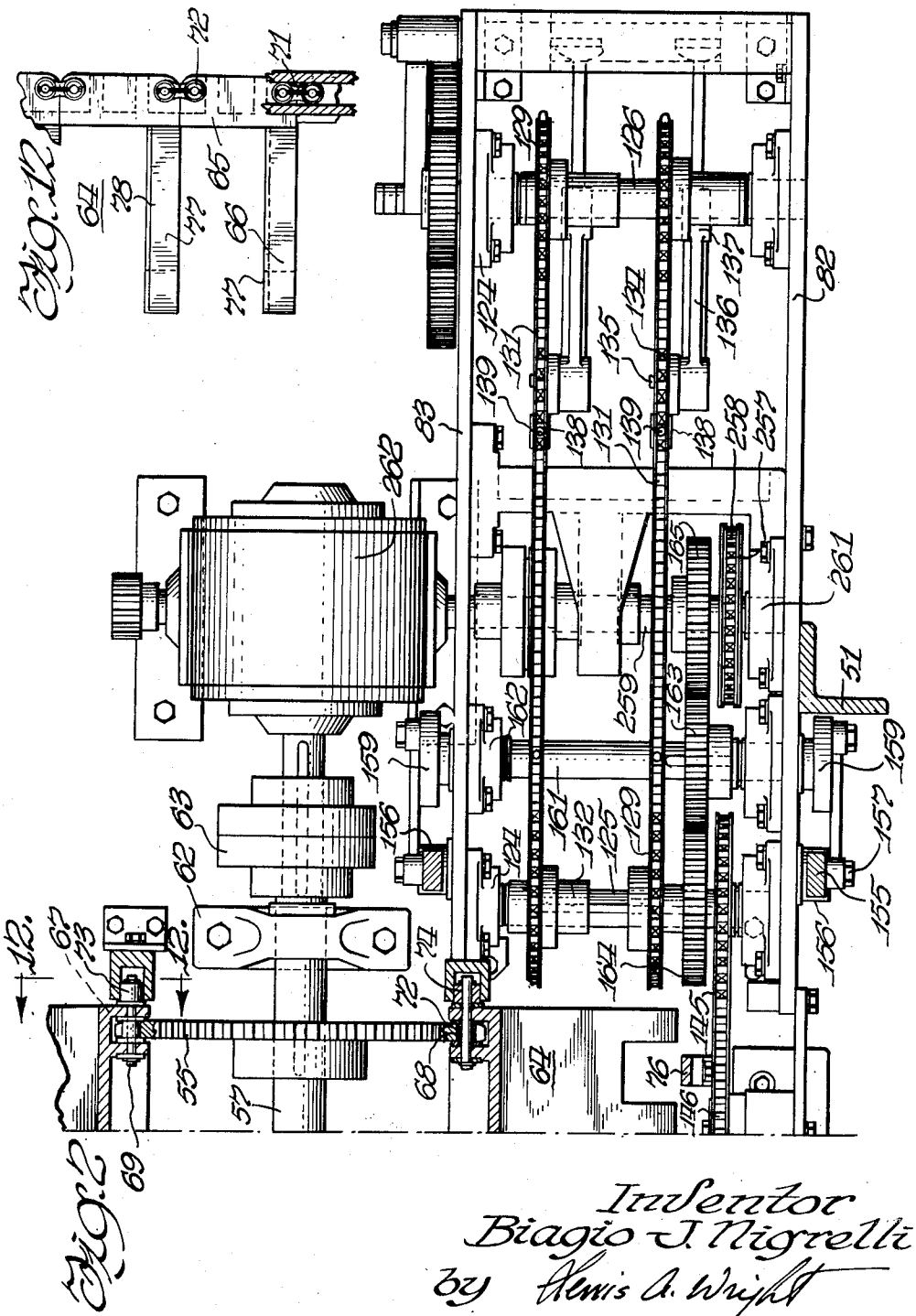


Fig. 2

Fig. 2

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CARTON LOADING MACHINE

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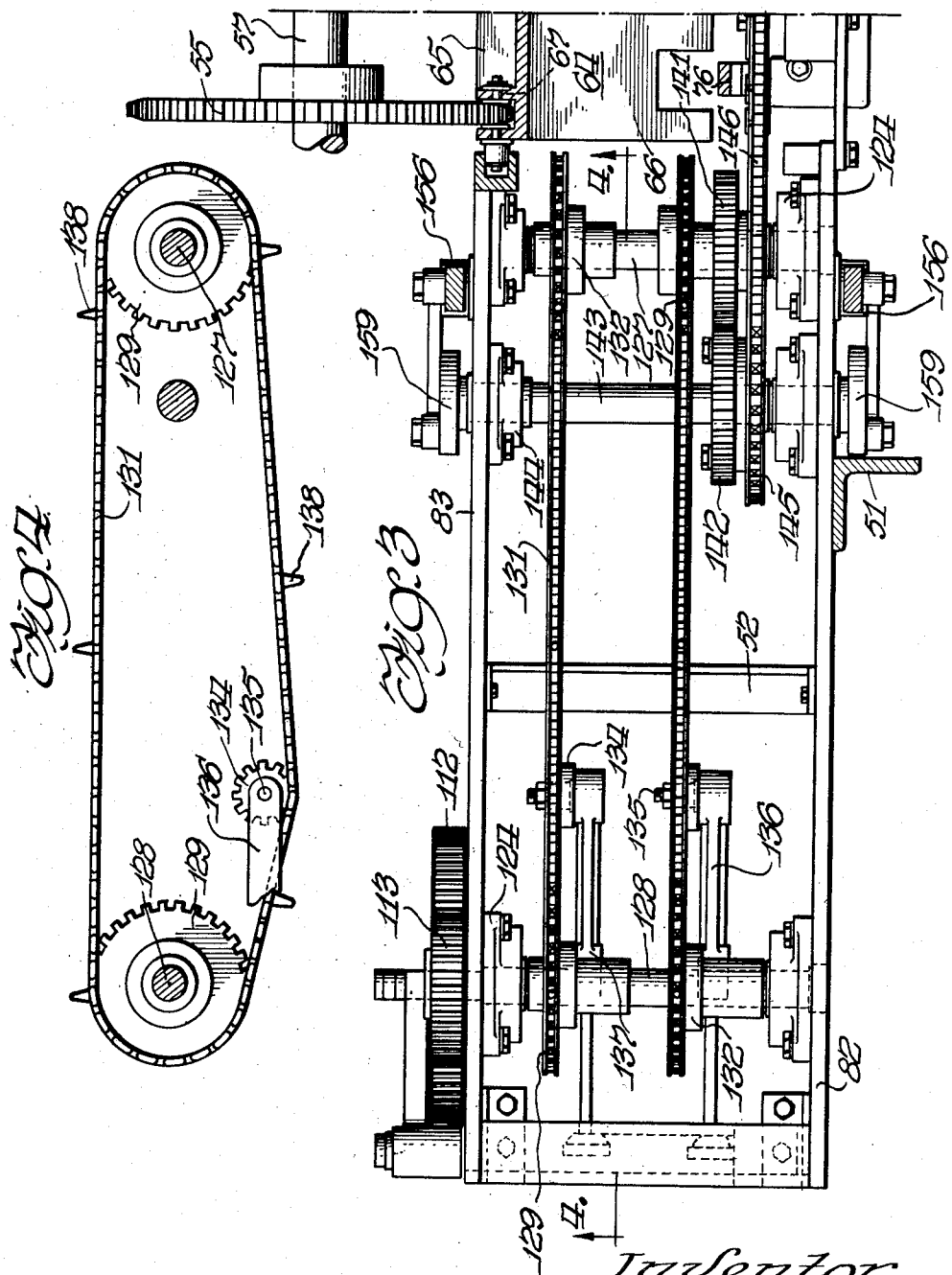


Fig. 4

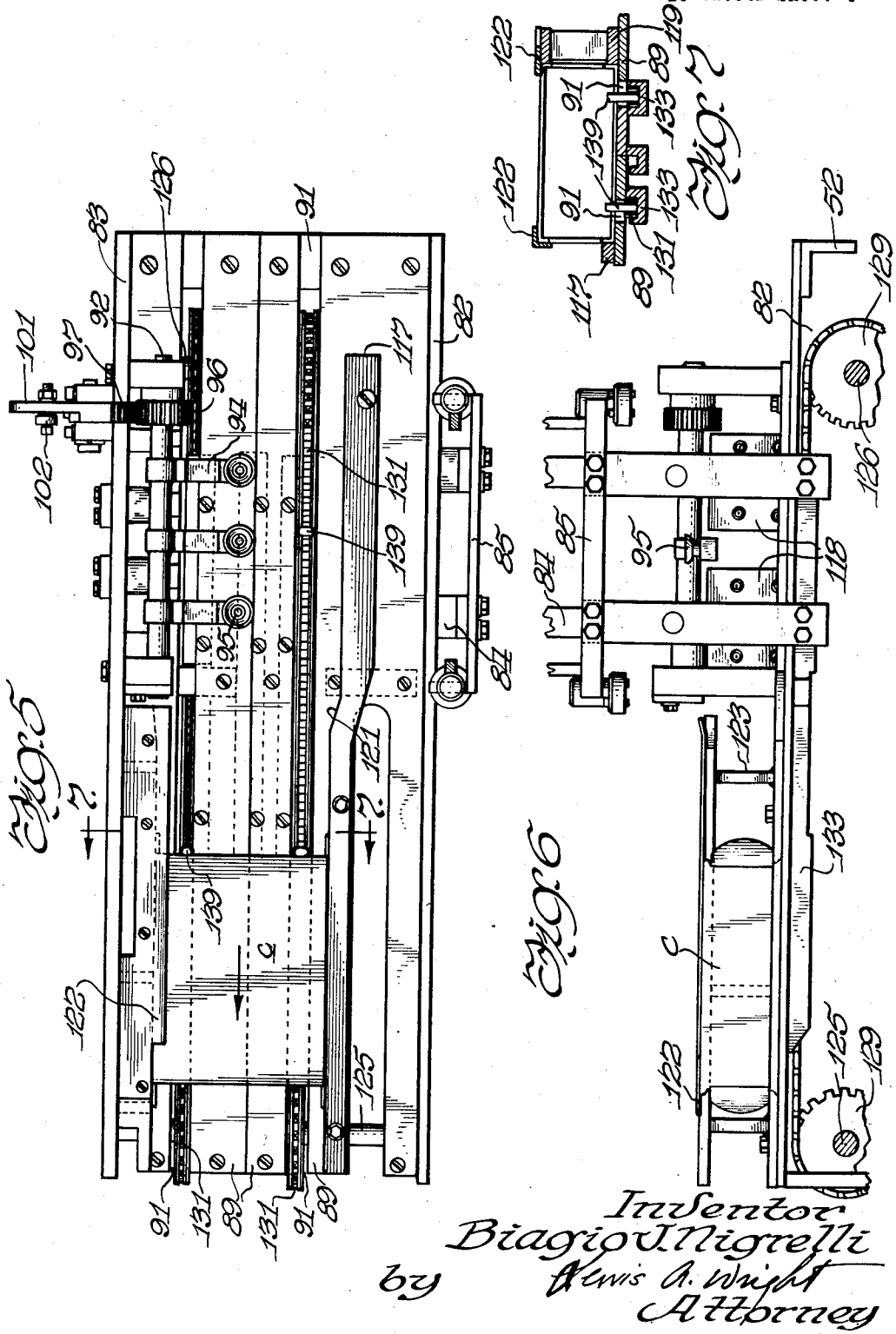
Fig. 3

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CARTON LOADING MACHINE

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CARTON LOADING MACHINE

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Fig. 9

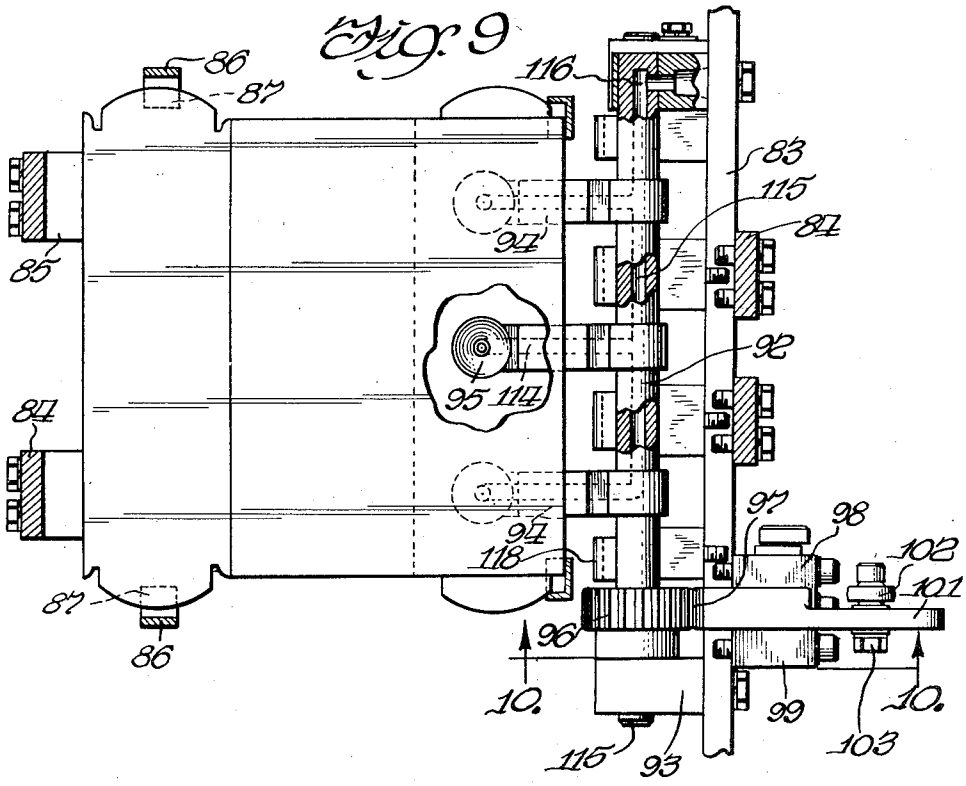


Fig. 10

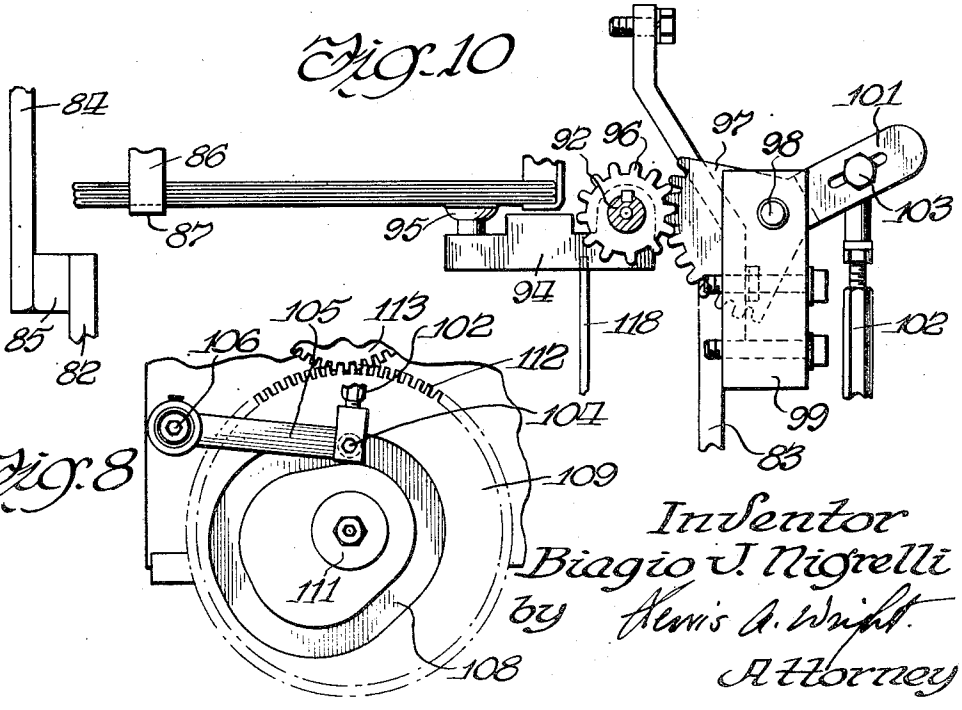


Fig. 8

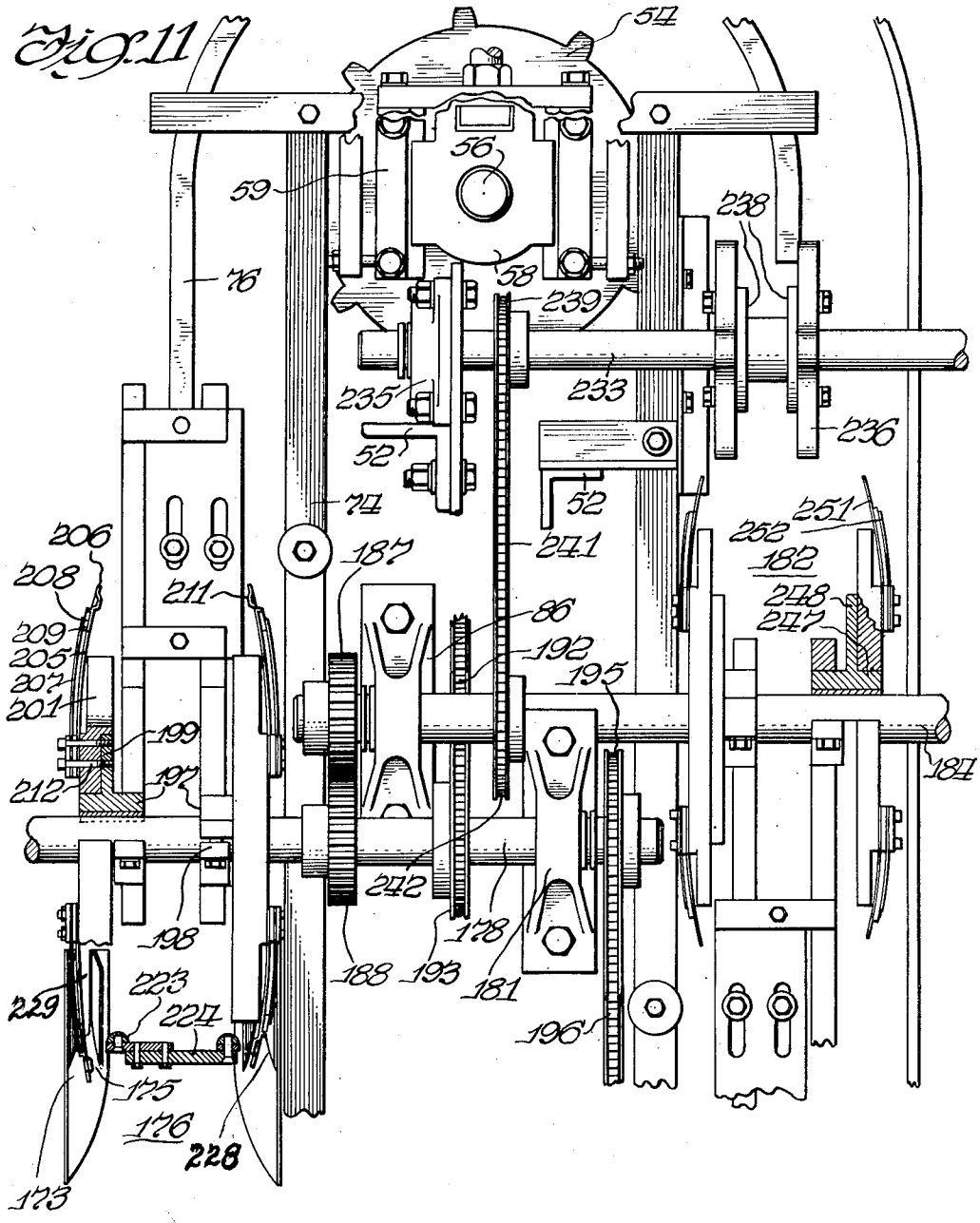
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CARTON LOADING MACHINE

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Fig. 11



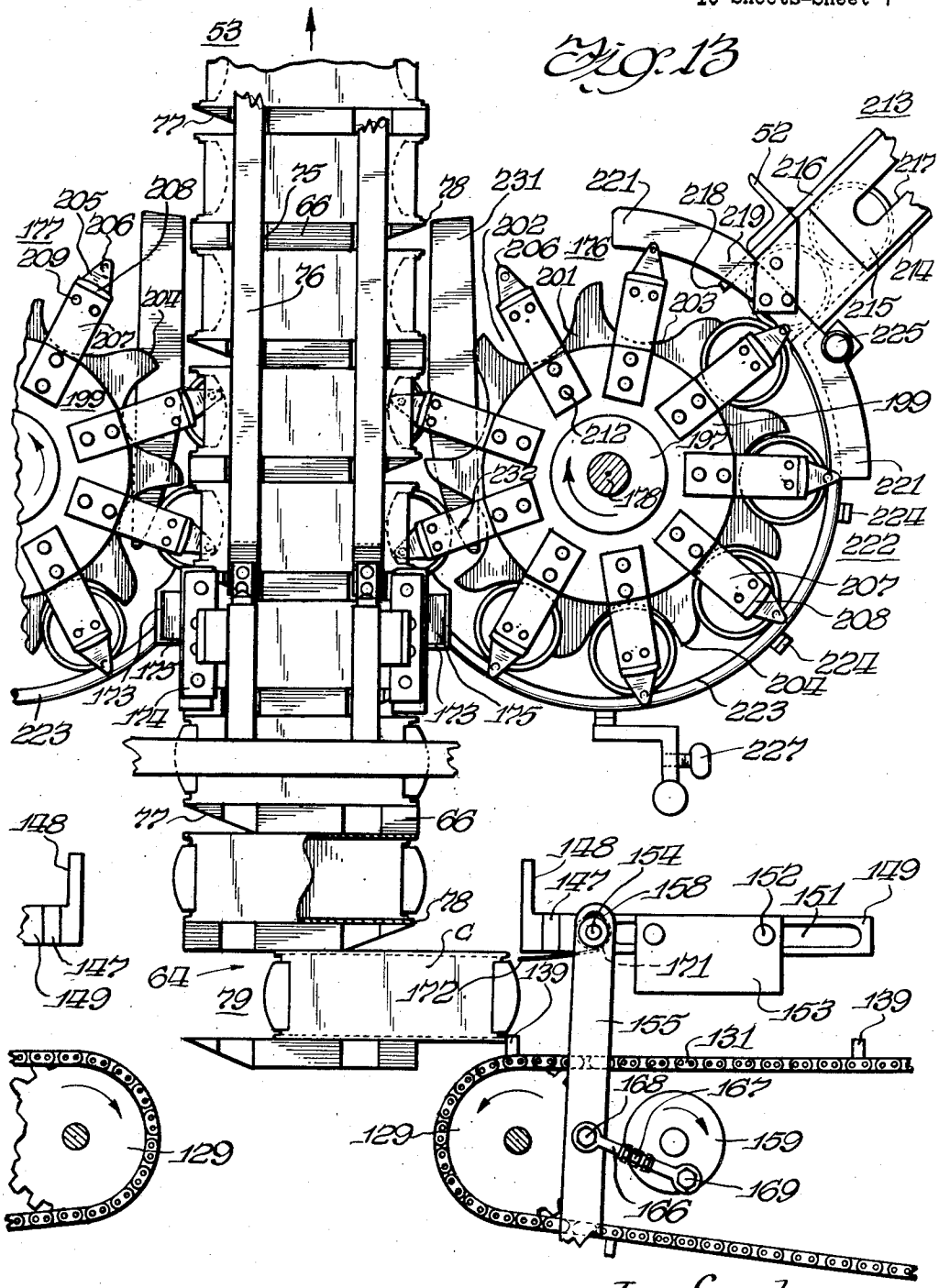
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CARTON LOADING MACHINE

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Fig. 13



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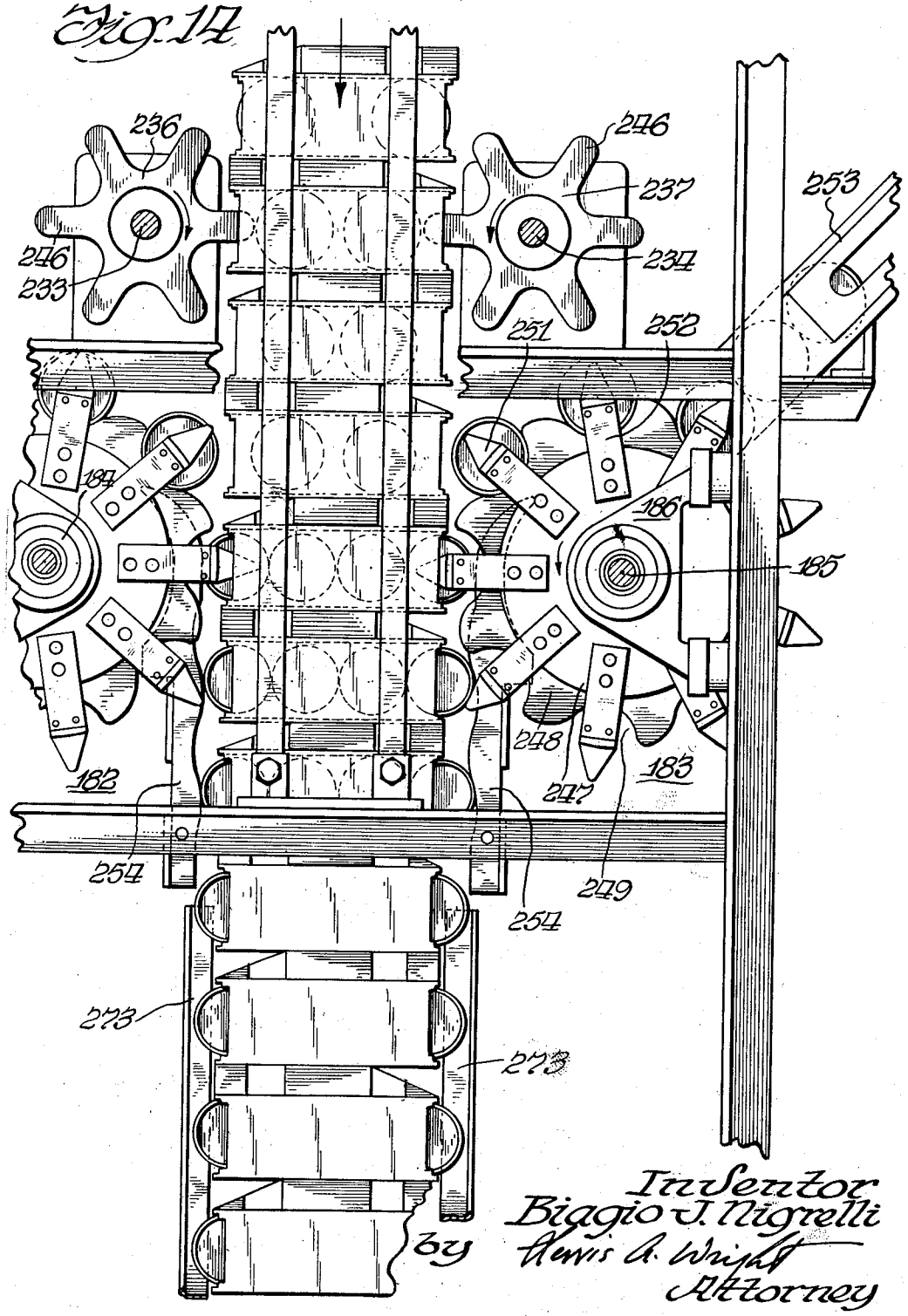
by Harris A. Wright Attorney

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CARTON LOADING MACHINE

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Fig. 14



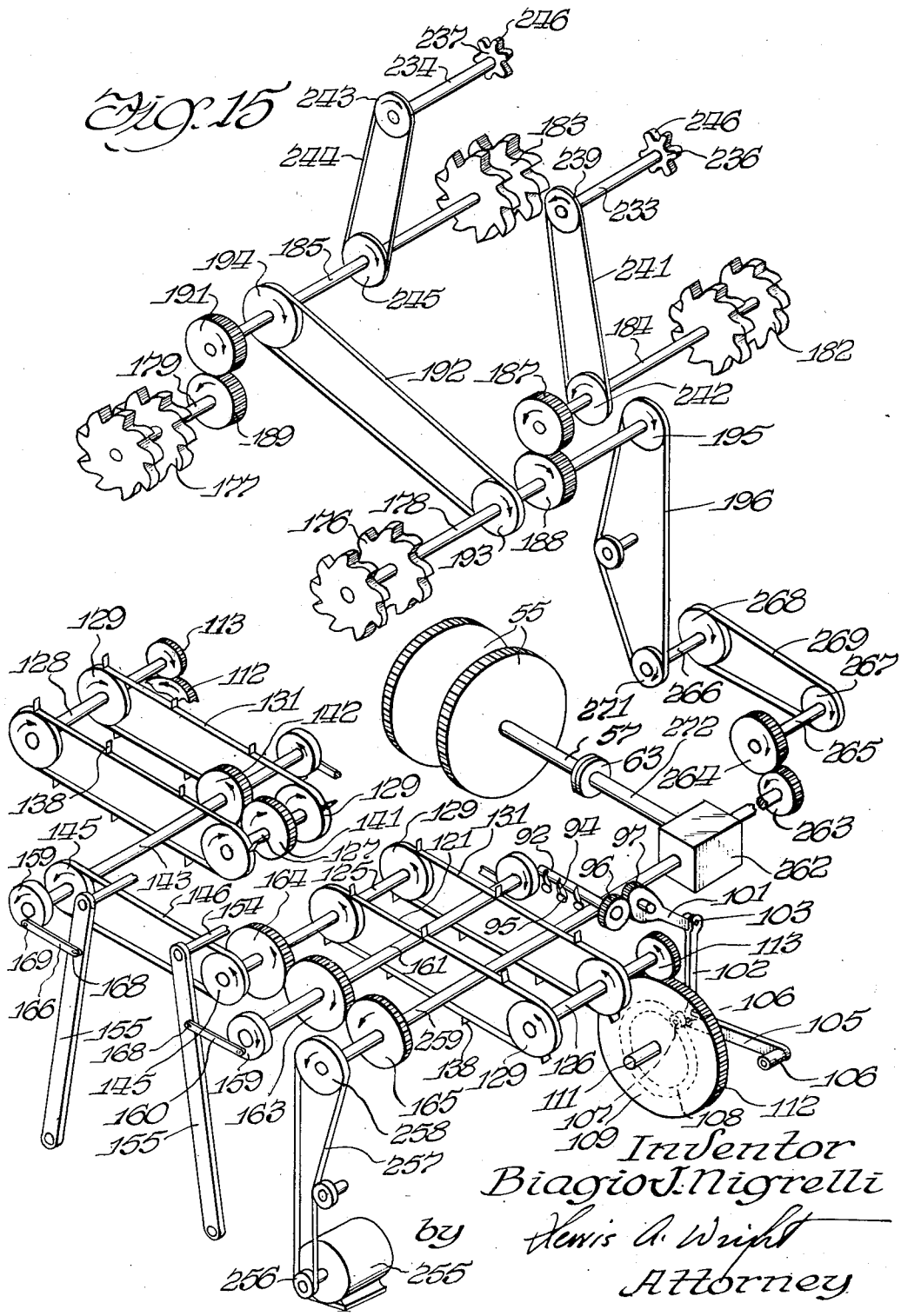
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CARTON LOADING MACHINE

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Fig. 15



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CARTON LOADING MACHINE

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Fig. 16

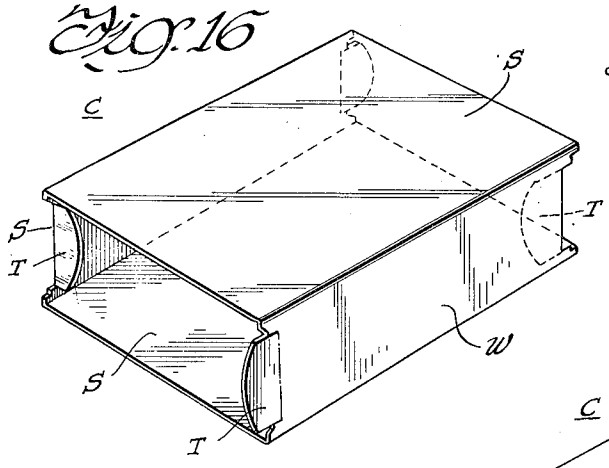
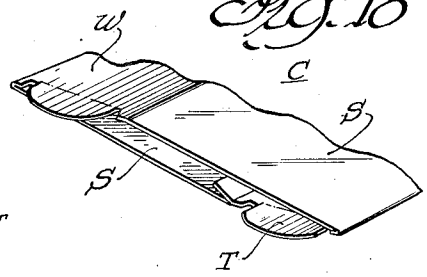


Fig. 18



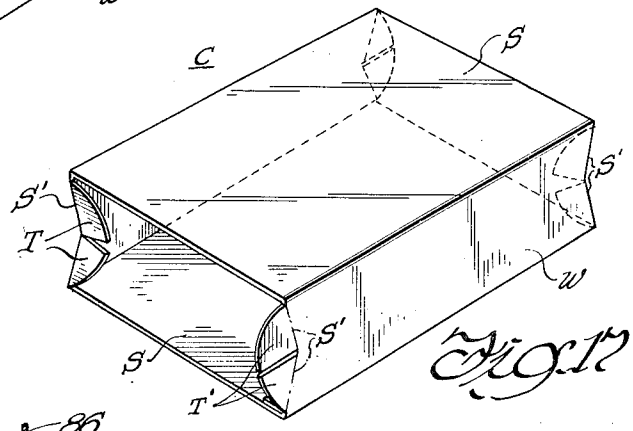


Fig. 17

Fig. 19

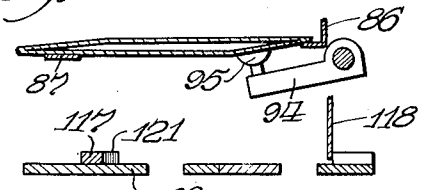


Fig. 20

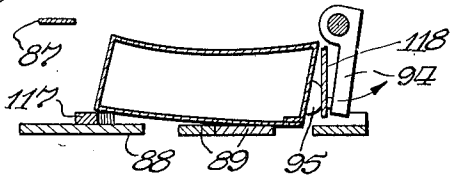


Fig. 21

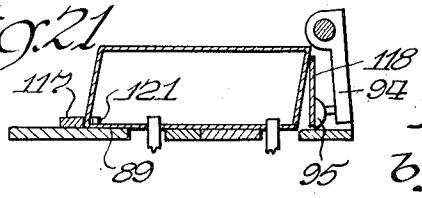


Fig. 23

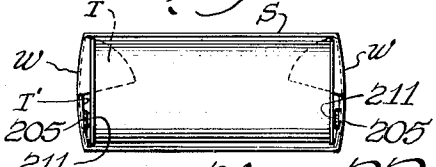
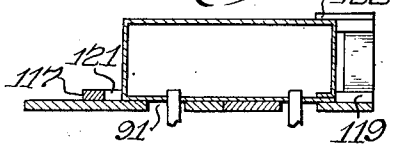


Fig. 22



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United States Patent Office 2,770,935 Patented Nov. 20, 1956

2,770,935

CARTON LOADING MACHINE

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Application September 21, 1955, Serial No. 535,548

27 Claims. (Cl. 53—168)

This invention relates to the loading of cans or similar generally cylindrical containers into open ended, tubular cartons or sleeves of rectangular section of the type formed with integral retaining tabs which project from the edges of the top and bottom walls of each of the open carton ends and which are folded in during loading of the cartons to engage and retain the cans against movement out of the carton ends. More particularly, the invention relates to an automatic machine adapted to feed and set up folded cartons from a supply stack, pre-break and fold the tabs thereof into position to receive the cans, load the cans into the cartons and discharge the loaded cartons, and to perform these successive operations in a smooth and continuous movement without necessity to stop either the carton or the can at any tab folding or loading station in their passage through the machine. Thus, the invention contemplates improvements on prior practices in the loading of cans into sleeve type cartons and in machines for the purpose such, for example, as the machine shown and described in the United States Patent No. 2,739,430, issued in the names of W. R. Griswold and B. J. Nigrelli.

The machine of the present invention comprises an arrangement of mechanism for effecting in order the various steps necessary to the continuous loading of cans into cartons and the discharge of the loaded cartons, all mounted on a suitable frame and driven and controlled in timed relation to provide greater output more efficiently and cheaply. These means include a loading and discharging conveyor vertically disposed at the center of the machine, having a rectilinear ascending leg at the front of the machine and a parallel rectilinear descending leg at the rear thereof, and provided with spaced members which define pockets adapted to receive and support erected cartons. The conveyor is continuously driven at constant speed so that the pocket members are moved past carton receiving stations on opposite sides of the ascending leg near the lower end thereof and thereafter past can receiving stations on opposite sides of both the ascending and descending legs. The loaded cartons are automatically removed from the conveyor at a discharge station located on the descending leg at the point below the last loading station.

The collapsed or folded cartons are withdrawn from suitable magazines or stacks located near opposite ends of the machine and are erected on horizontal slides or tables along which they are advanced in succession by means of lugs secured to horizontal feed chains, into the moving conveyor pockets at the carton loading stations, final movement into the pockets being accelerated by oscillatory pusher members. Alternate pockets are supplied from opposite sides of the conveyor so that each feed chain and pusher inserts a carton into every other pocket.

The machine is provided on opposite sides of the vertical ascending and descending conveyor legs with means for loading cans, through the open carton ends, into the moving cartons carried by the conveyor pockets. This loading means comprises rotatable members preferably in the form of turrets or star wheels adapted to rotate on

horizontal axes and provided with axially spaced parts, herein shown as discs, formed with rounded aligned notches, of which each pair is adapted to receive the ends of a can in horizontal position from a gravity chute in which the cans are adapted to roll on their chimes. The star wheels are located in a substantially tangential relation to the rectilinear path of the open ends of the cartons on the conveyor and each wheel is continuously driven at the same speed and in the direction of the conveyor motion so that each can in succession may be transferred adjacent the point of tangency to the corresponding carton through the open end thereof, by a combined rolling and sliding motion. Positive means are provided to assist gravity in effecting transfer of the cans from the star wheels to the cartons. Star wheels are provided on both sides of both the ascending and descending legs of the conveyor and are adapted to feed cans into either end or both ends of the carton, thus providing a mechanism for packing cans in any of the usual numbers into cartons designed for such pack, such as 3, 4 or 5 cans per carton, without the necessity of major changes in the machines.

Means is provided for properly folding tabs of either of the two principal types now in common use; that is, the single piece tab and the split or two-piece tab, without changes in the machine. Pre-breaking of the tab of either type on the cartons is provided by fixed members, such as cams or plows, located on the machine above the carton feeding station and below the first star wheels on the ascending leg of the conveyor. Further folding of the tabs into the cartons in position to receive and retain the cans is effected by resilient fingers mounted in pairs on the star wheels in spaced relation, one pair corresponding to each pair of can receiving notches. These fingers extend radially outward so that the points thereof may rotate into and out of the end of each carton. In the case of the single piece tab, the wiping action of the fingers folds the pre-broken tab back along the adjacent carton walls. In the case of the two-piece tab, the first or lower tab portion is folded in by the fingers, the second or upper portion being folded in part by the entering can and in part by the fingers. The fingers also serve as guides for the can during the movement of transfer into its pocket and they assist in holding the cans in the notches during the circular travel in the star wheels. Suitable means are provided for springing the resilient fingers apart during that part of the star wheel travel that a can is entering its notches and other means are provided for springing the fingers inwardly as the points enter the carton to avoid tearing the tabs and the carton walls. Shoulders or lugs carried by the spring fingers are adapted to engage the ends of cartons to position them accurately in the pockets.

It is an object of this invention to provide an efficient machine for loading cans into tubular cartons of the sleeve type, which feeds cartons and cans at synchronous speeds along the contiguous paths and transfers cans into the moving cartons in a continuous movement without stopping either cartons or cans.

Another object of the invention is to provide a machine of the character designated in which the locking tabs of sleeve-type cartons are pre-broken and then folded into can retaining position while the cartons are in continuous motion.

A further object is to provide a machine for loading cans into sleeve-type cartons which will readily accommodate cartons having can locking tabs of either the solid type or the split type.

Another object is to provide a machine for inserting cans into sleeve-type cartons having the split type of locking tabs, including mechanism for temporarily deforming the end of the carton while folding in one part of the tab and maintaining the deformation while guiding

the entering can into folding relation to the other part of the tab while passing into the carton.

Other objects of the invention will be apparent from the specification taken in connection with the drawings which form a part hereof and in which:

Figure 1 is a front elevation of a machine constructed in accordance with this invention.

Fig. 2 is a plan view, partly in section, of the right hand carton forwarding mechanism, showing the relation thereof to the loading conveyor, certain parts including the carton feed table being removed.

Fig. 3 is a view similar to Fig. 2 of part of the left hand carton forwarding mechanism, forming a continuation of Fig. 2 toward the left side of the machine.

Fig. 4 is a view in section taken substantially on the line 4—4 of Fig. 3.

Fig. 5 is a plan view of the right hand feed table and carton erecting mechanism.

Fig. 6 is a side elevation of the feed table of Fig. 5 showing the relation of the carton magazine and the carton guide to the table.

Fig. 7 is a detail view in cross-section substantially on the line 7—7 of Fig. 5.

Fig. 8 is a rear elevation of the drive for the carton erecting mechanism.

Fig. 9 is an enlarged detail view in plan showing the carton pick-off mechanism.

Fig. 10 is an end elevation of the mechanism shown in Fig. 9 looking in the direction of arrows 10—10 of Fig. 9.

Fig. 11 is an enlarged view, partly in elevation and partly in section, of the upper part of the loading conveyor, showing the front and rear star wheels.

Fig. 12 is a detailed, fragmentary view in side elevation showing the construction of the loading conveyor and pocket members, taken along line 12—12 of Fig. 2.

Fig. 13 is a detailed view to enlarged scale, partly in section through a portion of the loading conveyor and the front star wheels, showing the relation of the carton forwarding mechanism and the pushers to the conveyor, and the feed of cans to the star wheels.

Fig. 14 is a view similar to Fig. 13 showing the rear star wheels, the finger wheels and their relation to the loading conveyor.

Fig. 15 is a schematic diagrammatic view showing the driving connections between the various parts of the machine, various details being omitted in the interest of clarity.

Fig. 16 is a perspective view of an erected carton adapted to be loaded by the machine, of the type having one piece solid locking tabs, the tabs being shown in different positions.

Fig. 17 is a perspective view similar to Fig. 16 of the type of carton having split tabs.

Fig. 18 is a perspective view of the end of a carton such as shown in Fig. 16, in collapsed condition.

Figs. 19, 20, 21 and 22 are schematic sectional views illustrating successive steps in the erection and forwarding of a carton.

Fig. 23 is a view in front elevation of the open end of a carton having split tabs of the type shown in Fig. 17 receiving a can, illustrating the deformation of the carton walls and the action of the can chimes in folding in the upper halves of the tabs.

This invention provides a can loading machine which is particularly adapted to operate with the tubular or sleeve-type of carton, now in extensive use, which will be briefly described. The two most commonly used forms of this carton, which differ principally in the form of their can locking members, are shown in Figs. 16 and 17. The carton C is formed of a single piece of paper board and comprises a pair of side walls S connected along their longitudinal edges by top and bottom walls W, the ends being open. The walls W are formed, adjacent the open ends with integral, extended can locking members or tabs which are adapted to be folded back

into operative position adjacent the walls W inside the carton to engage the chimes of the end cans in the loaded carton to retain the cans therein, as is well understood.

In Fig. 16 is shown a carton having single piece locking members in the form of tabs T, integral with and attached to the walls W adjacent the ends thereof at score lines *s*, along which they may be folded. During passage through the machine the tabs T are first folded on the lines *s* into the position shown at the left hand end of the more remote wall W in Fig. 16, so that they are disposed substantially in the plane of the open carton end. During the loading operation they are further folded into can engaging position within the carton against the inner surface of the wall with their free ends extending away from the open carton end, as shown at the right hand end of the nearer wall W in Fig. 16.

In Fig. 17 is shown a similar carton C having locking tabs T′ of the double or split type, each half of which is connected to the adjacent wall W at its own score line *s′*. These are arranged at an angle in the plane of the wall so that when fully folded into operative position, as shown at the right hand end of the nearer wall W, they are adapted separately to engage the chime of the end can.

In collapsed condition as shown in Fig. 18, the carton C is folded flat along each of two diagonally opposite side edges so that the top wall W is in surface contact with one of the two side walls S and the bottom wall W is in contact with the other. The cartons are formed, shipped, stored and fed to the machine in this collapsed condition.

The machine of this invention, designated generally in Fig. 1 by the numeral 50, comprises a suitable frame including vertical members 51 and horizontal members 52, such as angles, channels, and plates, which are welded or otherwise rigidly secured together for supporting the various mechanisms and operating means of the machine.

Centrally disposed in the machine frame is a vertical loading conveyor 53, supported at its upper end on a pair of spaced sprocket members 54 (Fig. 11), and at its lower end on a similar pair of sprockets 55 (Fig. 2) which are vertically aligned with the sprockets 54. The pairs of sprockets are mounted respectively on upper and lower shafts 56 and 57. The upper shaft 56 is journaled for rotation in bearing 58, slidably mounted in ways 59, carried by frame members 52 and provided with bolts 61 by which they may be adjusted up or down to take up slack in the conveyor and to facilitate removal thereof. The lower shaft 57 is mounted in bearing 62, secured to the frame, and the shaft projects through one of these bearings to a coupling 63 by which it is driven at constant speed by means to be further described.

The conveyor 53 is driven through the lower sprockets 55 by the shaft 57 in a direction such that its ascending leg is at the front of the machine and its parallel descending leg at the rear thereof. It comprises a series of L-shaped pocket members 64, best shown in Fig. 12, preferably of light weight material such as aluminum or aluminum alloy, of which the shorter arms 65 are pivotally connected to form a continuous chain trained around the pairs of sprockets 54 and 55, while the longer arms 66 project at right angles to the line of motion of the conveyor.

Each arm 65 is formed adjacent its corners with pairs of integral projecting lugs 67, the lugs of each pair being laterally spaced to accommodate a chain roller 68 of conventional construction, adapted for operative engagement with the teeth of sprockets 54 and 55. Fixed in the lugs 67, as by a press fit in suitable bores therein are aligned pins 69 on which the rollers 68 are journaled, which pins project from the outer faces of the lugs on both sides thereof. The projecting pins of each pocket member are pivotally connected to the adjacent pins of the next preceding and the next following pocket members by chain plates or links 71 of usual construction, the pins passing

through suitable bearings 72 in the ends of these links. The pins 69 extend past the outer plates 71 to carry guide rollers 73, adapted to run in channel guides 74, best shown in Fig. 2, secured to the frame and extending substantially from the level of the upper sprocket shaft 56 to the level of the lower shaft 57, so as to guide the upward movement of the pocket members in a rectilinear path.

The arm 66 of the members 64 is formed at its outer edge with a pair of symmetrically spaced notches 75 adapted to receive vertically disposed carton retaining rails 76, as shown in Fig. 13, which are adjustably secured to the machine frame. By adjustment of the rails 76 toward or from the conveyor, the effective size of the pocket members may be varied for use with cartons adapted to be loaded with various lengths of cans. Thus, if the machine is packing the small 8 ounce cans, the rails 76 will be set in close to the bottom of the notches 75, whereas, if the machine is packing 16 ounce cans the rails will be set out substantially flush with the outer edge of the arm 66.

That surface of each arm 66 which is downwardly disposed on the ascending leg of the conveyor is formed with a beveled surface 77 extending from the center line of the pocket member to a narrow edge 78 at one side thereof. These surfaces 77 are formed on the opposite halves of alternate pocket members and are adapted to provide clearance whereby the carton loading mechanism may insert an erected carton into position on the rising upper surface of each arm 66 while the conveyor is moving at constant speed. The bevels on successive members are disposed alternately in opposite directions to permit the loading of cartons from alternate sides of the moving conveyor.

It will be noted that the arms 65 and 66 of each pocket member, together with the beveled face 77 of the preceding pocket member and the rails 76, define a space or pocket 79 which, on the ascending and descending legs of the conveyor, is generally rectangular in section, is open at its ends and which is of a size to receive and support an erected carton C. At the top of the conveyor as the members 64 pass around the upper sprockets 54, the arms 66 separate to assume a position radially of the sprockets, but return again on the descending leg to restore the rectangular form of the pockets.

Cartons are fed to the conveyor assembly from magazines or hoppers 81 in which they are stacked in folded or collapsed condition as received from the manufacturer. The feeding means includes pick-off and erecting mechanism for the cartons, and means to forward the erected cartons to the conveyor 53 where, with the aid of pusher mechanism, they are inserted into the moving pockets 79 alternately from opposite sides thereof as previously described.

This feeding means is preferably mounted on and between spaced front and rear vertical supporting plates 82 and 83, suitably secured to frame members 51 and 52 and laterally disposed at the sides of the ascending leg of conveyor 53. The hoppers 81 are mounted on the upper edges of each pair of plates 82, 83 and comprise vertical guide rails or slats 84 secured by horizontal connecting rails 85 to define a space of rectangular section adapted to receive a stack of collapsed cartons C. The stack of cartons in each hopper is supported on spring clip members 86, mounted on the lower hopper rails 85 formed with inturned hook ends 87 adapted to engage the lowermost of the cartons C in the stack by their rear corners and by their front tabs, the other cartons being carried by the lowermost carton in the well known manner. Between the plates 82 and 83 at each side of the conveyor 53 are mounted horizontal carton tables or slides 88 which extend laterally of the machine from beneath the hoppers 81 to a point closely adjacent the ends of pocket members 64. The slides 88 are formed of flat strips 89, suitably mounted between the plates 82 and 83 and spaced to define parallel slots 91 extending the length of the slides, through which project the carton forwarding means presently to be described. It will be noted that the strips 89 are of different widths, so chosen as to expedite the lateral spacing of the slots 91 by interchanging them, when the machine is being adjusted to handle cartons of different lengths.

The pick-off mechanism for each of the hoppers 81 is mounted on the rear support plate 83 opposite the hopper and substantially at the level of the bottom carton C therein. This mechanism comprises a shaft 92 journaled at its ends in suitable bearings formed in brackets 93 mounted on the rear plate 83 and adapted for oscillatory movement therein through an angle slightly greater than 90°. The shaft 92 carries a number of projecting arms 94, each provided at their ends with suction cups which, in the uppermost position of the arms 94 are adapted to contact the downwardly disposed surface of the wall W of the lowermost carton C in the stack at points which lie on a vertically disposed side of the carton as erected. The shaft 92 is provided near its end with a pinion 96 which is adapted to mesh with a segment gear 97 journaled as at 98 on a suitable bracket 99 secured to the outer face of the rear plate 83. The gear 97 is formed opposite its toothed portion with a projecting arm 101 which is adapted for timed oscillation through a rod 102, connected thereto at its upper end by a pin-and-slot connection 103 for convenience in adjusting the stroke of the gear.

The lower end of the rod 102 is pivotally connected near one end thereof, as at 104, to a lever or radius rod 105, which is fulcrumed at its other end on a suitable pivot 106 on the rear plate 83. The end of the lever adjacent the pivot 104 carries a roller cam follower of conventional construction, indicated at 107, adapted to track in a cam slot 108 formed in the side face of a circular disc 109 which is mounted for rotation on a suitable bearing on a stub shaft 111, secured to the rear plate 83. The cam disc 109 is provided at its circumference with gear teeth 112 adapted to mesh with and be driven by a pinion 113 in a manner presently to be described.

As best shown in Fig. 9, each of the suction cups 95 is connected as by means of bore 114 formed in its arm 94 with a passage or manifold 115 formed in the shaft 92 and connected through a sleeve valve 116 of any well known construction with a suitable source of vacuum, not shown. The valve 116 rotates with the shaft 92 and is provided with ports adapted to open and close the connection to the source of vacuum at definite positions in the stroke of the arms 94. Since valve structure of this nature is well known in the art and since it forms no part of the present invention, more detailed description thereof is unnecessary and has been omitted.

Thus when the arms 94 are in their uppermost position and the cups 95 are in contact with the lowermost carton C in the stack, the valve 116 opens, so as to apply suction to the cups, which thereby seize the carton as shown in Fig. 19. The arms 94 then make their down stroke so that the cups pull the carton C off the supporting hooks 87 and partly erect it in the position shown in Fig. 20, the lower left hand edge of the carton resting on a guide rail 117 secured to the top of the table 88. Continued movement of the arms 94 pulls the carton edge over the rail 117 so that the carton is disposed in nearly erected condition on the table between the rail 117 and vertical fence members 118 carried in alignment on the table between the arms 94. At this point the valve 116 closes the connection to vacuum and connects the manifold 115, the bores 114 and the cups 95 to atmosphere, in a manner well understood, so that the cups release the carton and continue their movement to the position shown in Fig. 21 between the fence members 118.

It will be understood that from this position the carton is moved laterally on the table 88 by a carton forwarding mechanism which will be further described, and that the cartons are fully erected in the course of this sliding

motion. The pick-off mechanisms at each side of the machine are so timed as to operate alternately, so that successive cartons are removed first from one hopper and then from the other and are similarly advanced toward the loading conveyor 53. The cartons are advanced on each table between the rail 117 and an opposite guide rail 119 (Fig. 22) of which the guiding surface is disposed substantially in the vertical plane of the fence members 118. The guide rail 117 is formed with an offset portion 121, inclined in the direction of carton travel to space its vertical guiding surface from the rail 119 an amount corresponding to the width of the cartons being fed. In this way the lower lefthand edge of the carton, as shown in Fig. 21, is pushed over by the inclined portion 121 so as to straighten up the walls W and fully erect the carton to the position shown in Fig. 22. The uppermost carton edges also pass under hold-down guides 122, carried by upright members 123 on the table 88, as shown in Figs. 5, 6 and 7, so that the erected carton is guided in a fixed path toward the conveyor 53.

As best shown in Figs. 2, 3 and 4, the inner faces of the support plates 82 and 83 at each side of the conveyor 53 support pairs of aligned flange bearings 124 in which are journaled on the right side shafts 125 and 126, and on the left side similar shafts 127 and 128. On these shafts are mounted pairs of aligned sprockets 129, around which are trained pairs of spaced parallel carton conveyor chains 131. The sprockets 129 are splined to their respective shafts in driving relation in the well known manner, and are maintained in position axially of the shafts in any convenient way as by means of spacers or collars 132. The shafts 126 and 128 both extend through the rear support plate 83 and carry at their ends the pick-off drive pinions 113.

The upper reach of each of the chains 131 passes horizontally beneath the respective tables 88, through a chain guide 133 secured thereto, as shown in Figs. 6 and 7, and the lower reach thereof passes under chain tightening idle sprockets 134. As best shown in Figs. 3 and 4, each chain tightening sprocket 134 is mounted on a suitable stub shaft 135 at one end of an arm 136, of which the other end is pivotally mounted in any convenient manner, as at 137, on the machine frame, and provided with suitable means, not shown in detail, by which it may be manually adjusted about its pivot to thereby raise or lower the chain tightening sprockets 134 in a manner which will be readily understood.

The chains 131 are of conventional construction, having side plates connecting spaced rollers which are adapted to cooperate with the teeth of the various sprockets. They are provided at spaced intervals with special links having side plates of T formation which project from the outer chain faces to form conveyor lugs 138. Each pair of the lug links 138 is preferably connected by lug blocks 139 of suitable material such as Bakelite, which on the upper horizontal reaches of the chains 131 project through the slots 91 for engagement with erected cartons being forwarded on the carton slides 88.

The shafts 127 and 128, together with the sprockets 129 of the lefthand conveyor, are driven in the opposite direction to the corresponding members of the righthand conveyor so as to convey cartons from each hopper toward the sides of the pocket members 64 on the loading conveyor 53. For this purpose the shaft 127 is provided with a spur gear 141 adapted to mesh with and be driven by a spur gear 142 keyed to a shaft 143 mounted in flange bearings 144 on the members 82 and 83. The shaft 143 also carries a sprocket 145 keyed thereon which is aligned with and connected by means of a chain 146 to a sprocket 145 on the shaft 125. In this way the lefthand conveyor is driven from the righthand conveyor through the gearing just described but in the opposite direction.

The pusher mechanism of this invention is adapted to pick up the cartons being forwarded into the pockets 79 by the chain lugs 139 and accelerate them into fully inserted position in their respective pockets from opposite sides of the conveyor 53. This mechanism includes a pusher head 147 provided with upstanding pusher fingers 148 and formed near its end with rearwardly disposed guide pieces 149. The guides 149 are provided with longitudinal slots 151 by which they are supported on cross rods 152 which are mounted in brackets 153 secured to the side plates 82 and 83, respectively. The rods are preferably provided with rollers (not shown) which cooperate with the inner surface of the slots 151.

Forwardly of the slots 151 the guide pieces 149 are connected by a cross pin 154 extending laterally at each end past the side plates 82 and 83 to provide for reciprocation of the pusher head in a rectilinear path parallel to the travel of the cartons. For this purpose a pair of oscillating arms 155 are mounted on the outside of the plates 82, 83, being provided at their lower ends with hub members 156 pivotally supported on stub shafts 157 suitably secured to the side plates. The upper end of each of the arms 155 is provided with a slotted hole 158 through which holes project the ends of the cross pin 154 so that oscillatory motion of the arms 155 will result in a corresponding rectilinear motion of the pin 154 and with it the entire pusher head assembly.

Motion of the arms 155 is derived from crank discs 159 of which those of the lefthand assembly are mounted upon the ends of shaft 143 (Fig. 3) while those of the righthand assembly (Fig. 2) are mounted upon a shaft 161, journaled in suitable bearings 162 supported in the plates 82, 83 and disposed parallel to the shaft 125. The shaft 161 is provided intermediate its ends with a gear 163 which is in mesh on one side with a similar gear 164 on the shaft 125 and on the other side with a similar gear 165, which is adapted to drive the gears 163 and 164 in a manner presently to be described.

The oscillatory arms 155 are connected to their cranks 159 by means of connecting rods 166 which are preferably adjustable in stroke as by means of turnbuckles indicated at 167, being adapted to cooperate with wrist pins 168 mounted on the arms 155 and, at their other ends, with crank pins 169 mounted on the cranks 159.

The pusher head 147, being thus reciprocated in timed relation to the travel of the conveyor lugs 139, is adapted to contact the rearwardly disposed end of each carton just before it is released from the lugs 139 by reason of their passage downwardly around the sprocket 129, and to accelerate the carton movement into the open end of the sprocket 79 on the conveyor, which is also moving in timed relation to the assembly. To provide more time and also more clearance for this entry of the moving carton into the moving pocket, the lower edge of the pocket in question is provided with bevelled surface 77 previously described. The cross arm 154 is also provided at its mid-portion between the pusher fingers 148 with a hub 171 on which is mounted a forwardly disposed hold-down finger 172 adapted to prevent upward buckling of the top carton wall and possible catching on the upper surface of the pocket member 66.

It is to be noted that both of the pusher heads 147 make a stroke for each carton forwarded into the pockets and that these strokes are made in unison so that the pusher heads approach each other from opposite sides of each pocket in a manner readily understood. In this way the pusher head opposite to the head which is forwarding a carton will approach the opposite side of the pocket into which that carton is being inserted, and thereby acts as a positioning stop for the carton. It will also be understood that the stroke of the pusher heads is so adjusted that they approach closely the sides of each pocket member 66, whereby the carton is accurately positioned in the pocket and over-feeding is prevented. In this way the cartons are fed continuously in succession from the hoppers to the tables 88, and from the tables into the pockets 79 of the conveyor 53 without being

caused to stop for any appreciable time during the course of their movement.

As the cartons move upwardly in the pockets 79, the can retaining tabs project from the ends of the pockets laterally of the conveyor, being disposed in parallel vertical planes. It is necessary before the loading of cans into the cartons to bend these tabs back on their score lines into the cartons in proximity to the inner surfaces of the carton walls W. To effect the preliminary step of this bending, the invention provides a pair of prebreaking tab plows 173 mounted on suitable brackets 174 on the machine frame at each side of the conveyor 53 and having inclined surfaces 175 adapted to engage the projecting tabs at each end of the carton and bend them approximately 90° across the open carton ends.

The can loading means of this invention comprises rotary turrets or star wheel assemblies best shown in Figs. 1, 11 and 13. The machine will include as many of these star wheel assemblies as there are cans to be placed in the cartons being loaded, so that in the present embodiment, wherein the machine is adapted to place four cans in line in a single sleeve carton, the machine includes four of the assemblies, which are preferably mounted—two in the front of the machine and two in the rear thereof.

The front assemblies are shown at 176 and 177 to the right and left of the ascending legs of the loading conveyor 53 and arranged generally in the plane thereof and in close proximity thereto. They are mounted respectively on shafts 178 and 179, rotatably mounted in suitable bearings 181, carried by the machine frame. The rear star wheel assemblies are located at the rear of the machine in line with the descending leg of the conveyor 53, the right rear assembly 182 and the left rear assembly 183 (Fig. 14) being mounted respectively on shafts 184 and 185, arranged parallel to and somewhat above the level of the front shafts 178 and 179, respectively. These shafts are journaled in bearings 186, similar in construction to the front shaft bearings 181 and similarly mounted on the machine frame. The forward end of the right rear shaft 184 projects through its bearings 186 and is provided at its end with a spur gear 187 adapted to mesh with a similar spur gear 188 mounted on the right front shaft 178, whereby the shafts 178 and 184 rotate at the same speed in opposite directions. The left front shaft 179 and the left rear shaft 185 are similarly connected by a pair of spur gears 189 and 191, shown in Fig. 15, whereby the front and rear left assemblies 177 and 183 also rotate in opposite directions at the same speed. These assemblies are connected by means of a cross chain 192 trained around a sprocket 193 secured to the shaft 178 and a sprocket 194 secured to the shaft 185, which chain passes across the machine between the ascending and descending legs of the conveyor 53 so that the lefthand assemblies may be driven from the righthand assemblies at the same speed in a manner which will be readily understood. The right front shaft 178 projects through its rear bearing 181 and carries a sprocket 195 adapted to be driven by a drive chain 196 in a manner to be further described.

The right and left front star wheel assemblies 176 and 177 are of similar construction and rotate in opposite directions with their respective shafts 178 and 179 as previously described. Each of these assemblies comprises a pair of hubs 197 spaced on the shaft as by means of clamps 198 and keyed or otherwise secured thereto in driving relation. Each of the hubs 197 is formed with a radially disposed flange 199 to which is secured a radial disc or star wheel 201, formed at its periphery with a series of spaced notches 202, each adapted to receive a can in horizontal position. The notches 202, as best shown in Fig. 13, are formed with rounded bottoms 203 terminating in projecting portions 204 which extend radially outward and are inclined forwardly in the direction of wheel rotation. The projecting portions 204 are of dimensions such that their tip portions pass within a short distance of the edge of the ascending leg of the conveyor 53. Also secured to the hub flanges 199 are radially disposed spring fingers 205, which are provided with pointed tip portions 206, having smoothly rounded ends, as best shown in Fig. 13. The fingers 205 are formed with an axially inward curve from their base portions to their tip portions, whereby the distance between the tips of any pair of the fingers is less than the distance between these bases, the tips being spaced to just enter between the vertically disposed carton walls W as the carton advances in the conveyor pocket 79. The fingers 205 are spaced around the hubs 197 so that there is a finger for each of the notches 202, being angularly disposed substantially opposite the pocket bottom 203 and formed of a radial length such as to rotate into and out of the open end of each of the moving carton C carried in the pockets 79.

Reinforcing each of the spring fingers 205 is a second spring finger 207, provided at its end with a positioning block 208, formed with a curved outer end and secured by rivets 209, being adapted to bear against the adjacent side of the spring finger 205. The projecting outer ends of the blocks 208 form shoulders adapted to engage the ends of the carton walls and accurately to position the cartons C in the conveyor pockets. The spring fingers 205 are provided on their inner surfaces adjacent the tips 206 with a small protuberance or dimple 211, conveniently formed by upsetting the metal of the fingers. These are adapted during a portion of the rotation of the fingers axially to spread the tips thereof by contact with the can chimes in a manner and for a purpose presently to be described. This assembly, including the disc 201, the spring fingers 205 and the reinforcing springs 207, are secured at their base portion to the hub fingers 199 in any convenient manner as by means of bolts or cap screws 212.

The function of the star wheel assemblies is to receive cans in succession from a can supply line into successive notches 202, carry the cans in a circular arc approaching tangency to the line of movement of the conveyor 53, and to deliver cans from the moving notches 202 into the open ends of the moving cartons C without stopping motion either of the cans or of the cartons. The function of the spring fingers 205 and the associated mechanism is to complete the fold of the carton tabs inwardly into position to receive the can or, in the case of tabs of the split type, to fold in the lower half of each tab and to deform the carton so that the upper half of the tab may be initially folded in by the chimes of the can as this is passed into the open carton end.

Cans are fed from factory supply lines to the star wheel assemblies 176 and 177 by inclined chutes 213 of well known form in which the cans are adapted to roll by gravity in horizontal position on their chimes, as shown in Figs. 1 and 13. These chutes include spaced angle members 214, of which the inwardly projecting flanges form a pair of rails on which the can is adapted to roll while the upwardly projecting flanges thereof form side guides adapted to retain the can in its line of travel. If desirable, the chute may also include upper rails, disposed in a similar manner, of which the vertically disposed flanges assist in preventing side movement of the cans while the inwardly disposed flanges serve to prevent the cans from buckling upward in the line of descent and to retain them within the track.

In a typical installation of the machine, a separate can chute 213 is arranged to serve each star wheel, being supported in any suitable manner on members secured to the frame of the machine. The rails 214 are joined near the end of the track by side plates 215 and a top plate 216. The side plates are preferably provided with aligned apertures 217 adapted to receive a stop pin or

other means, not shown, to restrain the line of cans from movement when the machine is stopped for any reason. The top plate **216** extends downwardly past the end of the chute, terminating in a forward edge **218** disposed between the notched portions of the discs **201**.

It will be evident that as the cans roll down the can tracks under the influence of gravity, the lowermost can will drop into the next adjacent notch **202** of the star wheel as this comes into position opposite the end of the can chute. The extending edge **218** of the top plate **216**, aided by the preceding can, prevents the next succeeding can from entering the space until the pocket is opposite the conveyor end. To provide ready admission of the can between the ends of the spring fingers **205**, curved cams **219** are provided at each side of the can chute, formed with wings **221** which are bent inwardly toward each other at their upper and lower extremities. These are adapted to engage the tip portions of the resilient spring fingers **205** and spread or spring them axially as the fingers across the end of the can chute. In this way the can is unobstructed in its movement and may enter the pocket freely. After the notch has left the end of the can chute, the trailing wings **221** of the cams **219** permit the spring fingers to come together and resiliently engage the ends of the can to assist in retaining it within the notch.

The cans thus loaded into the notches **202** are transported by rotation of the front star wheels **176** and **177** through circular arcs which, in the present embodiment, pass under respective shafts **178** and **179**. To insure that the cans remain in their notches during this portion of their travel, each of these star wheels is provided with a retaining can rail assembly **222** comprising a pair of curved rails **223**, preferably of semi-circular cross-section and suitably spaced as by spacer members **224**, which rails are disposed between the planes of the star wheel discs **201** and are curved to a radius slightly greater than that of the projections **204**. Each assembly **222** is pivotally mounted at its upper end on a rod **225** secured to the end of the can chute **213** and is supported at its lowermost point on a movable bracket provided with a hand knob **227** by which the bracket may be quickly released to permit the assembly to swing about the pivot **225** away from the star wheel when, for any reason, a can becomes jammed at the end of the can chute or between the star wheel and the guides. The rails **223** are adapted to support the cans in the notches between the point of loading and the point of discharge, when they are beneath the wheel and may not be adequately retained by the end pressure from the spring fingers.

As each pair of notches and the can supported therein approaches the conveyor **63**, the tips **206** of the associated spring fingers pass over a pair of cam guides **228**, suitably supported on the machine above the plow members **173** and conveniently on extensions of the brackets **174**. The cam members **228** are formed with slots **229** having inclined surfaces adapted to engage and guide the fingers, springing them inwardly so that they enter the carton at its lower corners in wiping engagement with the inner surfaces of the carton walls W, thereby engaging the prefolded tabs T. It will be understood that each pair of the fingers **205** rotates into and out of the carton end, whereby the tabs are folded back by the wiping action of the tip portions into position substantially against their respective walls W. During this movement the rounded ends of the blocks **208** engage the ends of the carton walls W at both ends of the carton, which is thus accurately positioned between them in the pocket member.

During this portion of the movement, the can is transferred from its supporting notches **202** into the adjacent open end of the carton. Just as the can arrives at the end of the supporting rails **223**, it is engaged by the lower end of a fixed ejecting plow **231**, there being such a plow for each of the front star wheels **176**, **177**, suitably mounted on the machine frame and extending between the discs **201**. These plows are formed with curved cam surfaces **232**, oriented toward the conveyor and terminating in a rounded point so positioned as to engage behind the cans carried in the notches. As the wheel rotates, each can is engaged between its ends by the cam surface **232**, on which it rides radially outward toward and into the open end of the approaching carton. The cans are guided in this transfer movement by the shoe-horn effect of the spring fingers **205** by which its ends are resiliently engaged and along which they slide.

It will be noted that when the chimes of the can being transferred engage the dimples **211** of the fingers **205**, the tips of the fingers, which have just entered the carton, are temporarily deformed, being spread axially further apart, which bends or bows the carton walls W outwardly, as indicated in Fig. 23. In loading cartons of the type having solid tabs T, this action has no appreciable effect on the folding operation, since the tabs T are formed with curved edges and present a smooth, continuous surface to the wiping action of the finger tip portions. However, when loading cartons of the type having split tabs T', the lower half of the tab is folded in by engagement of its curved edge with the finger tip as previously described, leaving the straight edge of the upper half of the tab disposed across the path of the rotating finger substantially at a right angle. To prevent damage to the upper tab portion in this case, the timing is such that the fingers are spread by can contact with the dimples **211** after the finger tips have entered the carton and during folding of the lower part of the tab T'. This spreading permits the can to enter the end of the carton so that the round can chime first engages the edge of the upper half of each tab T' and folds it back smoothly without tearing, crumpling or other damage. The finger then passes over the tab portion thus prefolded, ensuring that it is snugly positioned against the carton wall W.

As each of the pocket members reaches the top of the conveyor, its long arm **66** passes around the upper sprockets **54** in a radial position and proceeds down the descending leg of the conveyor in inverted position. This also inverts the cartons as will be readily understood, each of which travels down the descending leg resting on the back of the arm **66** of the pocket member which preceded it up the ascending leg.

Above and parallel to the shafts **184** and **185** at the rear of the machine, as shown in Figs. 14 and 15, are mounted a pair of shafts **233** and **234** journaled in suitable bearings **235** secured to the frame members **52**. Each of the shafts **233** and **234** carries a pair of finger wheels **236** and **237**, respectively, which finger wheels are mounted on hubs **238** suitably secured to the shafts. The shaft **233** is provided with a sprocket **239** connected by a chain **241** to a sprocket **242** mounted on the shaft **184**, whereby the finger wheel **236** will be rotated in the same direction as the rear star wheel assembly **182**. In a similar manner the shaft **234**, and with it the finger wheel **237**, are driven through a sprocket **243** and a chain **244** from a sprocket **245** mounted on the shaft **185**, as shown in Fig. 15. The position of the finger wheels **236** and **237** is such that upon rotation, the protruding fingers **246** thereof enter a short distance into the ends of the successive cartons and contact the cans therein which were loaded into the cartons from the front star wheels **176** and **177**, pushing said cans further into the cartons in order to permit entry of the cans to be loaded from the rear star wheels **182** and **183**. In the embodiment illustrated, each of the finger wheels is provided with six radially protruding fingers **246** having rounded ends, as best shown in Fig. 14, but it is to be understood that any convenient number of fingers may be used and that the ratio of the driving and driven sprockets is such that one finger of each set of wheels enters the ends of each carton

in succession as these move down the descending leg of the conveyor.

The rear star wheel assemblies 182 and 183 are similar in construction to the front assemblies 176 and 177, being provided with similar hubs 247 having flanges 248 formed with spaced notches 249. These assemblies also include radially disposed spring fingers 251 and reinforcing springs 252 which are generally similar to the fingers 205 of the front assemblies, differing principally in their lesser degree of stiffness, their more rounded ends and the absence of dimples such as 211 of the front assemblies. It will be understood that the spring fingers of the rear assemblies are not required to fold in the retaining tabs of the cartons which pass them since these tabs have already been folded in during their passage up the ascending leg of the conveyor 53, as previously described. It will also be noted that the rear assemblies 182 and 183 receive cans from inclined chutes 253 similar to the chutes 213 which supply the front assemblies, but that the star wheels carry these cans in the opposite direction over the top of each wheel rather than below the wheel, so that there is no necessity for retaining means such as the rails 223, the cans being maintained in position in their notches by gravity and by the spring action of the fingers 251. These fingers operate primarily as guides by which the cans are prevented from endwise motion during their passage out of the star wheels and are accurately guided into the open end of the downwardly moving cartons.

The cans are transferred from the notches 249 of the rear star wheel assemblies into the ends of the cartons by means of rear ejecting plows 254 of which the points are disposed upwardly, as shown in Fig. 14, this action being similar to the action of the plows 231 previously described. The cam surfaces of the plows 254 are so designed and positioned as to move the cans inwardly into the carton for substantially half the can diameter until the can-engaging edges of the tabs T, or T' as the case may be, engage the inside of the can chime to retain the end cans in the carton in the well understood manner. To ensure that the cans, now in line contact in the carton, are properly retained therein, the cam portions of the plows 254 are also formed with slightly curved or wavy surfaces, as shown in Fig. 14, these waves being complementary so that the crest of a wave on the right plows is opposite the trough between waves on the left plow. In this way the row of cans is given a small reciprocatory shake or jiggle on each side of final position, tending to free any tabs which may have become stuck or twisted, and are in proper locking engagement with the end cans.

It will be understood that the loading conveyor, the carton pick-off and feed mechanism and the can feeding means of the present machine are all connected and driven at the proper speeds and in the proper direction from a single source through gearing best understood by reference to Fig. 15. The source of the power is preferably an electric motor 255, mounted on the base of the machine and connected to a suitable electric supply, not shown. The motor is provided with a drive sprocket 256, connected through a chain 257 to a sprocket 258 on the end of a main drive shaft 259, suitably journaled in bearings 261 carried by the frame of the machine and extending from front to rear of the same. On this shaft is mounted the gear 165, which drives the gears 163 and 164 and through them the carton pick-off, the carton forwarding mechanism and the pushers, as previously described.

Near its rear end the shaft 259 extends through a transmission case 262 and is provided at its rear end with a pinion 263, meshing with a spur gear 264 carried by a jack shaft 265, suitably journalled on the machine frame. Another jack shaft 266, spaced from and parallel to the shaft 265, is driven therefrom through a pair of sprockets 267 and 268, connected by a chain 269. The shaft 266 also carries a sprocket 271 adapted to drive the chain 196, through which the shaft 178 and the star wheel and finger wheel assemblies are driven as previously described.

Within the transmission case 262, the shaft 259 is provided with suitable gearing, not shown, by which it drives a shaft 272, projecting at right angles to the shaft 259 and in alignment with the lower sprocket shaft 57, to which it is connected by the coupling 63. Through this gear train the conveyor 53 is driven in timed relation to the other mechanisms, as will be readily understood. The gearing between the shafts 259 and 272 may be of any well known construction, such as meshing bevel gears or pinions, but since the particular gearing employed forms no part of the present invention, it has not been shown and specific description is unnecessary.

After the cartons have been fully loaded by the rear star wheel assemblies, as described, they may be removed from the conveyor by any suitable ejecting means and deposited on a shipping table, a belt conveyor, a truck or any other desired receiver, not shown. Carton ejecting means has been indicated in Fig. 14 comprising a pair of parallel bars 273 arranged in close proximity to the pocket members 64 on either side of the conveyor 53 and inclined downwardly and rearwardly therefrom. The bars 273 engage under the protruding end cams of each of the loaded cartons in succession, exerting a plowing action to pull the carton out of its pocket and drop it on the desired receiver, as will be readily understood. Since the ejecting means forms no part of the present invention, it has not been described in detail.

It will be apparent that various changes may be made in the disclosed embodiment of the invention without departing from the scope of the inventive concept. It is not intended, therefore, to limit the invention otherwise than as required by the appended claims, with due regard to the spirit as well as the literal wording thereof.

What is claimed is:

1. In a machine for placing cans in open end cartons of the sleeve type, a vertically disposed conveyor adapted to be driven at substantially constant speed, members carried by said conveyor defining pockets adapted to receive erected cartons, a turret member rotatably mounted on a horizontal axis in tangential proximity to said conveyor pockets and formed with radially disposed pairs of notches each adapted to receive a can, supply means including an inclined chute adapted to roll cans on their chimes by gravity into successive pairs of notches of the turret member, resilient members carried by and disposed radially of the turret member adjacent each notch thereof and adapted to engage and retain the cans in said notches, means to rotate said turret member at the tangential speed of the conveyor and fixed cam means adapted to roll each can in succession out of its notches and into the carton carried by the tangentially adjacent pocket.

2. In a machine for loading chimed cans into cartons of the open-ended sleeve type, conveyor means adapted continuously to move said cartons in succession with the open carton ends disposed in a rectilinear path, a continuously rotatable can feeding member disposed tangentially to said path comprising axially spaced disc members formed with circumferentially spaced notches aligned in pairs, each adapted to receive and support a can, resilient fingers radially carried on the disc members adjacent each notch adapted to embrace the ends of a can in said notches, said fingers being formed with curved tip portions adapted to enter the open carton ends, means including a chute to roll cans on their chimes by gravity into successive notches of said feeding member, cam means adjacent the chute adapted to spread the tips of each pair of fingers to admit a can therebetween, cam means on the resilient fingers engageable by the can chimes to spread the tips of each pair of fingers within the carton to outwardly bow the carton walls, and plow

means to transfer said cans between the spread finger tips into the moving carton adjacent the point of tangency.

3. In a machine for placing cans in cartons of the sleeve type, a continuous vertically disposed conveyor having an ascending leg and a parallel descending leg, pocket members carried by said conveyor each adapted to receive and support an erected carton, means disposed laterally of the ascending leg of the conveyor for feeding erected cartons into the ascending pocket members of said leg in succession from alternate sides of the conveyor, said feeding means including pusher means to accelerate final movement of each carton into its pocket, and means to drive said conveyor at substantially constant speed.

4. In a machine for placing cans in cartons of the sleeve type, a continuous conveyor formed with pocket members each adapted to support an erected carton, carton feeding means disposed laterally of the conveyor at either side thereof, said means including carton advancing members adapted to forward erected cartons in succession to said pocket members and pusher means to accelerate the cartons away from said advancing members and into said pocket members, means to drive said conveyor and said advancing members at substantially constant speed in timed relation, and means to drive said pusher members in unison in timed relation to the conveyor.

5. In a machine for placing cans in cartons of the sleeve type having integral locking tabs projecting from opposite carton walls at each of the open carton ends, means to move said cartons through a vertical path at constant speed, fixed plow means arranged in a path of movement of the cartons engaging the projecting tabs to bend said tabs inwardly of the carton ends substantially into the planes of said ends, rotary can feeding members contiguous to the planes of movement of the carton ends adapted to move cans through a circular arc in tangential relation to the path of movement of the carton ends, resilient finger members arranged in opposed pairs on said rotary members, and projecting radially therefrom, each said pair of fingers embracing the ends of a can carried by the rotary member, said fingers being formed with curved tip portions rotatable into and out of the open carton ends to engage the tab carrying walls thereof, and means to roll each can in succession from between its associated resilient fingers into the tangentially adjacent carton.

6. A machine for loading chimed cans into cartons of the open-ended sleeve type having integral retaining tabs extending outwardly from the open ends of the top and bottom carton walls, comprising means for moving the carton in a vertical path while disposed on a side with the projecting tabs in parallel, vertical planes, fixed plow members disposed in the paths of said tabs to fold each tab inwardly of the carton into the plane of the carton end, rotary can feeding members adapted to move cans in a circular path having a tangential relation to the rectilinear path of movement of the carton ends while maintaining said cans in horizontal position, and means including resilient spring fingers radially disposed on said can feeding member adapted to enter said carton ends and engage said tab members, said fingers operating to expand the top and bottom carton walls and to guide said can into said carton whereby the can chimes complete the folding of said tabs.

7. In a machine for loading chimed cans into cartons of the open-ended sleeve type having integral retaining tabs extending from the ends of the top and bottom carton walls, means for moving the carton through a vertical path in a position wherein the carton side walls are horizontally disposed and the top and bottom walls and associated tabs are disposed in parallel, vertical planes, plow members fixed in the paths of said tabs to fold each tab inwardly of the carton into the plane of the open carton end, continuously rotating can feeding members adapted to move cans in a circular arc tangent to the path of movement of the open carton ends, resilient spring fingers mounted radially on the rotary feeding members and arranged in pairs each adapted to embrace the ends of a can, said fingers being formed with tip portions adapted to enter the open carton ends to engage the tabs, cam means carried by the machine adapted to spread the fingers of each pair to bow the top and bottom carton walls, and can plow means carried by the machine between the fingers of each said pair adapted to roll each can in succession from between its associated fingers into the adjacent carton.

8. In a machine for loading chimed cans into cartons of the open-ended sleeve type having integral split tabs projecting from the open ends of opposite walls, means to move said cartons in a rectilinear path, means to fold both halves of each tab into the plane of the adjacent open carton end across the opening thereof, a continuously rotatable can feeding member adapted to move cans in a circular path in tangential relation to the carton path, spring fingers mounted radially on the can feeding member in axially spaced pairs adapted resiliently to embrace the ends of a can, said fingers being disposed substantially in the planes of the carton ends and formed with inwardly curved tip portions adapted to rotate into and out of the open carton ends as the carton passes the point of tangency, a fixed plow member adapted to force each can radially outward from the can feeding member between said spring fingers into the open end of the adjacent carton, and means carried by the spring fingers and engageable by the chimes of the can to separate the tips of the fingers into spreading engagement with the tab carrying walls.

9. In a machine for loading chimed cans into cartons of the open-ended sleeve type having integral split tabs projecting from the open ends of opposite walls, means to move said cartons in a rectilinear path, means to fold both halves of each tab into the plane of the open carton end across the opening thereof, a continuously rotatable can feeding member including radial spring fingers disposed in axially spaced pairs resiliently to embrace the ends of a can, said fingers being formed with tapered tip portions curved to enter the open ends of the carton into folding engagement with the nearer half of the split tab as the carton approaches the point of tangency, a plow member disposed in the can path to force each can outwardly between the spring fingers toward the open end of the adjacent carton, cam lugs formed on said finger tips engageable by the chimes of the can upon outward movement thereof to separate the tip portions into wall expanding engagement with the tab carrying walls, whereby the can chimes engage and fold the other half of the split tab.

10. In a machine for loading chimed cans into open-ended sleeve type cartons, a rotary can carrying member having a pair of axially spaced discs formed with circumferentially spaced rounded notches arranged in aligned pairs each adapted to support a can, a radially disposed resilient finger mounted on the disc at each of said notches, each pair of said fingers being adapted resiliently to embrace by its ends a can disposed in the adjacent pair of notches, said fingers being formed with curved tip portions spaced to enter the open end of a carton, means for rolling cans on their chimes successively into each pair of notches, fixed means adapted to spread the tips of each pair of fingers during movement of a can into the adjacent notches, means to guide each pair of tips in succession into wiping contact with the inner walls of a carton through the open ends thereof, means to spread the tips into wall expanding position within the carton, and plow means engaging each can in succession to force said can between said fingers into a carton.

11. In a machine for loading chimed cans into cartons of the open-ended sleeve type having two-part split tabs projecting from the ends of opposite walls, means con-

tinuously to move a carton through a rectilinear path with the open end disposed in a vertical plane, means to fold the tabs into said plane, a can feeding member continuously rotatable at the speed of carton movement disposed in tangential relation to said vertical plane, radially disposed fingers carried by said member in pairs axially spaced resiliently to embrace the ends of a can, said fingers formed with curved tip portions spaced to rotate through the open end of the carton in proximity to the tab-carrying walls, said tip portions being formed with domed protuberances, plow means to force the can radially from the member between the protuberances toward the open end of the moving carton to separate said tip portions into tab folding engagement with the lower halves of the tabs and to expand the opposite tab carrying walls outwardly, said radial movement of the can between the fingers bringing the can chimes into folding engagement with the upper halves of the tabs.

12. In a machine for loading chimed cans into cartons of the open-ended sleeve type having tabs of the split type projecting from the open ends of opposite walls in the plane of said walls, means to move the cartons in a rectilinear path wherein the open ends are in spaced parallel planes, means to fold both halves into the plane of movement of and across the adjacent open carton end, continuously rotatable can feeding means adapted to move a can through a circular path having a tangential relation to a plane of movement of the open carton ends into juxtaposition to said ends, radially disposed fingers carried by said can feeding means arranged in axially spaced pairs each adapted resiliently to embrace the ends of a can, said fingers being formed with tapered tip portions curved to enter the open end of a carton in proximity to the tab carrying walls thereof, each tip portion being formed with a protuberance engageable by the can chime, plow means to force each can in succession radially outward between the protuberances to spread the fingers into expanding engagement with the tab carrying walls and to fold one-half of each tab inwardly against its wall, the other tab being folded by the chime of the can.

13. In a machine for inserting cans in open end sleeve-type cartons, a conveyor adapted to be driven at substantially constant speed, members carried by the conveyor defining pockets adapted to receive erected cartons, a turret member rotatably mounted in tangential proximity to the conveyor pockets and including two axially spaced disc members each formed with registering, radially disposed notches, each registering pair of notches being adapted to receive a can, supply means to deliver individual cans successively to the individual pairs of notches of the turret member, a resilient member carried by the turret member and disposed adjacent each notch thereof and adapted to engage the ends of the cans and retain them in the notches, means for rotating the turret member at a tangential speed conforming to the speed of the conveyor, and cam means disposed between the discs adapted as the turret rotates to move the individual cans successively out of the notches and into cartons carried by the tangentially adjacent pockets.

14. In a machine for loading cans into cartons of the open-ended sleeve type, conveyor means adapted continuously to move the cartons with the open carton ends disposed in a fixed path, continuously rotatable can feeding means disposed tangentially to said path comprising axially spaced members each formed with registering, radially disposed notches, each registering pair of notches being adapted to receive and support a can, resilient fingers radially carried on the spaced members adjacent each notch adapted to embrace the ends of a can in the notches, said fingers being formed with end portions adapted to enter the open carton end, means for delivering individual cans to successive notches of the feeding means, cam means in the path of the resilient fingers adapted to spread outwardly the end portions of the fingers to admit a can therebetween, and cam means disposed between the spaced member adapted, as the feeding means rotates, to cause the transfer of the individual cans successively from the notches past the end portions of the resilient fingers and into the cartons carried by the tangentially adjacent pockets.

15. In a machine for inserting cans in cartons of the open-ended sleeve type, a conveyor, means for driving the conveyor at constant speed, the conveyor being formed with pocket members each adapted to support an erected carbon, a carton feeding means disposed laterally of the conveyor at opposite sides thereof, each feeding means including carton advancing members adapted to forward erected cartons in succession to every other pocket member, and means for driving the two feeding means in timed relation to the conveyor.

16. In a machine for loading cans into open-ended sleeve type cartons, a rotary can carrying member having a pair of axially spaced discs formed with circumferentially spaced, rounded notches arranged in aligned pairs each adapted to support a can, a radially disposed resilient finger mounted on the disc at each of said notches, each pair of said fingers being adapted resiliently to embrace by its ends a can disposed in the adjacent pair of notches, said fingers being formed with tip portions spaced to enter the open end of a carton, means for moving cans successively into each pair of notches, means for spreading the tips of each pair of fingers during movement of a can into the adjacent notches, means to guide each pair of tips in succession into wiping contact with the inner walls of a carton through the open ends thereof, and plow means engaging each can in succession to force the can out of engagement with the resilient fingers and into a carton.

17. In a machine for placing cans in cartons of the sleeve type, a vertically disposed conveyor, members carried by the conveyor defining pockets adapted to receive and carry erected cartons in closely spaced relation and with the axes through their open ends transverse to the line of travel, a turret rotatable on a horizontal axis in tangential proximity to the conveyor with its peripheral face directed toward the open ends of cartons on the conveyor, said turret being formed with a plurality of uniformly and closely spaced notches to receive successive cans, means for driving the conveyor and rotating the turret at uniform speed and in the same direction at their points of tangential proximity, a can supply chute adapted to feed cans by gravity into successive notches of said turret, and means cooperating with the turret and supported independently thereof adapted to engage cans in the notches of the turret as they approach the point of tangential proximity of the turret and conveyor to move cans from the notches and into cartons on the conveyor.

18. In a machine for placing cans into open end cartons, a conveyor adapted to receive and carry erected cartons, means for driving the conveyor, a rotatable member adapted to move in tangential proximity to the conveyor, means for moving the rotatable member at comparable speed with the conveyor at the point of proximity, said rotatable member being formed with radially disposed notches adapted to receive cans therein from a can supply means, a plurality of thin, resilient finger elements secured in pairs on opposite sides of the rotatable member, one pair at each of the notches to engage the opposite ends of cans received therein, the finger elements being of a radial extent sufficient to enter the open ends of cartons on the conveyor as the rotatable member moves through the point of tangential proximity with the conveyor, and means disposed adjacent the point of tangential proximity of the rotatable member and conveyor adapted to move cans from the notches, and from between the resilient finger elements, and into cartons on the conveyor while the rotatable member and conveyor are moving in unison.

19. In a machine for placing cans into open end cartons, a vertically disposed conveyor, members carried by said conveyor defining pockets adapted to receive and carry erected cartons, a vertically rotatable turret in tangential proximity to said conveyor having radially extending portions to form therebetween a plurality of radially disposed notches to receive successive cans, a can supply chute having its end disposed to deliver cans by gravity into successive notches of said turret, the delivery end of the chute being spaced a substantial angular distance from the point of tangential proximity of the turret and the carton conveyor, the radially extending portions forming the notches being relatively narrow, whereby the notches are closely spaced, and the extent of such portions in a radial direction being less than the diameter of the cans to be received in the notches, whereby, upon travel of the notches of the turret past the delivery end of the chute, each succeeding can before leaving the chute will rest momentarily upon the immediately preceding can delivered into a notch and, upon further rotation of the turret to move the can held in the notch out of supporting contact with the succeeding can, the latter will move into the next succeeding notch in a substantially continuous movement, and means adapted to move cans from the notches directly into cartons carried by the conveyor.

20. In a machine for inserting cans in open end cartons, a conveyor adapted to be driven at substantially constant speed, members carried by the conveyor defining pockets adapted to receive cartons, a rotatable member mounted in tangential proximity to the conveyor pockets including two spaced parts each formed with registering radially disposed notches, each registering pair of notches being adapted to receive a can, supply means to deliver individual cans successively to the individual pairs of notches of the rotatable member, a resilient finger element carried by the rotatable member and disposed adjacent each notch thereof and adapted to engage the ends of the cans and retain them in the notches, means for rotating the rotatable member at a tangential speed conforming to the speed of the conveyor, and cam means disposed between the spaced parts in which the notches are formed adapted, as the rotatable member rotates, to move the individual cans out of the notches, out of engagement with the resilient finger elements and into cartons carried by the carton conveyor.

21. In a machine for inserting cans in open end cartons, a conveyor adapted to receive and carry erected cartons, a rotatable member arranged to travel in tangential proximity to the conveyor including two spaced parts each formed with registering radially disposed notches, each registering pair of notches being adapted to receive a can, supply means to deliver individual cans to the individual pairs of notches of the rotatable member, a resilient finger element carried by the rotatable member and disposed adjacent each notch thereof and adapted to engage the ends of the cans and retain them in the notches, means adjacent the delivery point of the can supply means adapted to spread the tips on each pair of finger elements to admit a can therebetween, means for rotating the rotatable member at a tangential speed conforming to the speed of the conveyor, and means disposed between the spaced parts in which the notches are formed adapted, as the rotatable member rotates, to move the individual cans out of the notches, out of engagement with the resilient finger elements and into cartons carried by the carton conveyor.

22. In a machine for placing cans in open end cartons, a conveyor disposed to travel in a vertical plane and having members carried thereby defining pockets adapted to receive and carry erected cartons with the axes through their open ends transverse to the direction of travel of the conveyor, the conveyor having connected ascending and descending legs, two rotatable members mounted on horizontal axes, each having can retaining elements on its periphery for receiving elongated cans with their longitudinal axes parallel with the axis of each rotatable member, one rotatable member being in tangential proximity with the ascending conveyor leg and the other being in tangential proximity with the descending conveyor leg, means for driving the conveyor, means for driving both rotatable members at a tangential speed conforming to the speed of the conveyor and in the same direction as the movement of the conveyor leg to which each is in tangential proximity, means for delivering cans to the can retaining elements on the periphery of each rotatable member, and means operable during the rotation of each rotatable member for transferring cans from the rotatable member to cartons on the conveyor while it is in motion.

23. In a machine as defined in claim 22, wherein means are included to synchronize the driving means for the conveyor and the two rotatable members whereby one rotatable member is adapted to deliver a first can to a carton on one vertical leg of the conveyor and the other rotatable member is adapted thereafter to deliver a second can to the same carton on the other vertical leg of the conveyor.

24. In a machine for placing cans into tubular cartons, open at each end, a conveyor adapted to receive and carry erected cartons with their tubular axes extending transverse to the direction of movement of the conveyor, a pair of rotatable members arranged to rotate in tangential proximity to the conveyor, one at each side thereof and acting in opposition to each other, each rotatable member including two spaced parts each formed with registering radially disposed notches, each registering pair of notches being adapted to receive a can, supply means to deliver individual cans to the individual pairs of notches of each rotatable member, resilient finger elements carried by the rotatable members and disposed adjacent each notch thereof and adapted to engage the ends of cans and retain them in the notches, means for rotating the rotatable members at a tangential speed conforming to the speed of the conveyor, means disposed between the spaced parts in which the notches are formed, adapted, as the rotatable member rotates, to move the individual cans out of the notches, out of engagement with the resilient finger elements and into cartons carried by the conveyor, means for driving each rotatable member in synchronism to deliver a can simultaneously into each of the opposite ends of the cartons on the conveyor, and positioning elements on the resilient finger elements, disposed on the side away from the can engaging surface, adapted to engage the edge of a wall at the open end of a carton on the conveyor and shift any inaccurately positioned cartons transversely of the conveyor.

25. In a machine for placing cans into open end cartons, a conveyor adapted to receive and carry erected cartons, means for driving the conveyor, a rotatable member adapted to move in tangential proximity to the conveyor including two axially spaced parts each formed with at least one radially disposed notch, said notches being in registration and aadpted jointly to receive a can, supply means to deliver a can to such pair of notches, resilient finger elements carried by the rotatable member, one finger element disposed centrally adjacent each notch, and adapted to engage the ends of a can to retain it in the notches, means for moving the rotatable member at a tangential speed conforming to the speed of the conveyor, and means disposed between the spaced parts in which the notches are formed, adapted to move a can out of the notches, out of engagement with the resilient finger elements and into cartons carried by the carton conveyor as the rotatable member moves into and out of tangential relation to the conveyor.

26. In a machine for placing cans into four-walled, open end cartons, a conveyor adapted to receive and carry erected cartons, means for driving the conveyor, a rotatable member adapted to move in tangential proximity

to the conveyor including two axially spaced parts each formed with at least one radially disposed notch, said notches being in registration and adapted jointly to receive a can, supply means to deliver a can to such pair of notches, resilient finger elements carried by the rotatable member, there being one finger element for each notch and such finger elements being disposed to extend radially outward beyond the respective spaced parts a sufficient distance whereby the end portions of the resilient finger elements are adapted to enter into wiping engagement with inner surfaces of opposed walls of a carton on the conveyor, at least the end portions of the resilient finger elements being adapted to engage the respective opposite ends of a can to guide it into the open end of a carton on the conveyor, means for moving the rotatable member at a tangential speed conforming to the speed of the conveyor, and means disposed between the spaced parts in which the notches are formed, adapted to move a can out of the notches, past the end portions of the resilient finger elements, and into a carton carried by the conveyor as the rotatable member moves into and out of tangential relation to the conveyor.

27. In a machine for placing cans into open end cartons, a conveyor adapted to receive and carry erected cartons, means for driving the conveyor, a rotatable member adapted to move in tangential proximity to the conveyor including two axially spaced parts each formed with at least one radially disposed notch said notches being in registration and adapted jointly to receive a can, supply means to deliver a can to such pair of notches, finger elements carried by the rotatable member, there being one finger element for each notch and such finger elements being disposed to extend outward beyond the respective spaced parts, at least the end portions of the finger elements being adapted to engage the respective opposite ends of a can and guide it into the open end of a carton on the conveyor, means for moving the rotatable member at a tangential speed conforming to the speed of the conveyor, and means disposed between the spaced parts in which the notches are formed, adapted to move a can out of the notches, past the end portions of the finger elements, and into a carton carried by the conveyor as the rotatable member moves into and out of tangential relation to the conveyor.

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