

June 19, 1962

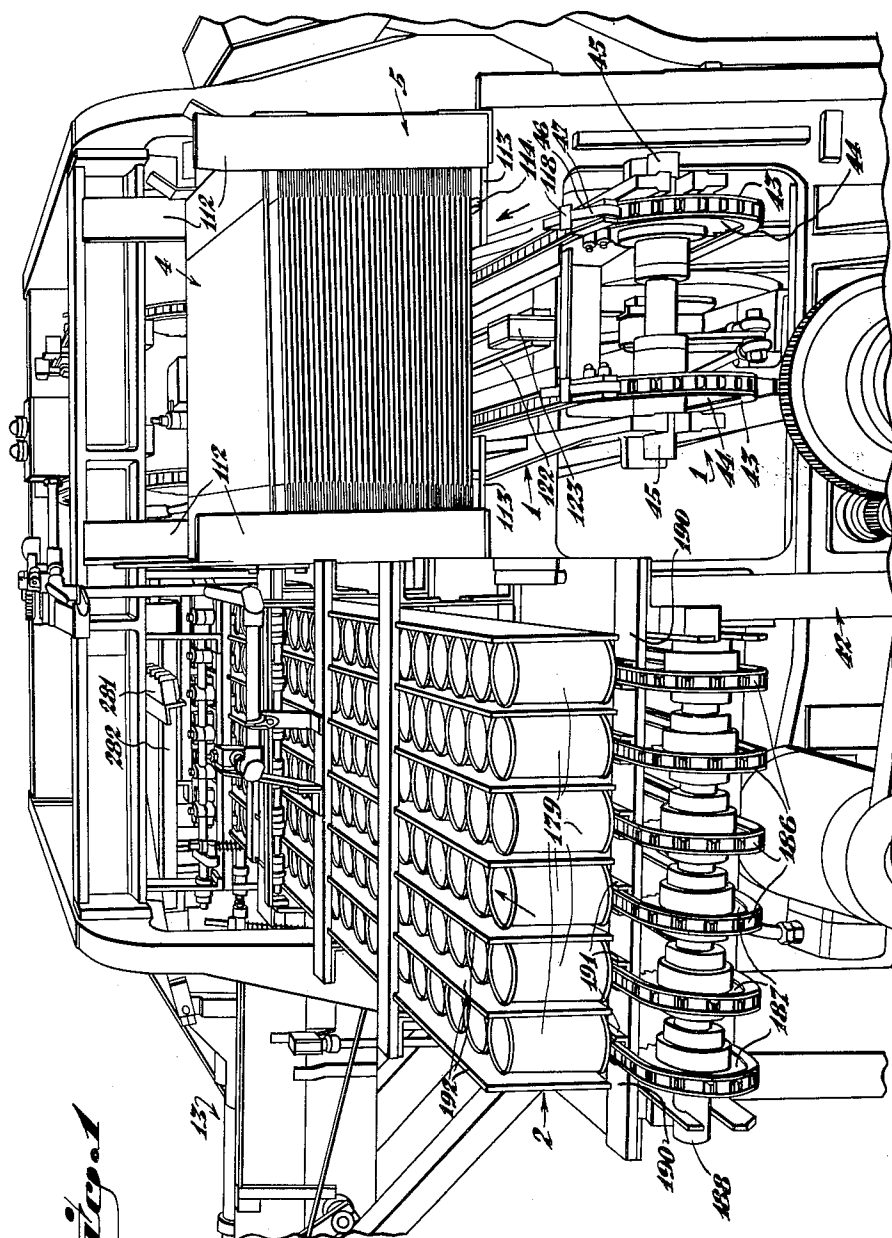
W. JONES

3,039,248

AUTOMATIC CASE PACKING MACHINE

Filed Sept. 15, 1958

23 Sheets-Sheet 1



INVENTOR.

Wickliffe Jones.
BY

BY

BY
Wood, Henson & Evans.

ATTORNEYS.

June 19, 1962

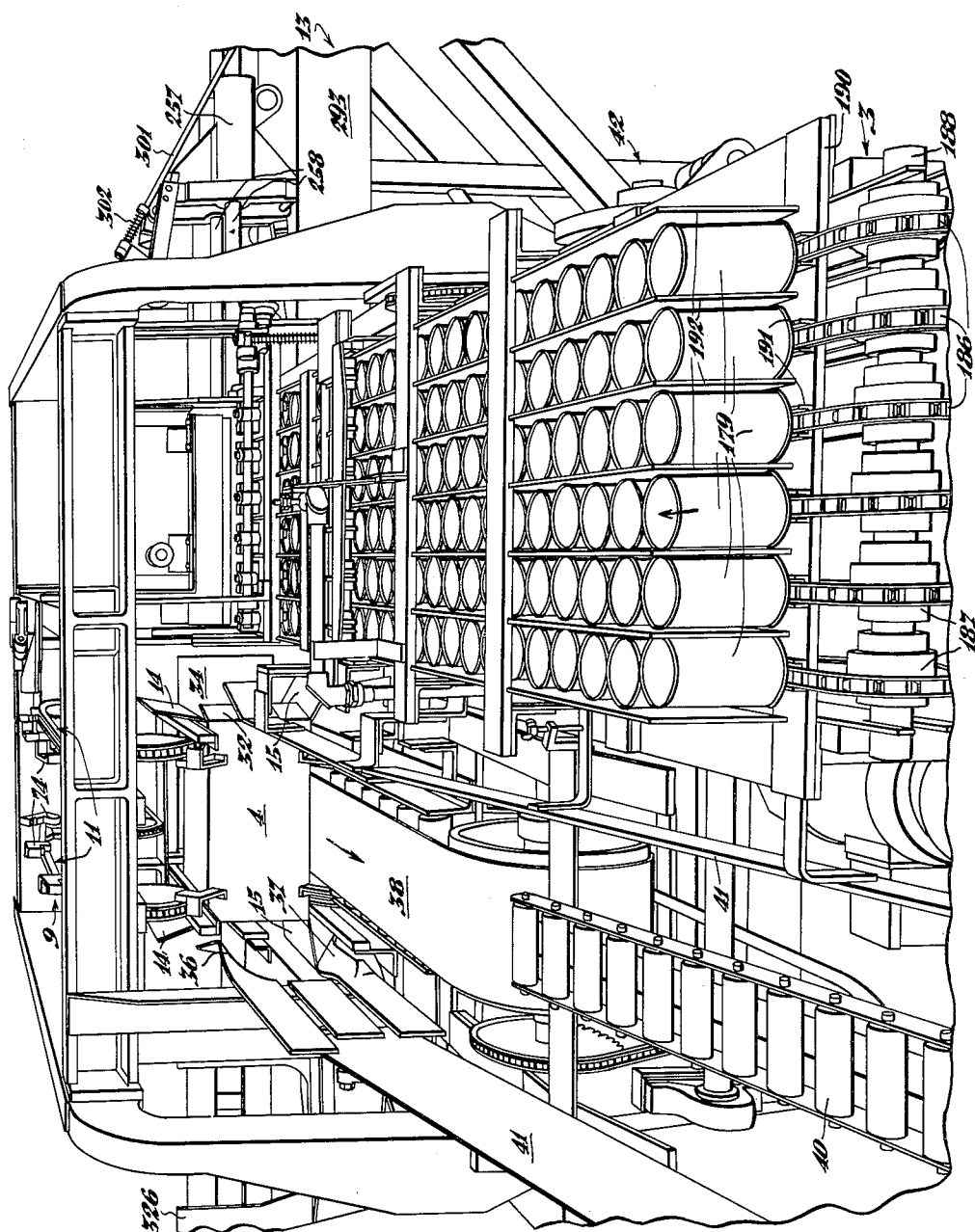
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AUTOMATIC CASE PACKING MACHINE

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23 Sheets-Sheet 2



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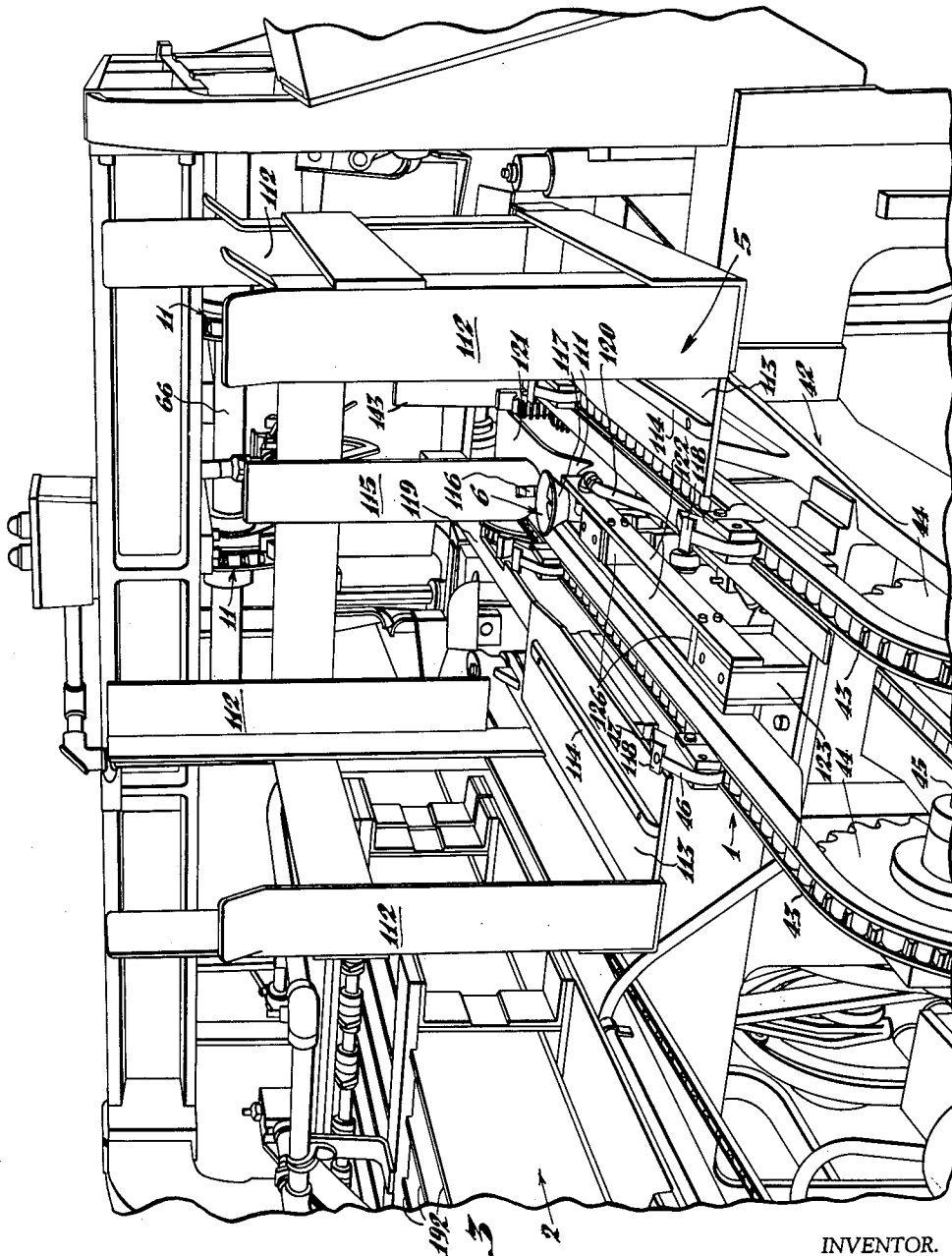


Fig. 3

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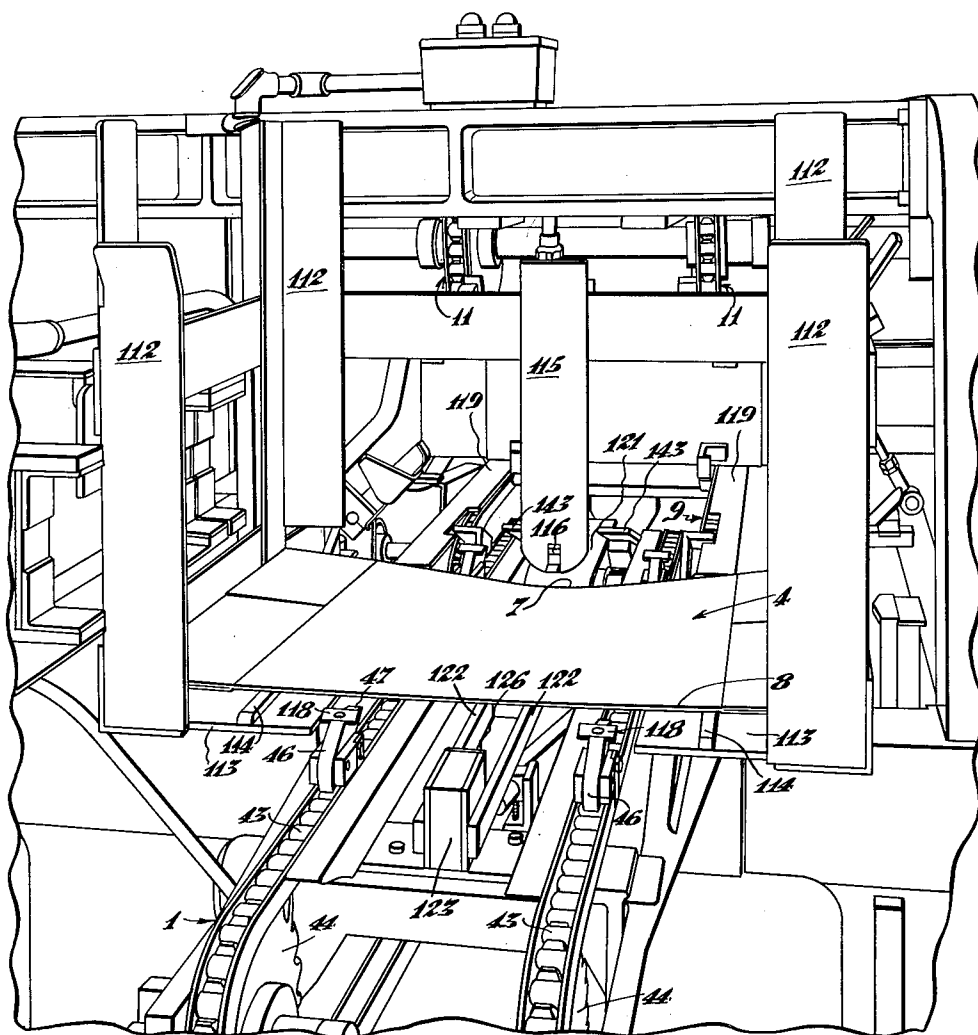


Fig. 4

INVENTOR.

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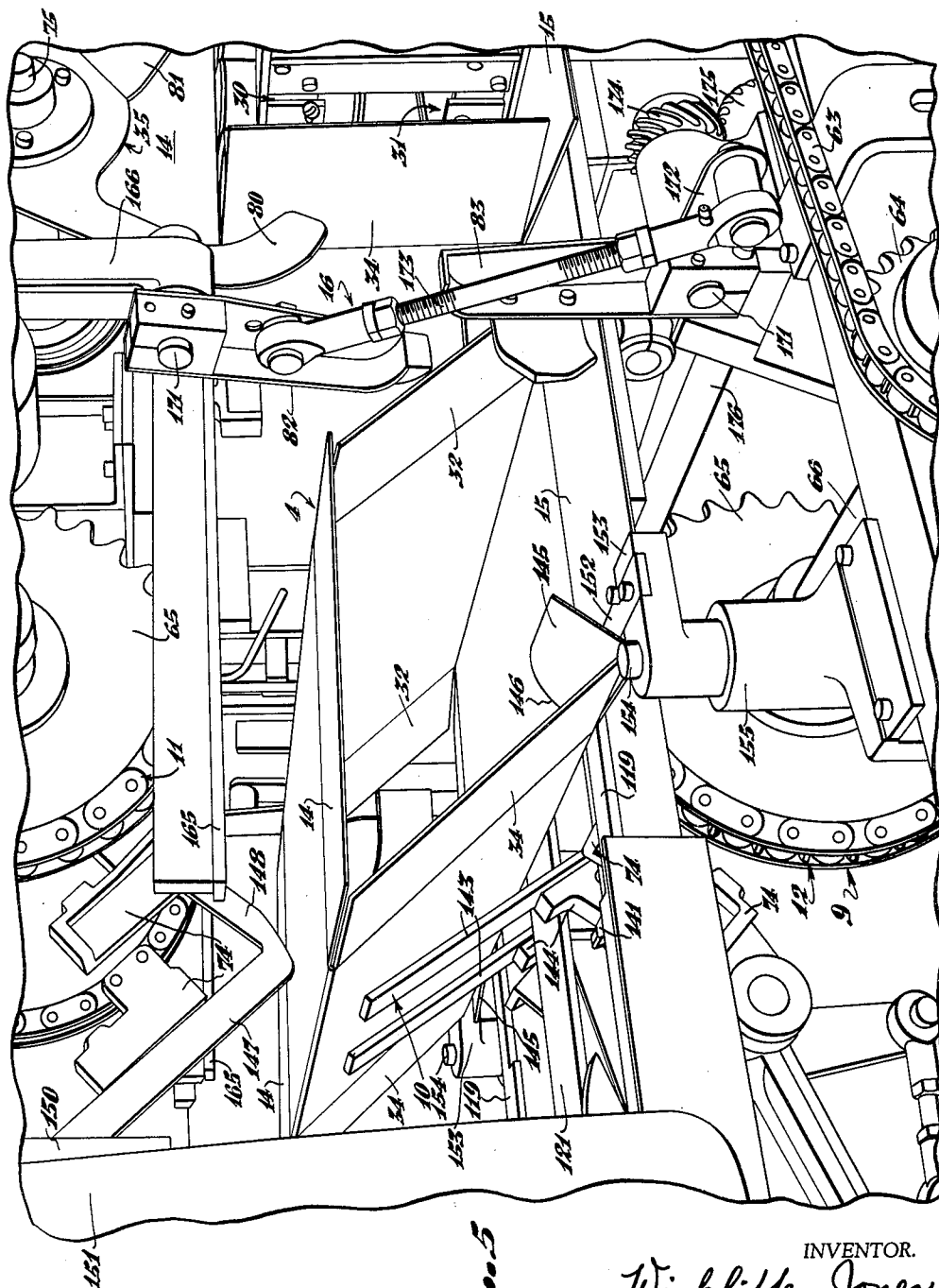


Fig. 5

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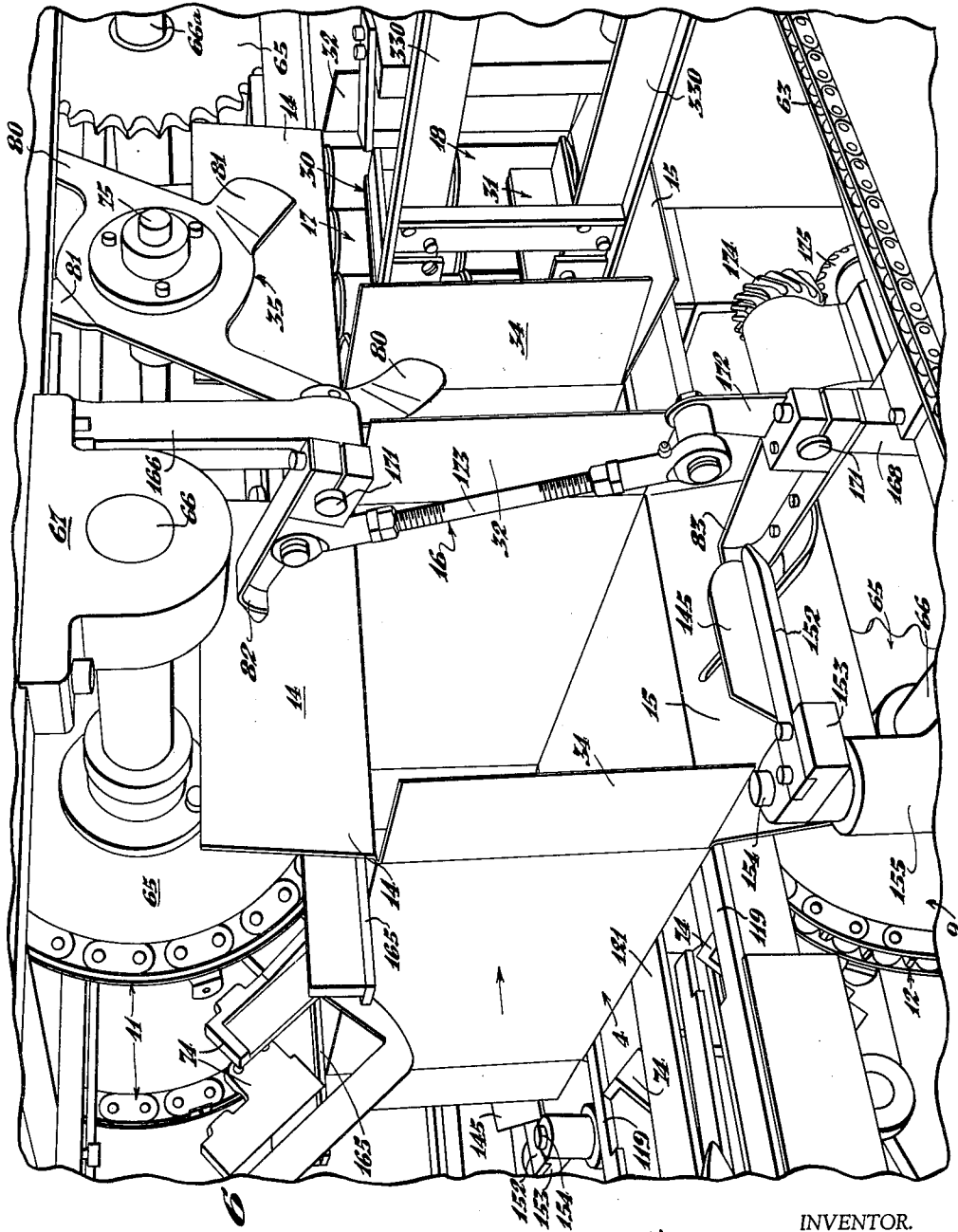


Fig. 6

INVENTOR.

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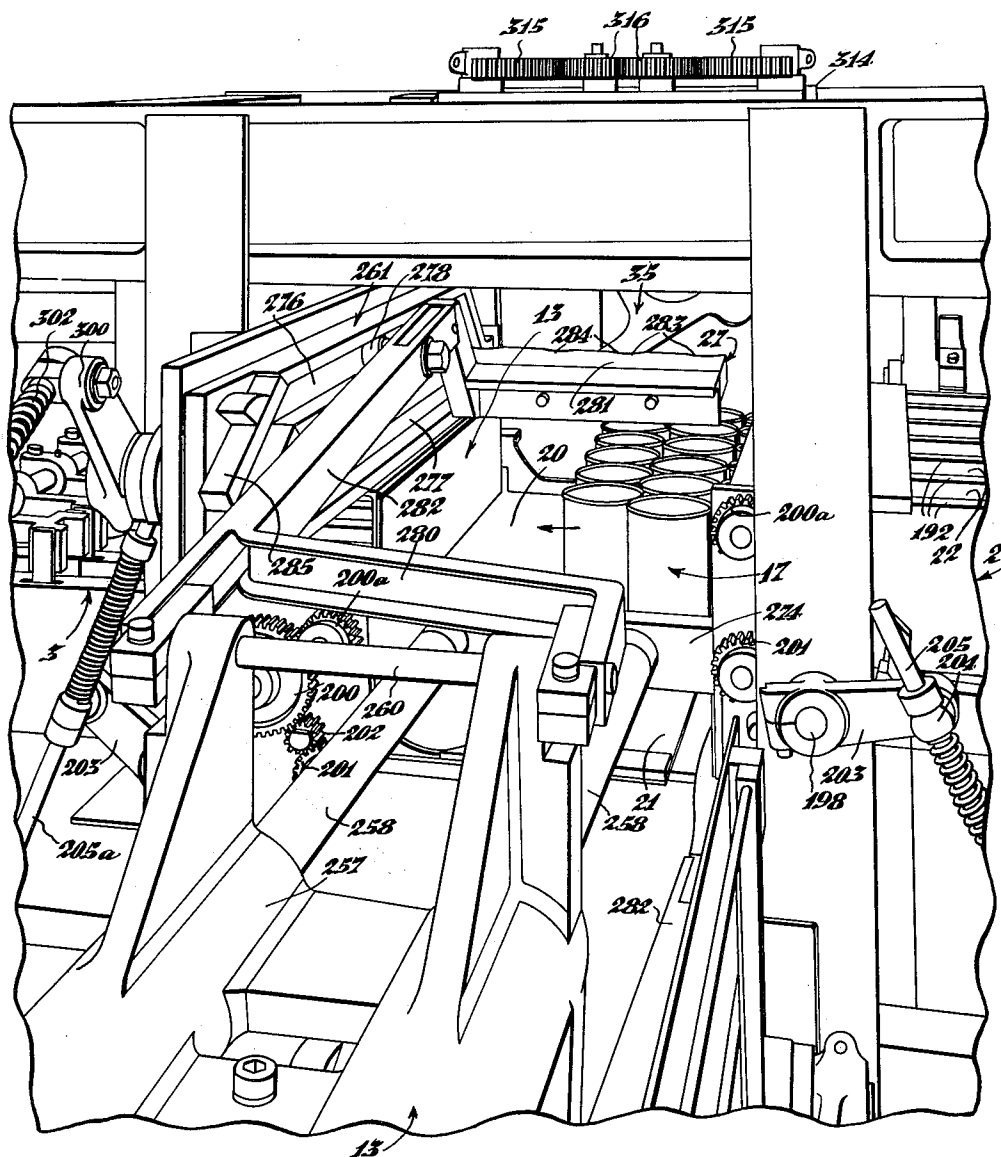
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INVENTOR.

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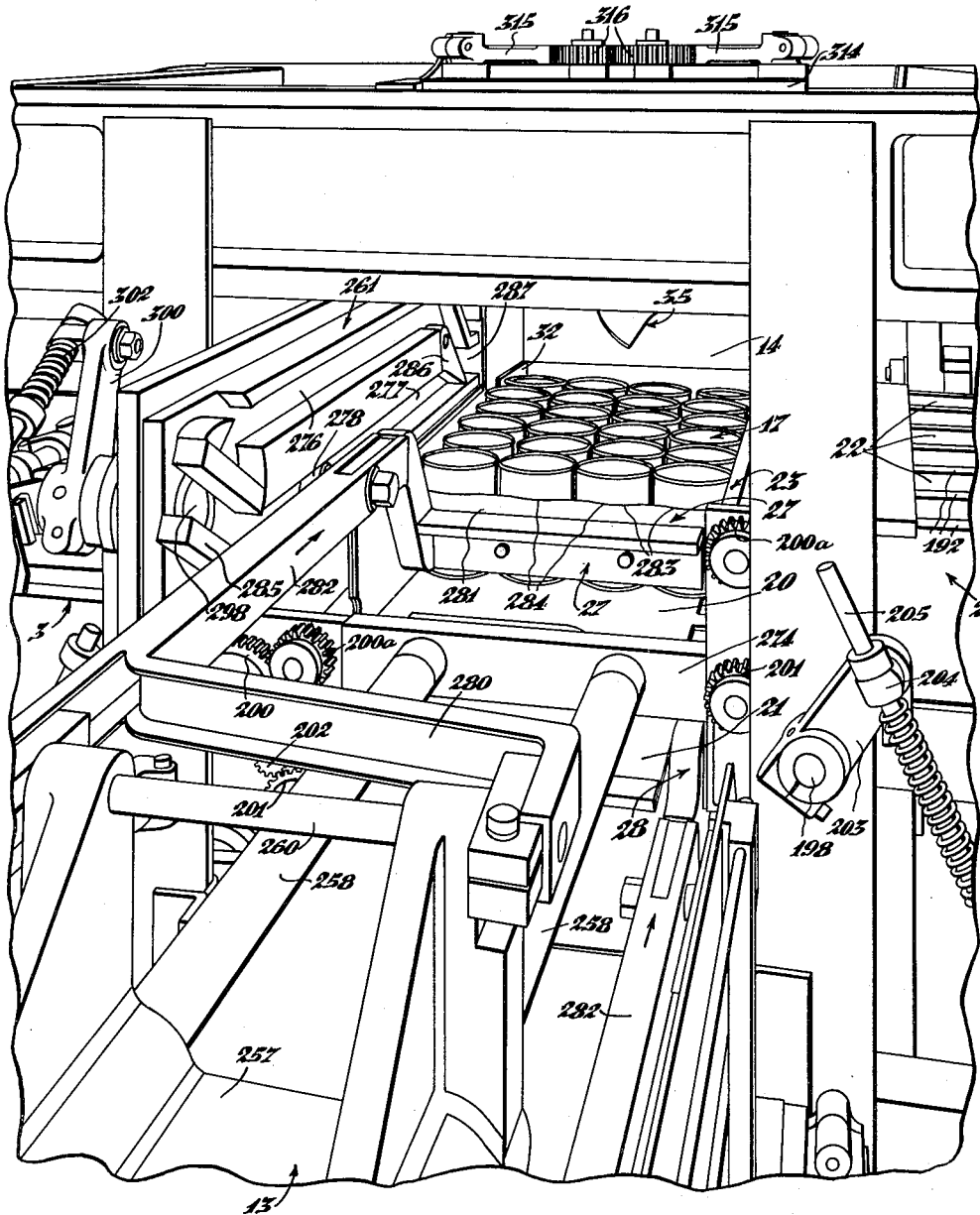


Fig. 8

INVENTOR.
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AUTOMATIC CASE PACKING MACHINE

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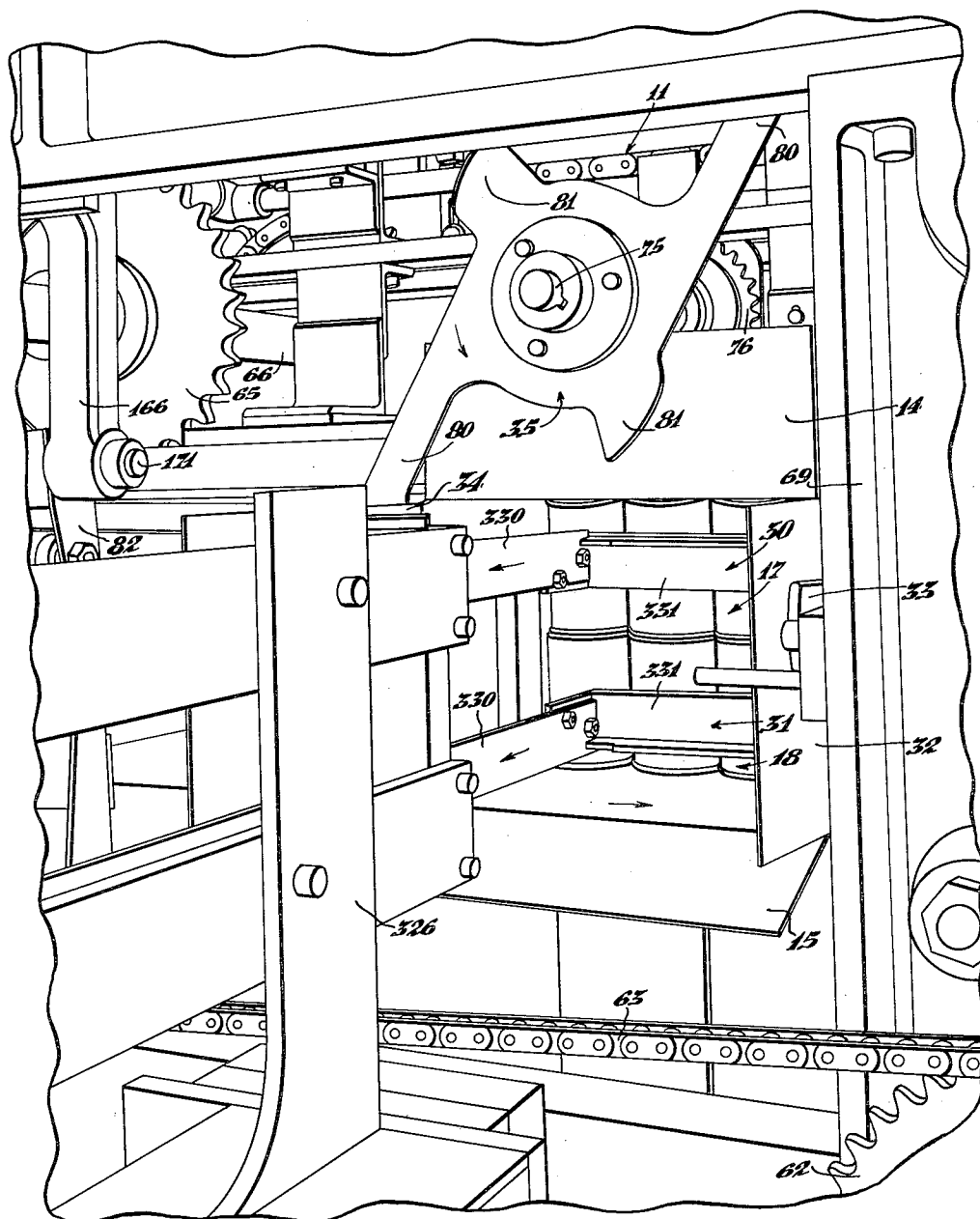


Fig. 9

INVENTOR.
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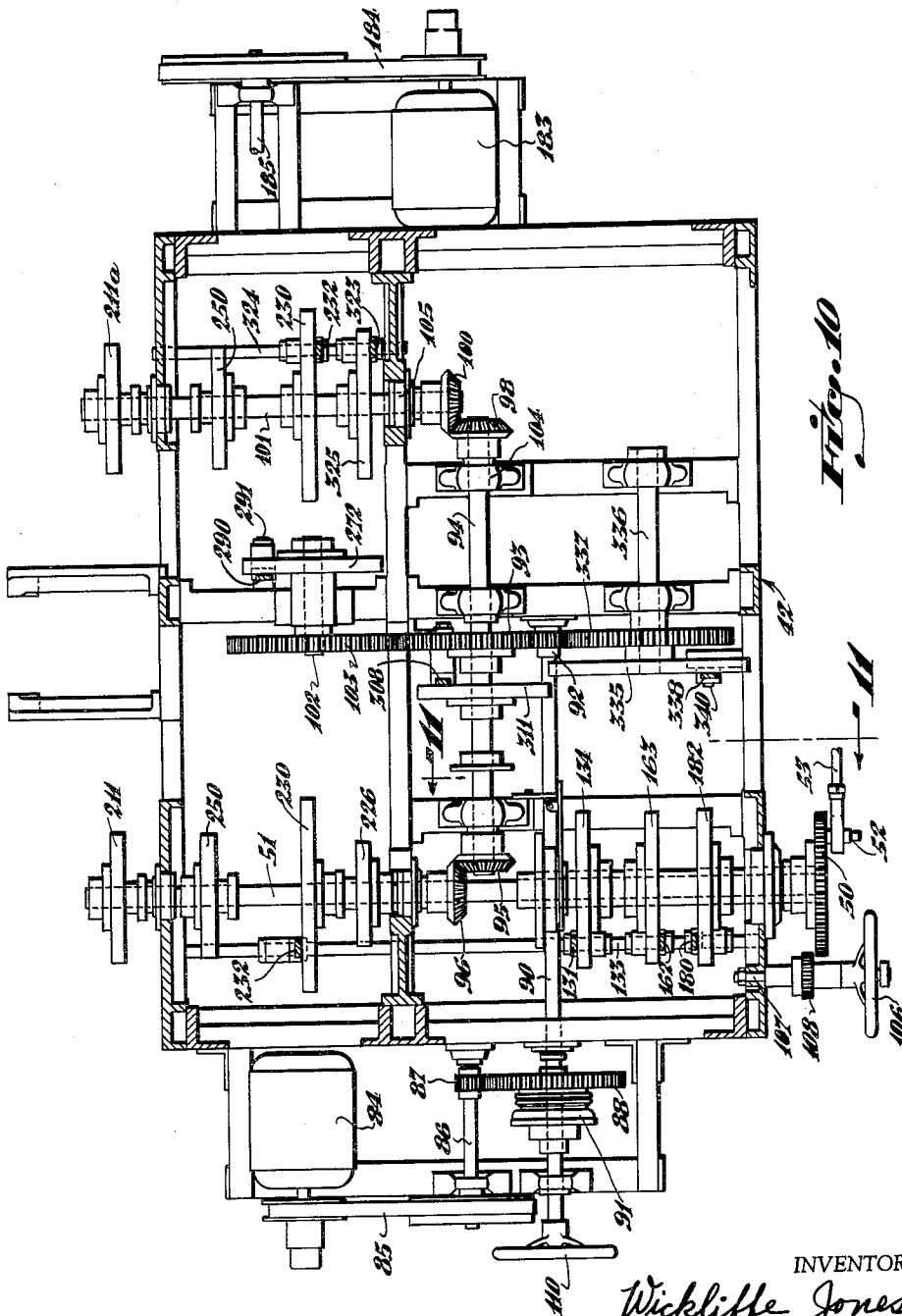
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AUTOMATIC CASE PACKING MACHINE

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23 Sheets-Sheet 10



INVENTOR.

Wickliffe Jones.

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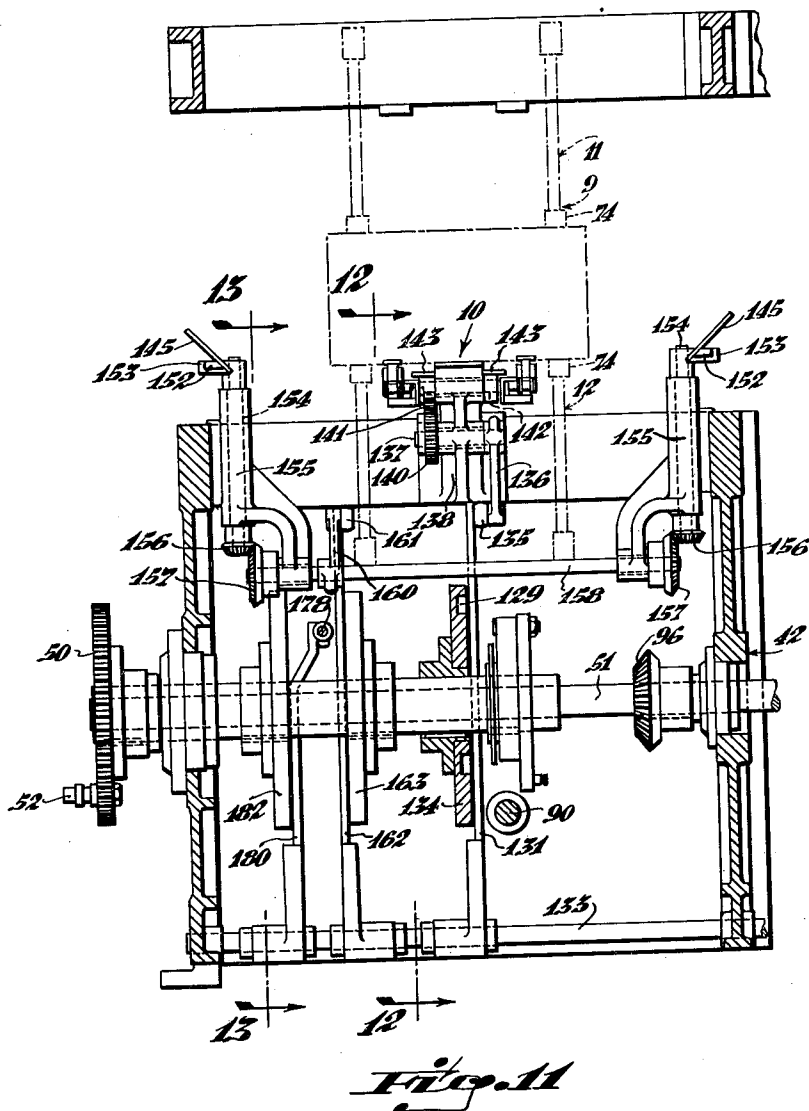
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AUTOMATIC CASE PACKING MACHINE

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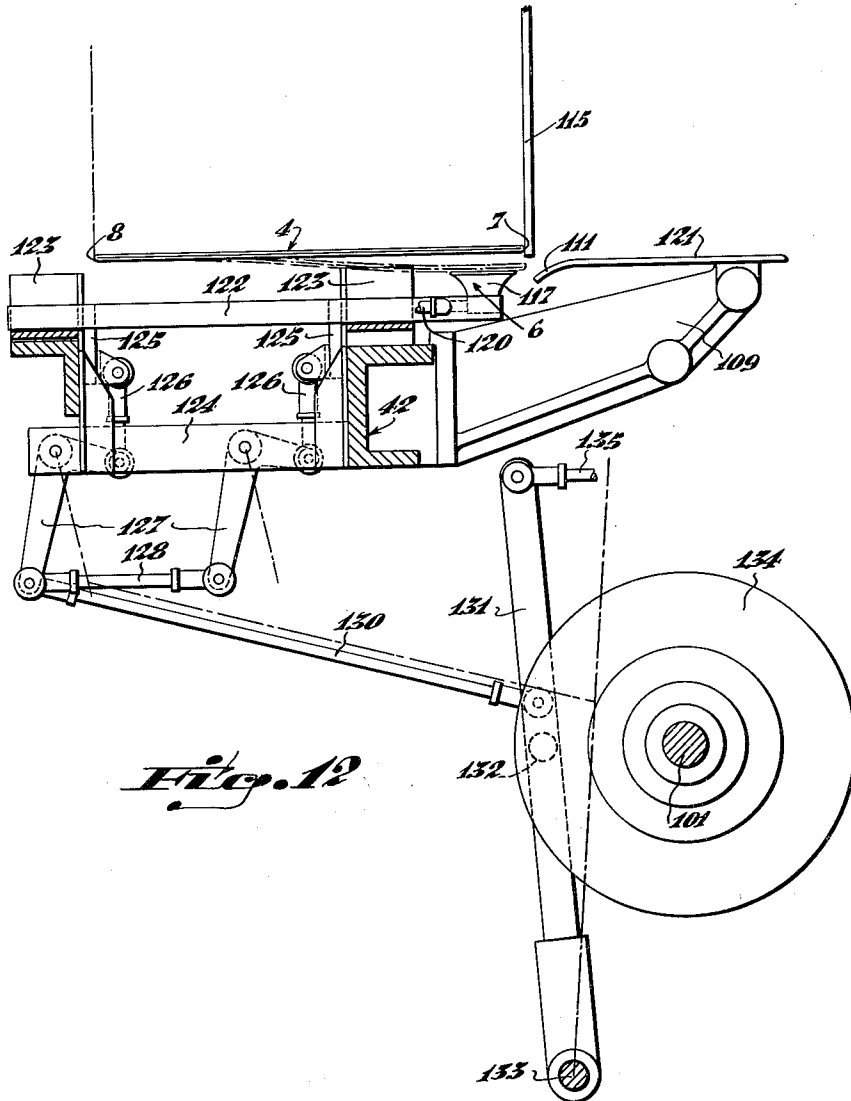
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23 Sheets-Sheet 12



INVENTOR.

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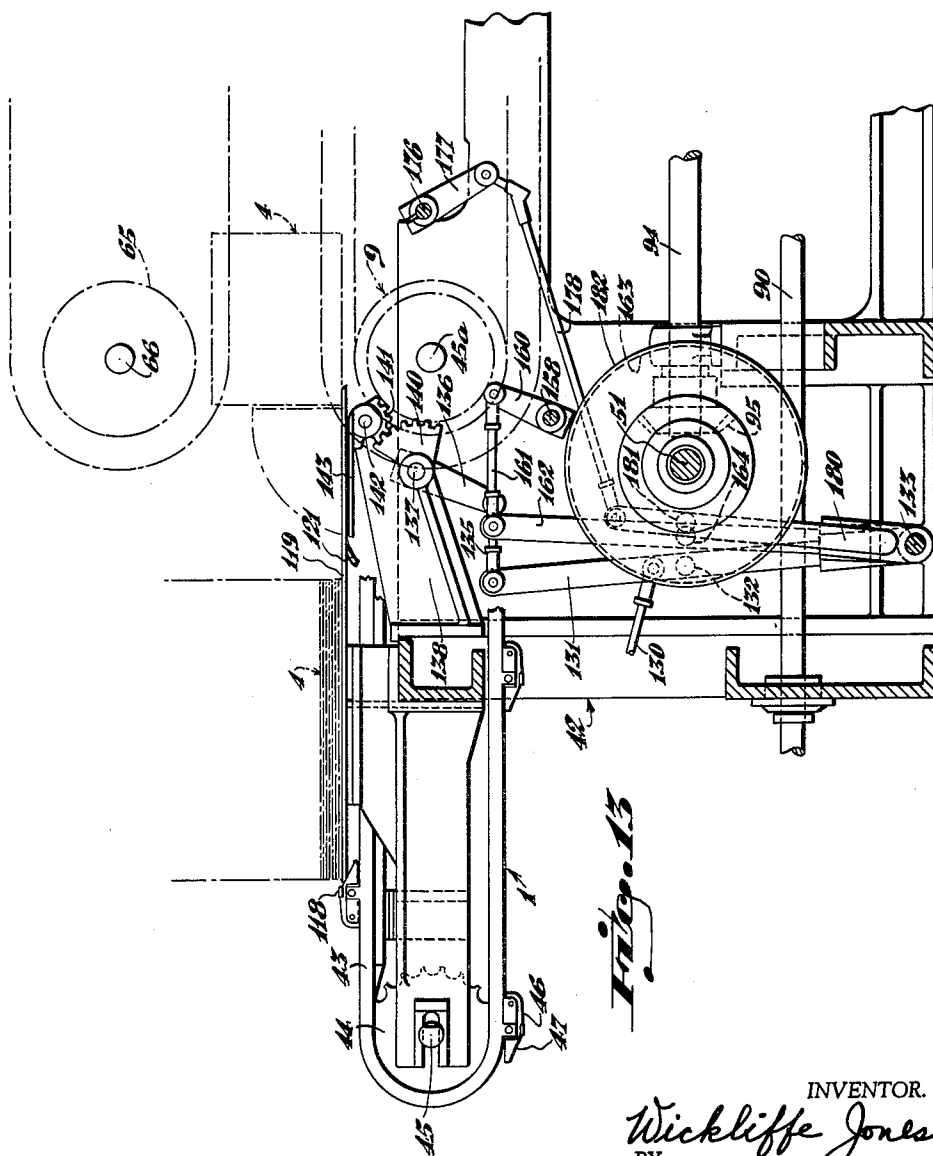
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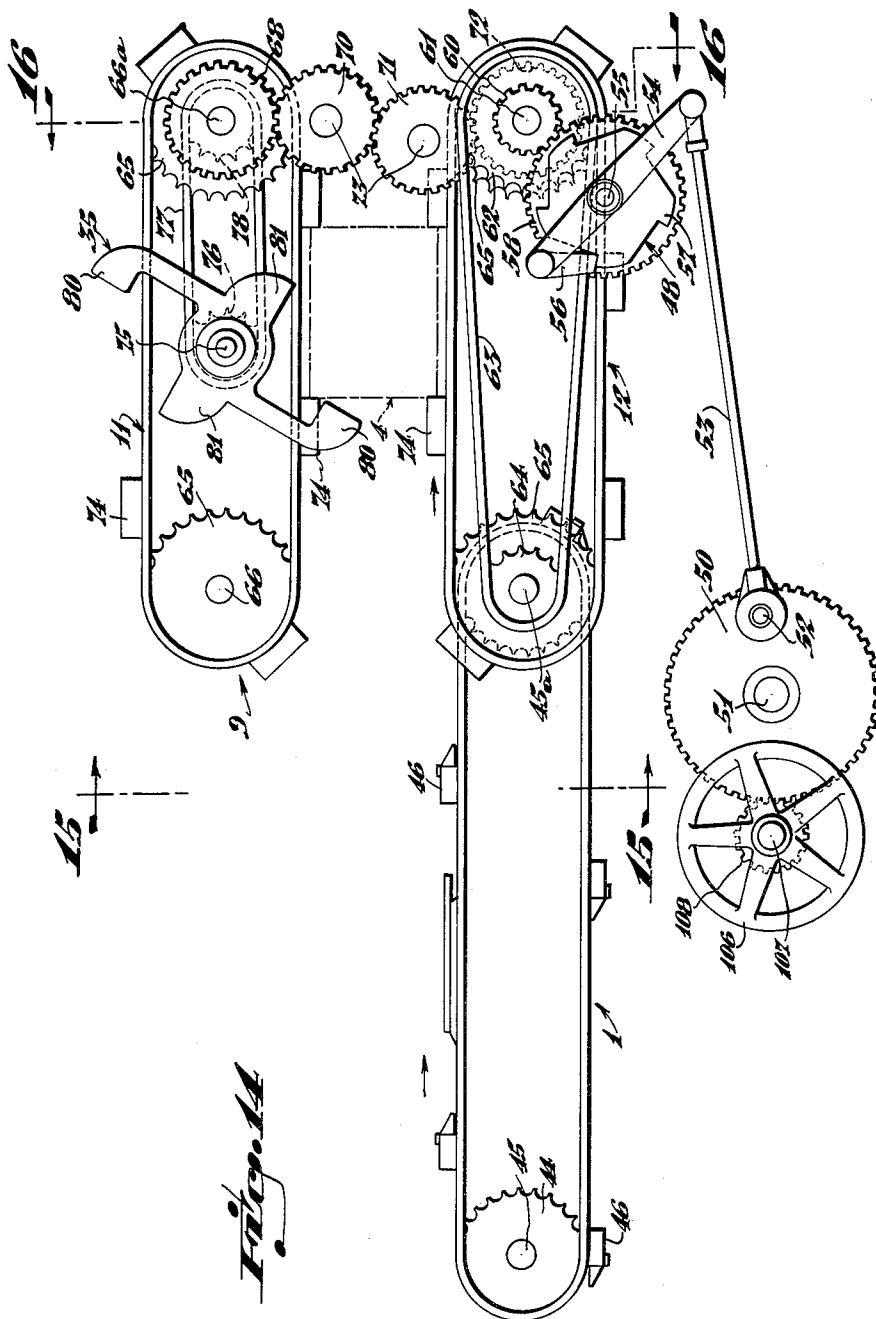
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23 Sheets-Sheet 14



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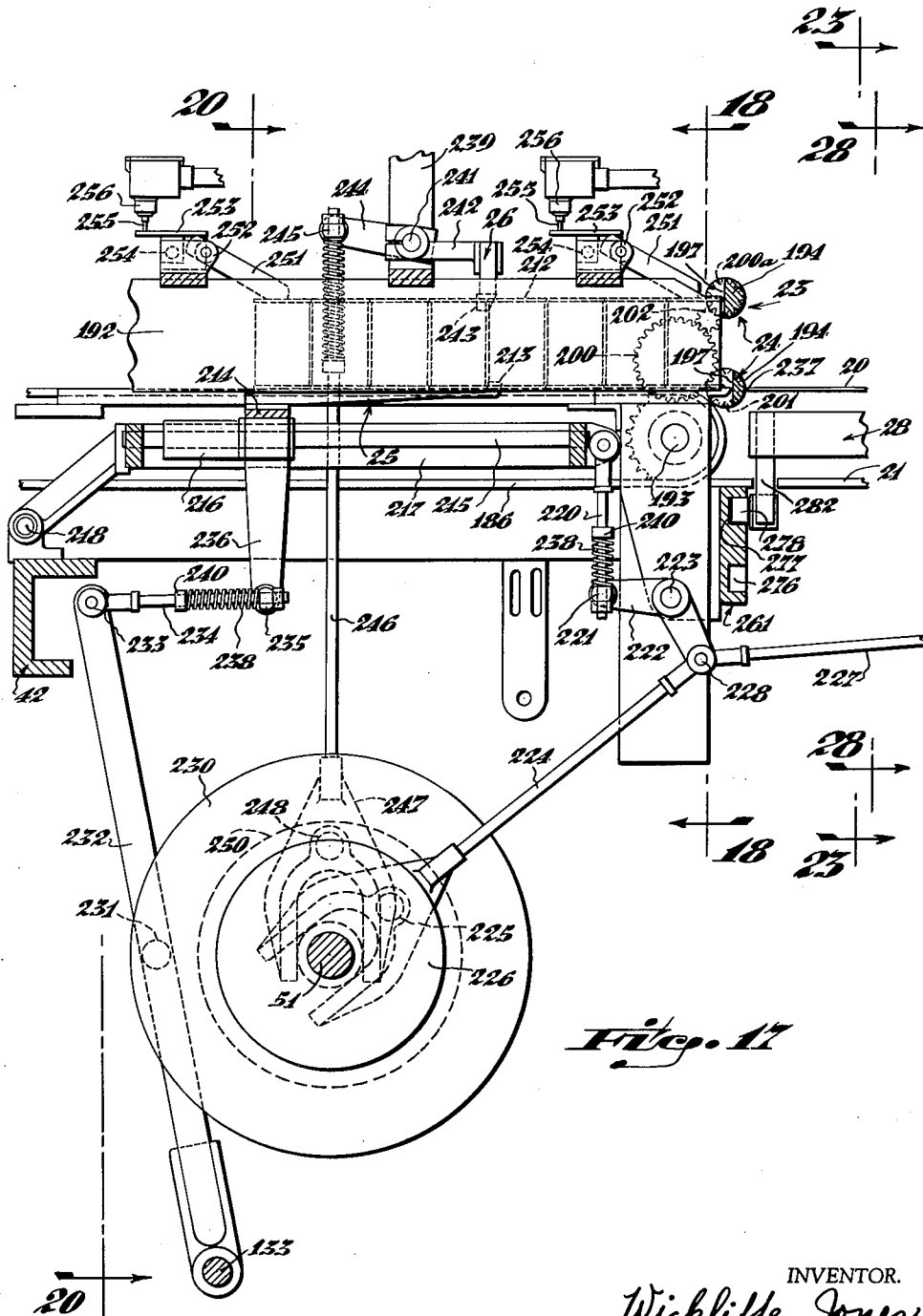


Fig. 17

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AUTOMATIC CASE PACKING MACHINE

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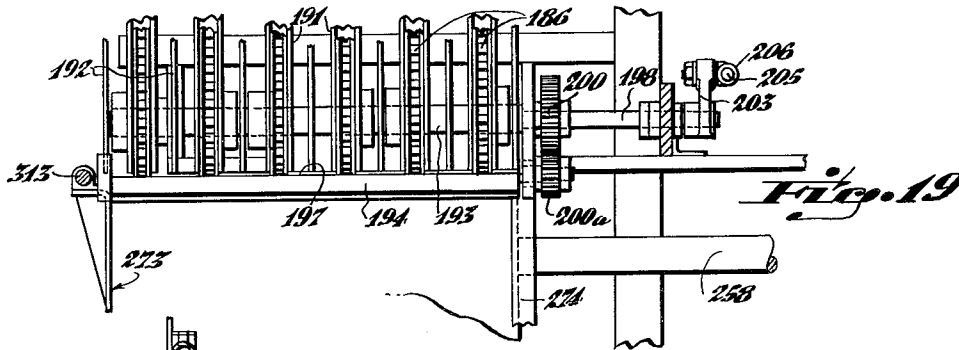
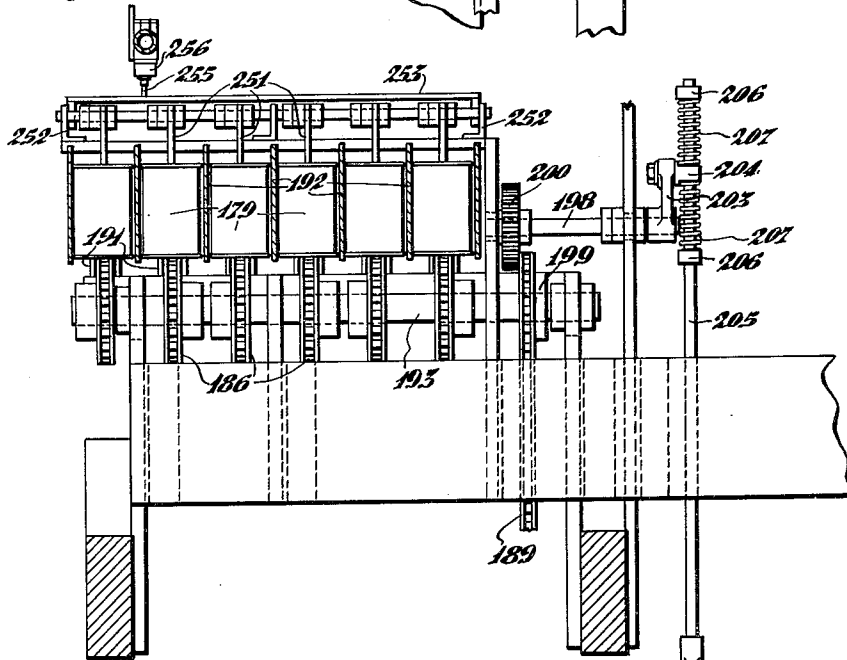
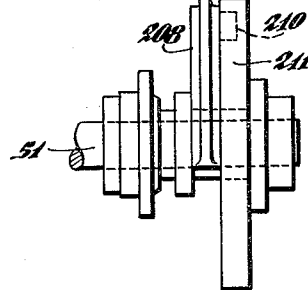


Fig. 18



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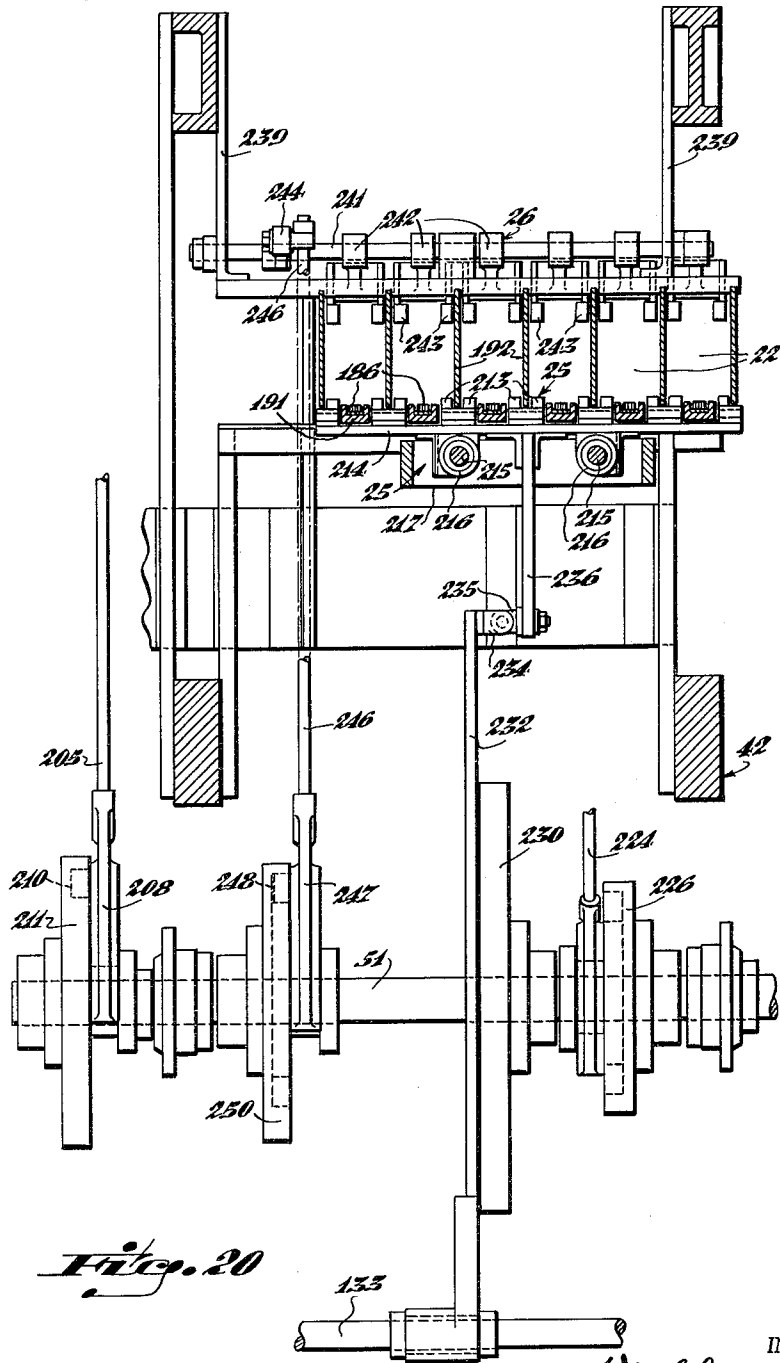


Fig. 20

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Fig. 22

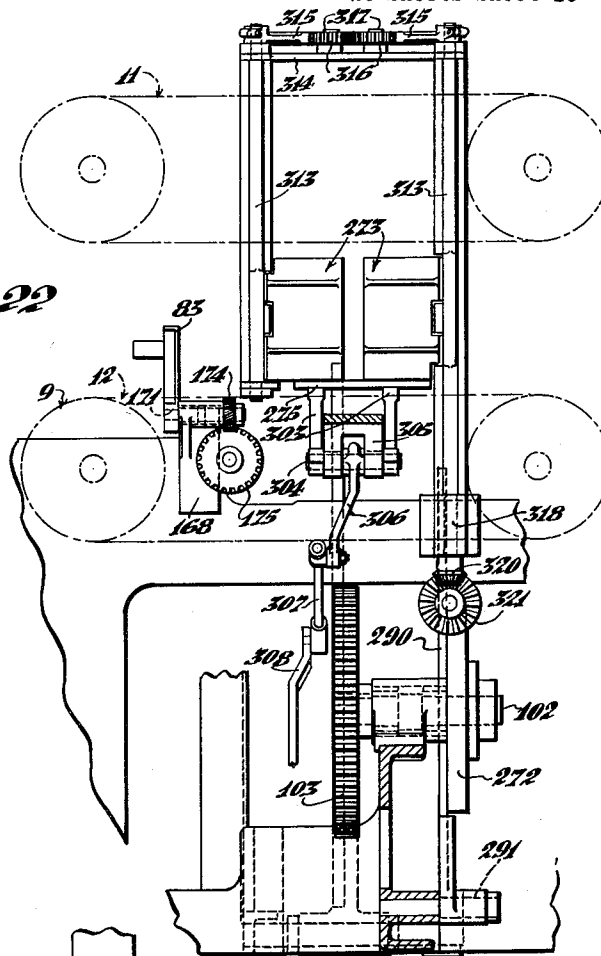
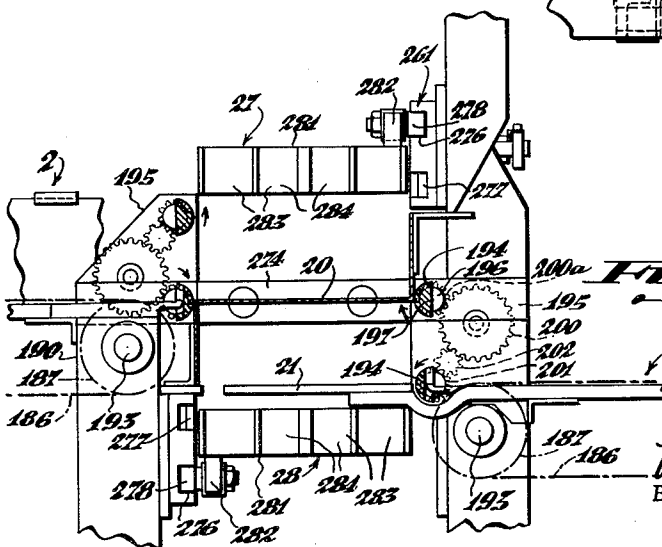


Fig. 21

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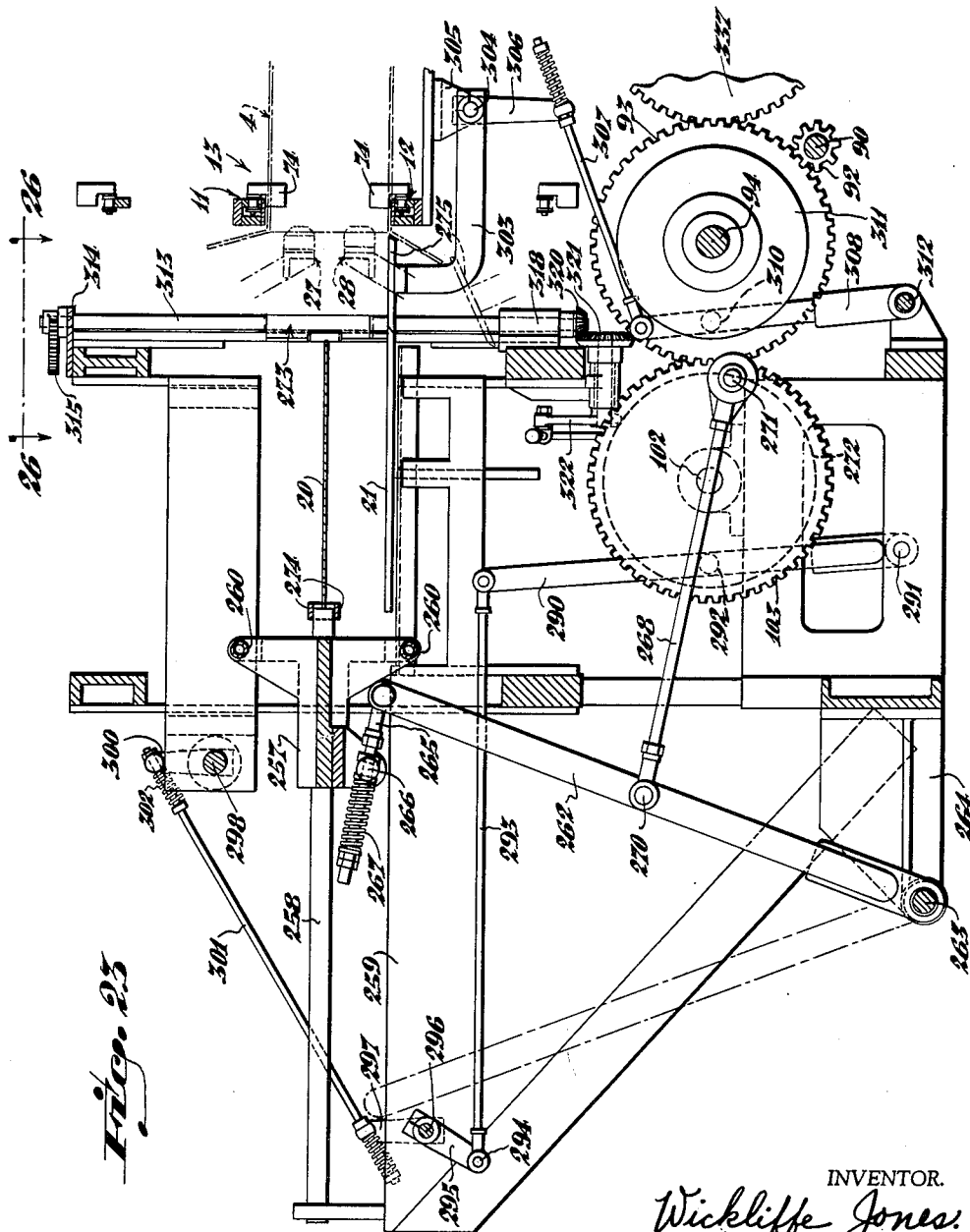


Fig. 25

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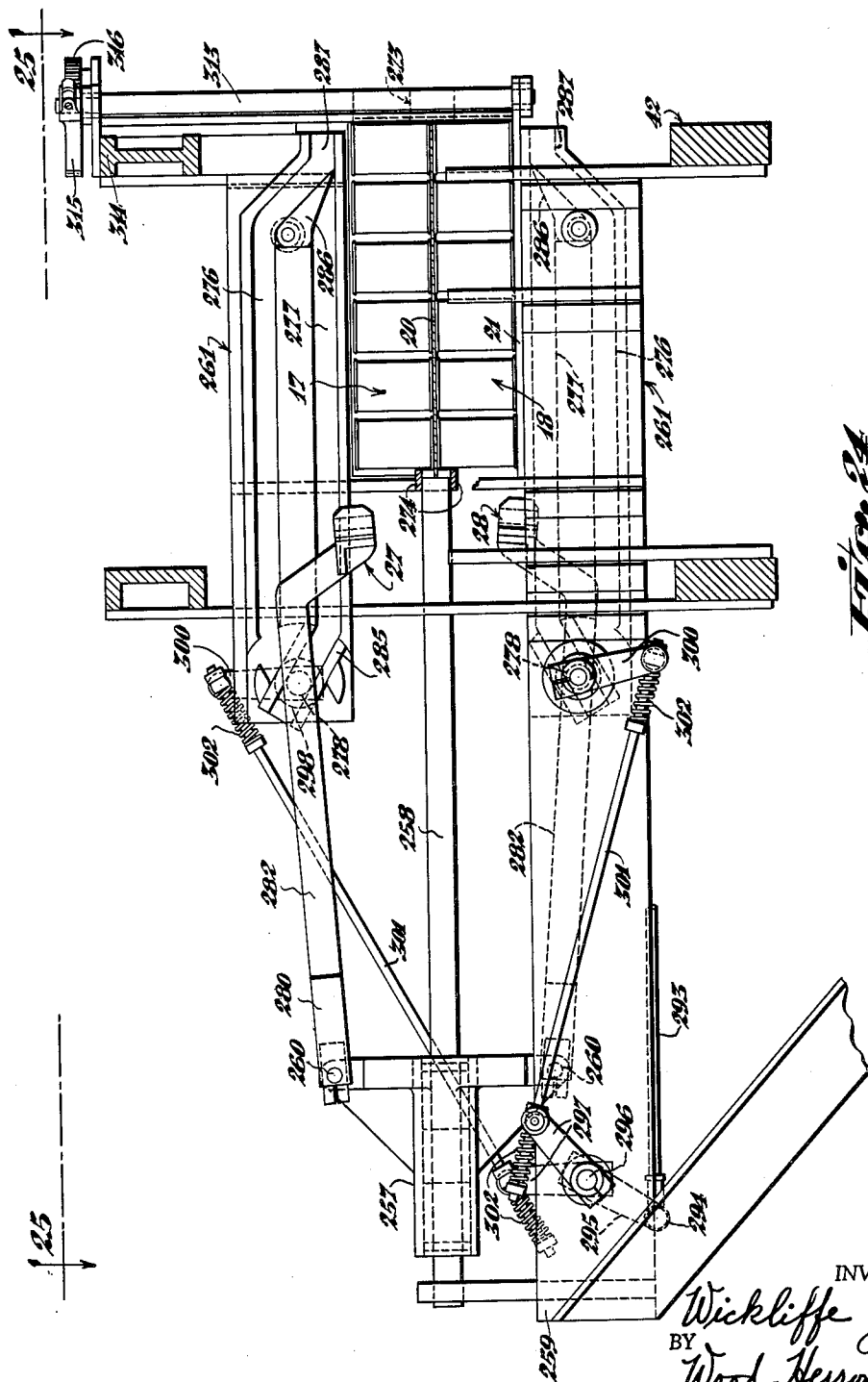


Fig. 24

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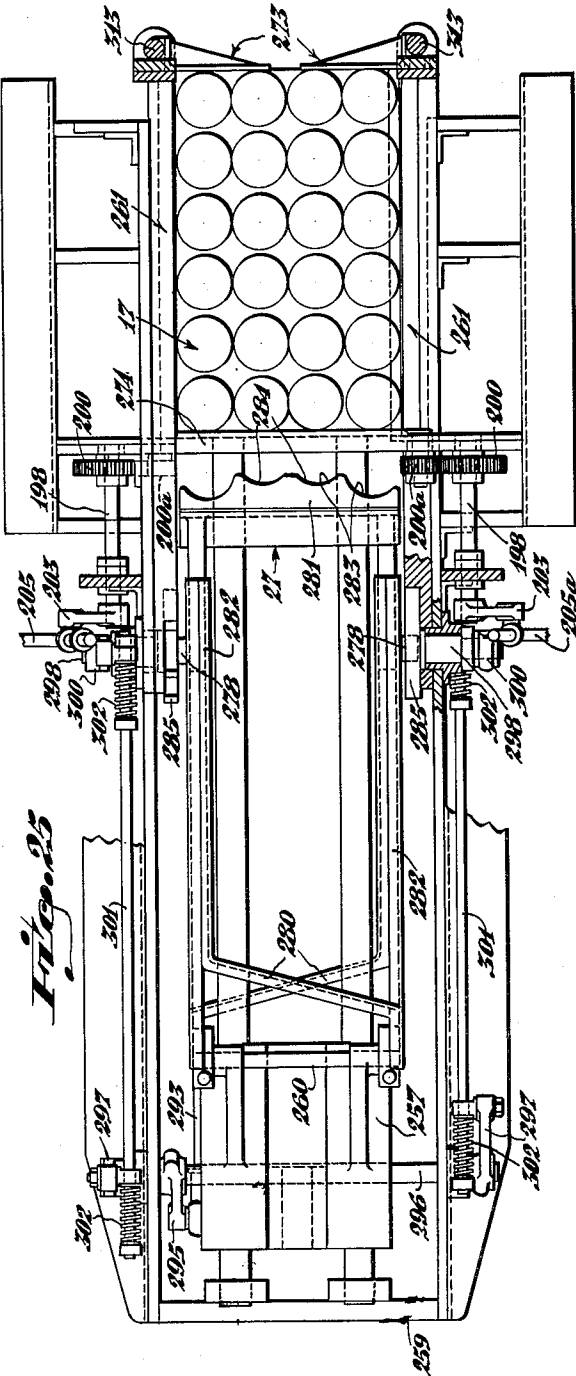
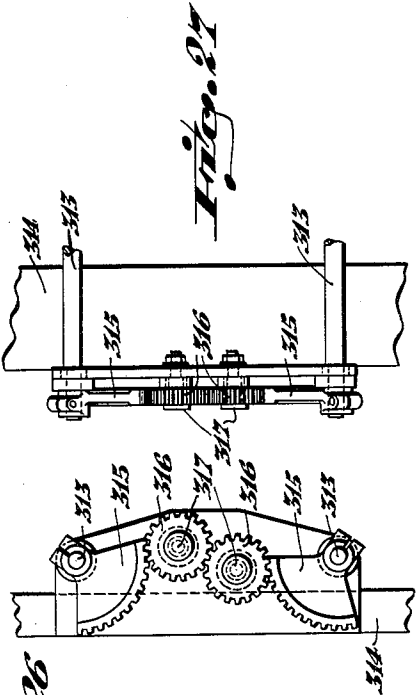


Fig. 26

Fig. 27

INVENTOR.
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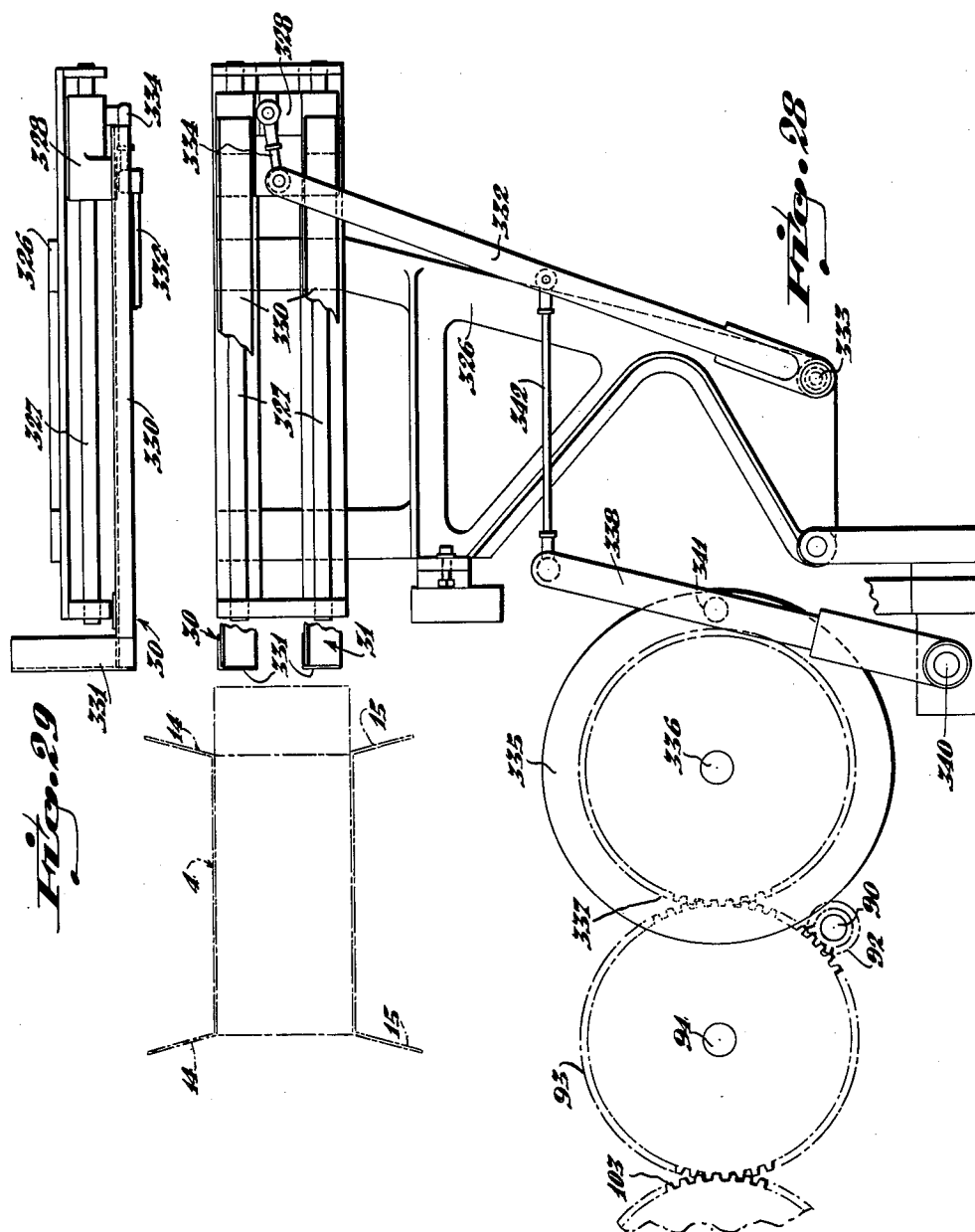
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AUTOMATIC CASE PACKING MACHINE

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23 Sheets-Sheet 23



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AUTOMATIC CASE PACKING MACHINE

Wickliffe Jones, Cincinnati, Ohio, assignor to R. A. Jones and Company, Inc., Covington, Ky., a corporation of Kentucky

Filed Sept. 15, 1958, Ser. No. 760,898

14 Claims. (Cl. 53-152)

This invention relates to packaging machinery of the type in which articles are conveyed to a transfer station and loaded into bulk packing cases, the flaps of which subsequently are closed and sealed.

One of the primary objectives of the invention has been to provide a machine which automatically erects relatively large packing cases and thereafter loads articles, such as canned goods, into the erected packing case, with the cans arranged in segregated groups, one above the other.

The packing case, for which the machine is intended, is of a well known type, fabricated from corrugated paperboard and having closure flaps at opposite ends. Cases of this character are used almost universally in shipping bulk quantities of canned goods to retail stores or other outlets, where the cans are removed from the case and placed upon the display shelves. In the past, it has been the practice for the wholesaler or packing house to utilize a semi-automatic machine in loading the packing cases for shipment. In a conventional operation of this character, the packing cases are supplied in flat, collapsed condition to conserve space. Each flat case is erected by hand and is placed at a loading station located along the packaging machine. Thereafter, the machine delivers the cans or other articles to the loading station for transfer into the erected case. The manual erection and handling of each individual packing case naturally is relatively slow; moreover, it is extremely tedious because of the repetitive nature of the work.

Briefly, the present machine erects the collapsed packing case, presents the cases successively to the transfer or loading station, then loads the segregated groups of cans into the case in an automatic manner; the packing operation is completed at a relatively high rate in comparison with the conventional semi-automatic machine.

In general, the automatic machine comprises a case magazine having means for ejecting collapsed cases individually, a mechanism for erecting the ejected case, a flap handling mechanism and a conveyor system for advancing the erected cases in stepwise fashion to the loading or transfer station. The cans are advanced to the transfer station by a pair of opposed can conveyors which are parallel with the case conveyor system; the two can conveyors advance rows of cans in two planes, one above the other, toward opposite sides of the transfer station. Upon approaching the ends of the conveyors at the transfer station, the cans are segregated in solid groups by a metering apparatus and are fed longitudinally to upper and lower dead plates at the transfer station. In the present machine, each group of cans consists of twenty-four cans arranged in orderly, compact rows. After being transferred to the dead plates, the upper and lower groups of cans are engaged by respective loading plungers and transferred laterally into the receiving end of the erected packing case, which now dwells adjacent the dead plates. It will be understood that the mechanism which handles the packing cases and the can handling apparatus both operate in time with one another, such that a successive case is erected, loaded and discharged from the machine during each operating cycle.

Referring now to the specific features of the machine, it has been another objective of the invention to provide an improved case ejecting and erecting mechanism which feeds and erects the cases in a positive manner in time

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with the stepwise advancement of the case conveyor system. For this purpose, the case magazine includes detent means for restraining the lowermost case of the flat stack which is stored in the magazine. A suction apparatus, residing beneath the lowermost case, disengages the leading edge of the case from the magazine; the case is then ejected lineally from the magazine by a pair of advancing lugs of the case conveyor system, which engages the trailing edge of the case. Upon being ejected, the lugs advance the case to a case erecting mechanism residing along the case conveyor; the arrangement is such that the collapsed case dwells temporarily in position to be engaged by the erecting mechanism. During the next conveyor advancement, the erected case is engaged by the lugs of an overhead conveyor, which forms a part of the case conveyor to maintain the case in erected condition and advance it to the loading station. During advancement of the erected case, a flap handling mechanism folds the flaps of the case to an open position for loading.

Another aspect of the invention resides in the metering apparatus for advancing the cans in orderly groups from the can conveyors to the dead plates at the transfer station. For this purpose, the metering station of each can conveyor includes a series of arresting fingers engageable with the upper ends of the cans on the can conveyors to segregate the group of cans which is to be transferred. The segregated cans are advanced longitudinally from each conveyor by respective sets of feed fingers which engage the lower ends of the cans and push the segregated cans longitudinally from the endwise portions of the conveyors to the upper and lower dead plates which are parallel with the two can conveyors. The cans are guided during their longitudinal motion across the dead plates by a pair of vertical, normally closed doors residing along the edge of the dead plates adjacent the receiving end of the erected case at the transfer station. These doors perform the double function of guiding segregated cans during their longitudinal feed motion from the conveyors and also of guiding the cans transversely into the receiving end of the packing case. In their normally closed position, the doors extend parallel with the can conveyors; during the loading cycle, the doors swing through an angle of approximately 90 degrees to an open position, thus guiding the segregated cans through their transverse path of motion into the receiving end of the packing case.

A further objective has been to provide an improved mechanism for transferring the segregated group of cans from the upper and lower dead plates in a positive manner into the receiving end of the packing case; also to permit the metering apparatus to segregate and feed a successive group of cans longitudinally to the dead plates during the transverse loading stroke, thereby to speed up the machine cycles.

The loading apparatus comprises upper and lower loading plungers, together with associated follower plungers which coact with one another in the loading operation. During the loading cycle, the vertical doors, which reside between the dead plates and receiving end of the case, open to provide guide surfaces extending laterally from the dead plates to the receiving end of the packing case, and also to hold the flaps of the case in open position. Thereafter, the follower plungers pass transversely through the case from its opposite end to contact the leading end of the two groups of cans on the dead plates. The loading plungers then advance in contact with the trailing ends of the groups of cans and push the cans transversely across the dead plates into the case, while the follower plungers retract. The opposite ends of the groups of cans are thus confined between the loading and follower plungers, while the side of the groups are guided by the vertical doors during lateral transfer into the pack-

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ing case. To facilitate entry of the cans into the packing case, the active ends of the loading plungers are configured to embrace the individual cans and to advance the inner cans of the group ahead of the outer cans so as to reduce the effective width of the groups during transfer.

In order to permit continued operation of the metering apparatus during the loading operation, the loading plungers are guided in two separate planes during the transverse loading and unloading strokes. During the loading stroke, the plungers advance in respective active planes to intercept the segregated rows of cans on the dead plates. During the retracting stroke of the plungers, they pass through an inactive plane spaced outwardly from the dead plates. Accordingly, during the retracting stroke, with the plungers in their inactive planes, the feed fingers of the metering apparatus advance the next segregated groups of cans longitudinally from the can conveyors to the dead plates for transfer during the next advancement of the plungers in their active planes.

After the packing case is loaded, the case conveyor system advances the loaded case toward a delivery conveyor, and during advancement, the flaps are folded to closed position to confine the cans. Upon delivery from the machine, the cases pass to a flap gluing and sealing apparatus which permanently seals the flaps for shipment. This apparatus forms no part of the present invention and is not disclosed herein.

The several features and advantages of the machine outlined above, will be more fully apparent to those skilled in the art from the following detailed description taken with reference to the drawings.

In the drawings:

FIGURE 1 is a perspective view of the machine as viewed from the upstream end, showing a portion of the can conveyor system and case magazine.

FIGURE 2 is a view similar to FIGURE 1, as viewed from the opposite or downstream end of the machine.

FIGURE 3 is a fragmentary perspective view of the upstream end of the machine, illustrating the magazine and feed mechanism which ejects the collapsed cases from the magazine for subsequent erection.

FIGURE 4 is a view generally similar to FIGURE 3, showing one of the collapsed packing cases being ejected from the magazine.

FIGURE 5 is a fragmentary perspective view looking toward the case conveyor system, illustrating one of the packing cases in the process of erection.

FIGURE 6 is a view similar to FIGURE 5, showing one of the cases being loaded at the can transfer station, and showing the next case completely erected and ready for advancement to the transfer station.

FIGURE 7 is a fragmentary perspective view looking toward the machine opposite from the side shown in FIGURE 6, showing the can metering apparatus and loading plungers, with the upper group of cans being metered into groups for subsequent transfer into the packing case.

FIGURE 8 is a perspective view similar to FIGURE 7, showing the loading plungers in position to transfer the metered groups of cans laterally into the erected packing case.

FIGURE 9 is a view looking toward the opposite side of the machine from FIGURE 8, showing the follower plungers which guide the groups of cans as they are transferred into the packing case.

FIGURE 10 is a top plan view showing the driving system and cams which actuate the several components of the machine in time with one another.

FIGURE 11 is a cross sectional view, taken along line 11—11 of FIGURE 10, detailing the cam and linkage which actuates the case erecting mechanism as shown in FIGURE 5.

FIGURE 12 is a longitudinal sectional view taken along line 12—12 of FIGURE 11, showing the mechanism which ejects the flat cases from the magazine.

FIGURE 13 is a longitudinal sectional view taken along

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line 13—13 of FIGURE 11, further illustrating the case erecting mechanism of FIGURE 11.

FIGURE 14 is a diagrammatic view illustrating the case conveyor system which forms a part of the case erecting mechanism shown in FIGURE 13.

FIGURE 15 is a cross sectional view taken along line 15—15 of FIGURE 14, further illustrating the case erecting mechanism.

FIGURE 16 is a fragmentary cross sectional view taken along line 16—16 of FIGURE 14, illustrating the driving system of the rotary flap closer.

FIGURE 17 is a fragmentary longitudinal sectional view detailing the components of the can metering apparatus.

FIGURE 18 is a cross sectional view taken along line 18—18 of FIGURE 17, further detailing the can metering apparatus.

FIGURE 19 is a fragmentary top plan view projected from FIGURE 18, further detailing the can metering apparatus.

FIGURE 20 is a cross sectional view taken along line 20—20 of FIGURE 17, detailing the can metering apparatus, particularly the arresting fingers and feed fingers.

FIGURE 21 is a fragmentary longitudinal view, similar to FIGURE 17, showing the upper and lower can conveyors in relation to their associated dead plates.

FIGURE 22 is a diagrammatic view similar to FIGURE 14, illustrating the relationship of the doors of the can transfer station in relation to the case conveyor system.

FIGURE 23 is a cross sectional view taken along line 23—23 of FIGURE 17, detailing the loading plungers and associated components of the can transfer station.

FIGURE 24 is a view similar to FIGURE 23, illustrating the trackways which guide the loading plungers in their active and inactive planes during the loading and unloading strokes.

FIGURE 25 is a top plan view of the loading plungers, as viewed along line 25—25 of FIGURE 24.

FIGURE 26 is a top plan view taken along line 26—26 of FIGURE 23, showing the gear train which actuates the doors of the can transfer station.

FIGURE 27 is a fragmentary view projected from FIGURE 26, further illustrating the gear train of the doors.

FIGURE 28 is a fragmentary view taken along line 28—28 of FIGURE 17, further showing the follower plungers and the actuating mechanism thereof.

FIGURE 29 is a top plan view, as projected from FIGURE 28, further detailing the follower plungers.

General Arrangement and Operation

Referring to the drawings, FIGURES 1-9 best illustrate in perspective the general organization of the machine and will be referred to primarily in describing its principles of operation. The driving system, cams, and related components of the machine are described later with reference to the detailed views of the several mechanisms. FIGURE 1 illustrates the machine as viewed from its upstream end, and FIGURE 2 is viewed from the downstream end.

As indicated by the arrows in FIGURE 1, the primary case conveyor 1 and upper can conveyor 2 both advance in the same direction, while the lower can conveyor 3 (FIGURE 2) advances in the opposite direction. The arrangement is such that two layers of cans are advanced in two planes toward one another to a can transfer station, at which point, groups of cans are transferred laterally from both can conveyors into an erected packing case, the flaps of which subsequently are folded to closed position.

It is to be noted at this point, that the case conveyor system (primary conveyor 1 and the secondary conveyor 9) advances intermittently or in stepwise fashion in time with the other components of the machine. The

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can conveyors 2 and 3 are driven by a separate motor at a continuous rate to deliver the cans to the transfer station.

The packing cases, indicated generally at 4 in FIGURE 1, are of conventional design, fabricated from corrugated board or heavy paperboard, and having closure flaps at opposite ends, as described later. The cases are placed in the case magazine 5 in collapsed condition to be erected during intermittent advancement along case conveyor 1 to the can transfer station. As shown in FIGURES 3 and 4, the collapsed packing cases 4 are withdrawn individually from the lower end of the stack in the magazine 5 by a suction apparatus indicated generally at 6. Upon being withdrawn, the leading edge 7 of the case clears the retaining means at the lower edge of the magazine, then its trailing edge 8 is engaged by lugs of the primary case conveyor 1 for advancement toward the can transfer station. After ejection from the magazine 5, the case is erected from its collapsed condition by the case erecting mechanism, indicated generally at 10 in FIGURE 5. After being erected, the case passes to a secondary conveyor 9, comprising upper and lower runs indicated at 11 and 12 (FIGURE 6); these runs advance the erected case to the can transfer station indicated generally at 13 in FIGURE 7. As the case is advanced between the runs 11 and 12, its upper and lower flaps 14 and 15 at opposite ends, are folded outwardly by the flap handling mechanism, indicated generally at 16 in FIGURE 6.

During the erection and advancement of the packing case, a group of cans concurrently is segregated from the upper and lower can conveyors 2 and 3 and advance longitudinally to the transfer station 13 (FIGURE 7) subsequently to be transferred laterally to the erected case. The segregated cans from the upper conveyor 2, are indicated at 17 in FIGURE 7; a similar group of cans, indicated at 18 in FIGURE 24 at the same time is advanced from the lower conveyor 3 in the opposite direction such that two layers of cans reside one above the other on the upper and lower dead plates 20 and 21 of the transfer station (FIGURE 8). It will be noted at this point, that the mechanism shown in FIGURES 7 and 8 is viewed from the side of the machine opposite to that shown in FIGURE 6 and that the upper and lower flaps 14 and 15 at opposite ends of the case are held in outwardly folded position for the reception of the upper and lower groups of cans 17 and 18.

In the present example, the upper and lower groups consist of 24 cans each, which are advanced upon the dead plates 20 and 21 (FIGURE 8), group 17 being advanced from the right, as viewed in FIGURE 8, and group 18 being advanced from the left. For this purpose, each can conveyor is divided into six longitudinal lanes 22 in FIGURE 8, for cans from each row being advanced longitudinally to the dead plates for lateral transfer into the packing case.

The group of cans are segregated and advanced longitudinally from the delivery ends of the upper and lower can conveyor by a metering apparatus indicated generally at 23 in FIGURE 17. The metering apparatus is duplicated for the upper and lower conveyor and each comprises a roller gate, indicated generally at 24, a series of pusher fingers indicated generally at 25 and a series of arresting fingers 26. Each roller gate 24 arrests the cans at the downstream end of its conveyor (which advances continuously) so as to form a solid row of cans in each lane of the conveyor, with the arresting fingers in an elevated position. During the metering cycle, the arresting fingers 26 descend to an arresting position, the pusher fingers 25 assume the elevated position shown in FIGURE 17 and the gate mechanism 24 opens to release four cans from each lane. Thereafter, pusher fingers 25 advance the segregated cans through the roller gates 24 to the dead plates 20 and 21.

Referring again to FIGURE 8, the groups of cans 17

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and 18, after being advanced to the dead plates 20 and 21, are transferred laterally into the open end of the case by the upper and lower loading plungers indicated at 27 and 28. In order to hold the cans in group formation, upper and lower follower plungers 30 and 31 first advance through the opposite end of the case to engage the leading ends of the cans which are resting upon the upper and lower dead plates. Thereafter, the loading and follower plungers move in unison in the directions indicated in FIGURES 8 and 9 to transfer the cans into the erected case. After the cans are positioned in the case, the loading and follower plungers retract to their former positions for discharge of the loaded case from the machine.

After the plungers retract, the conveyors runs 11 and 12 again advance the case, and during advancement, the leading side flap 32 (FIGURE 9) is folded inwardly by a stationary flap folding device 33, and the trailing side flap 34 is folded inwardly by the rotary flap folder 35. Similar flap folding devices (not shown) are provided for the opposite end of the carton. The upper and lower flaps 14 and 15 subsequently are ploughed inwardly upon opposite ends of the case by the stationary cam plates 36 and 37, as indicated in FIGURE 1. The upper and lower conveyors 11 and 12 terminate adjacent the transfer station 13 and deliver the loaded case to a belt-type conveyor 38 leading to a roller type conveyor 40 for discharge from the machine. These conveyors include side plates 41—41 which contact the opposite ends of the case to hold the flaps in closed position. The loaded cases subsequently are advanced to a machine which opens the flaps, applies adhesive to them, then closes and seals them permanently for shipment. The case sealing apparatus forms no part of the present invention and is not illustrated.

It will be understood from the foregoing, that the primary and secondary can conveyors 1 and 9, and the several mechanisms which handle the cases and segregate and transfer the cans, all operate in synchronism with one another being driven from a single motor and driving system described later with reference to FIGURE 10. The can conveyors 2 and 3 are of the friction type and are driven from a separate motor at a rate to supply an adequate supply of cans at all times to the transfer station 13.

Case Conveyor System

Referring to FIGURE 13, the various components of the machine are mounted on a suitable frame indicated generally at 42. The primary case conveyor 1 comprises a pair of conveyor chains 43—43 tracked upon sprockets 44—44 carried upon respective shafts 45 and 45a suitably journaled in the machine frame 42. The chains 43 include lugs 46 arranged in pairs, each lug having an inclined nose 47 arranged to pass under the trailing edge 8 of the collapsed case; the lugs are arranged to eject the cases individually from the bottom of magazine 5, as explained later.

Referring to FIGURE 14, the primary case conveyor 1 and the secondary conveyor 9 (runs 11 and 12) are advanced intermittently in unison by a pawl and ratchet drive, indicated generally at 48. The pawl and ratchet drive comprises a crank disk 50 rotated by a cam shaft 51 (FIGURE 10) and having a crank pin 52 in driving connection by way of a link 53 with a lever 54. Lever 54 is mounted for rocking motion upon a cross shaft 55; lever 54 carries on its outer end a pawl 56 which engages the teeth of the ratchet wheel 57 journaled on shaft 55. Ratchet wheel 57 drives a gear 58 meshing with a pinion 60 keyed on shaft 61. Shaft 61 includes a sprocket 62 driving a sprocket chain 63 which meshes with a sprocket 64 of shaft 45 of primary conveyor 1. Shaft 45 drives the sprockets 44 of the primary conveyor in the direction indicated by the arrow.

Ratchet drive 48 also advances the secondary conveyor 9 (runs 11 and 12) in the same direction and in time

with the primary conveyor. For this purpose, the lower run 12 includes pairs of sprockets 65—65, one pair loosely journaled on shaft 45 and the other pair keyed to shaft 61. The lower run is thus driven by shaft 61. The upper chain run 11 also comprises respective pairs of sprockets 65—65 mounted upon shafts 66 and 66a which are journaled in suitable bearing blocks 67 (FIGURE 6); the bearings are carried by the upper rails of the machine frame. Shaft 66a includes a gear 68 meshing with an idler gear 70, gear 70 being driven by a second idler gear 71 meshing with a drive gear 72 keyed on shaft 61.

The idler gears 70 and 71 are journaled on stub shafts 73—73 carried by a vertical bearing plate 69 (FIGURE 16). As shown in FIGURE 14, the several gears are driven in the directions indicated by the arrows, causing the adjacent runs 11 and 12 to advance in the same direction, with the erected case embraced between them. In order to provide positive advancement of the cases, the runs 11 and 12 are provided with lugs 74 which engage opposite sides of the case as indicated by the broken lines in FIGURE 13.

It will be noted at this point, that the rotary flap folder, previously indicated at 35 in FIGURES 6 and 9, is secured upon a cross shaft 75 (FIGURE 15) and is also driven in time with the intermittent conveyor system. For this purpose, shaft 75 includes a sprocket 76 (FIGURES 13 and 14) driven by a sprocket chain 77 meshing with a companion sprocket 78 keyed to shaft 66a. The driving ratio of the folder 35 is such that its arms 80—80 are rotated to the position shown in FIGURE 14 alternately as each box advances beyond the transfer station 13. The rate of advancement of the arms 80 is sufficiently greater than the linear advancement of the case to fold the trailing side flap 34 to closed position as the case advances. The flap folder 35 is also provided with a pair of short secondary arms 81—81 intermediate the arms 80. The arms 81 alternately engage the top flap 14 (in its open position) after passage beyond the upper and lower flap opening arms, as indicated at 82 and 83 in FIGURE 6. This mechanism is described below, following the case erecting section.

It will be noted in FIGURE 14, that the chain drive 63 from shaft 61 to shaft 45 drives the primary conveyor 1 at a linear rate higher than the secondary conveyor runs 11 and 12. The purpose of this speed differential is to accommodate for the difference in length between the collapsed and erected cases. The lugs 46 are spaced along the primary conveyor a distance substantially equal to the collapsed case, while the lugs 74 of the secondary conveyor system correspond to the dimension of the erected case. The relationship of the lugs 46 and 74 is such that a partially erected case in advanced by the conveyor 1 to the upstream end of the secondary conveyor as the opposed upper and lower lugs 74—74 pass around the upstream sprockets 65—65, the erected case subsequently being confined between adjacent sets of lugs 74 after passing around the sprockets. The mechanism for erecting the case is described in a subsequent section.

Driving System

The case conveyor system as well as the other components of the machine are driven from the main motor 84 indicated in FIGURE 10. Motor 84 is connected through a variable speed belt drive 85 to a counter shaft 86 journaled in the machine frame. Shaft 86 includes a pinion 87 meshing with a gear 88 which is in driving connection with a main drive shaft 90 through an electric clutch 91. This clutch forms part of a control system which shuts down the entire machine under certain conditions, as explained later.

The opposite end of shaft 90 includes a pinion 92 meshing with a gear 93 of shaft 94. The left end of shaft 94 includes a bevel gear 95 meshing with a bevel gear 96 of cross shaft 51. The disk 50, which operates the pawl and ratchet 48 of the can conveyor system, is mounted

on the outer end of shaft 51. The driving system so far described advances the case conveyor system in stepwise fashion in synchronism with the other components of the machine.

Shaft 94 carries on its right end a second bevel gear 98 meshing with a bevel gear 100 carried on a cam shaft 101. Shaft 101 carries a series of cams for operating several of the components of the machine, as explained later. A second cam shaft 102 is also in driving connection with shaft 94. Shaft 102 is driven by a gear 103 meshing with the gear 93 of shaft 94. The opposite end of cam shaft 102 carries a cam which is identified later. The several shafts of the driving system are rotatably journaled on the machine frame 42 by suitable bearings of conventional design such as the bearing blocks 104 of shaft 94 and the bearing caps 105 of shaft 101.

In order to actuate the components of the machine manually, for example in making adjustments, there is provided a hand wheel 106 mounted on a shaft 107. A pinion 108 is coupled to the hand wheel and may be shifted axially into meshing engagement with the gear 50. Main shaft 90 also includes a hand wheel 110 for the same purpose.

Case Feeding and Erecting Mechanism

As best shown in FIGURES 3 and 4, the magazine 5 comprises four upright angle members 112 rising from base plates 113—113 mounted on suitable brackets joined to the machine frame 42. The chains 43—43 of the primary case conveyor pass in a plane slightly below the base plates 113 and the upstanding lugs 46 of the conveyor are arranged to intercept the trailing edge 8 of the lowermost case, as described later.

The lowermost case of the stack in the magazine rests upon the rails 114—114 (FIGURE 3) of the base plates 113 and the leading edge 7 is restrained by the vertical retaining plate 115, which includes at its lower end a spring loaded detent 116. The detent normally resides in an extended position, engaging the leading edge 7 of the bottom case of the stack; the bottom case is withdrawn from the magazine by the suction apparatus previously indicated at 6, which includes a suction cup 117. The suction cup is reciprocated vertically in time with the advancement of the lugs 46, to disengage the leading edge 7 of the case from the detent and to draw the edge downwardly to a plane below the lower end of restraining plate 115, as indicated in broken lines in FIGURE 12.

As shown in FIGURES 3 and 13, each lug 46 includes on its upper surface a pick-up plate 118 advancing in a plane to intercept the trailing edge 8 of the lowermost case. The timing between the reciprocation of the suction cup and advancing lug 48 is such that the leading edge 7 is free from the detent for ejection slightly before the trailing edge 8 is engaged by the pick-up plate.

In order to engage and release the case, the suction cup 117 communicates with a flexible hose 120 (FIGURE 12) which is interconnected with a suitable suction apparatus (not shown), including means for applying suction to withdraw the leading edge 8 and thereafter to release the case for advancement by the primary conveyor 1.

It will be noted in FIGURES 13 and 14, that the nose 47 of the lug is inclined downwardly so as to pass without interference beneath the surface of the flat case; the pick-up plate has a thickness sufficient to provide engagement with the edge of the lowermost case so as to provide positive ejection of each individual case. Upon engagement by the pick-up plates, the ejected case advances to a centrally located horizontal guide plate 121 having an upwardly curved leading end 111 to guide the case upwardly as it is advanced by the primary conveyor. As shown in FIGURE 12, the guide plate 121 is supported by a bracket 109. After being ejected, the case is erected and advanced to the secondary conveyor runs 11 and 12 as described at a later point in this section. During advancement, the bottom panel of the case is in sliding en-

gagement with the parallel guide rails 119, which are located along opposite sides of the chains 43.

As shown in FIGURES 3 and 12, the suction cup 117 is mounted on a vertically movable carriage 122 having opposite ends guided for vertical motion by guide blocks 123 supported upon a bracket structure 124 projecting from a cross member of the machine frame 42. The carriage 122 includes opposed slide blocks 125 in sliding engagement with the brackets 123. A respective actuating link 126 is pivotally joined to each slide block 125, and each link is pivotally connected to a respective bell crank lever 127. The bell crank levers are pivotally connected to the stationary bracket 124 and the lower ends of the levers are joined by a connecting link 128 for movement in unison. A main actuating link 130 connects the left hand bell crank lever 127 to a cam lever 131 which includes a cam follower 132. The lower end of cam lever 131 is journaled on a rock shaft 133 which extends across the machine frame, as seen in FIGURE 10.

The cam roller 132 rides in the track of cam 134 which is mounted on cam shaft 51, previously described with reference to FIGURE 10. The configuration of the cam track has been omitted from the drawings in order to simplify the disclosure; however, it is indicated in section at 129 in FIGURE 11. It will be understood that the track has a configuration to shift the actuating linkage and suction cup to its upper and lower positions in time with the can conveyor system and other components. The second position of the cam lever 127 is shown in broken lines in FIGURE 12, corresponding to the elevated position of the suction cup as shown in FIGURE 3.

The cam 134 also actuates the case erecting mechanism, previously indicated at 10 in FIGURE 5. For this purpose, the upper end of cam lever 131 includes a second link 135 (FIGURES 11-13) connected to an actuating lever 136 secured upon a rock shaft 137. The rock shaft is journaled in a bracket 138 (FIGURE 13) secured to the frame of the machine. Keyed to the rock shaft 137 is a gear sector 140 meshing with a gear sector 141 fixed to a rock shaft 142, also mounted on bracket 138.

The case erector 10 includes a pair of arms 143-143 one of which is secured to the lug portions 144 of the gear sector 141 (FIGURES 5 and 11). The other arm 143 is fixed to the opposite end of shaft 142. It will be noted in FIGURE 13, that the arms 143, when in lowered position, reside beneath the plane of the central guide plate 121 and guide rails 119 to allow the collapsed case to pass without interference during its stepwise advancement by the primary conveyor from the magazine. The timing is such that the arms 143 swing upwardly from the position shown in FIGURE 5 to the erected position shown in broken lines in FIGURE 13 while the case conveyor dwells in stationary position. Since cam 134 operates the suction cup as well as the arms, the suction cup is now in its elevated position ready to disengage the next case from the magazine when the arms 143 are swung back to the horizontal position.

As the erector arms 143 begin to swing upwardly, they first contact the trailing edge 8 of the blank and disengage it from the pick-up plate 118 of the primary conveyor and advance its leading edge toward the lug 74 of the lower run 12 of the secondary conveyor. It will be understood at this point in the cycle, that the conveyor system dwells with the lugs approximately in the position shown in FIGURE 14. As the erector arms continue their upward sweep, the collapsed case is held in position on the guide rails 119 by a pair of knives 145-145 (FIGURE 5) which swing inwardly through a horizontal plane from the position shown in FIGURE 6 to engage the lower corner of the case. The knives reside in an inclined plane and the swinging end is curved as at 146 to provide a plowing action as the knife swings in its arc to a position between the walls of the case which are partially erected by the erector arms 143 at this point in the cycle. The walls of the case thereafter hinge in parallelogram

fashion to the fully erected position into contact with the leading lugs 74 of the secondary conveyor. The actuating mechanism of the knives 145 is described below.

In order to hold the case temporarily in erected position until engaged by the trailing secondary conveyor lugs 74, there is provided a swinging latch 147 (FIGURE 5). This latch has a curved foot 148 at its swinging end and its opposite end is pivotally connected to a bracket 150 which is mounted on an elevated portion 151 of the machine frame. The latch swings by gravity and normally assumes the position shown in FIGURE 5. As the case approaches its fully erected position, the foot portion 148 cams along the upper corner of the case, slightly lifting the latch. When the case is fully erected, the latch drops downwardly as in FIGURE 6, thus locking the carton in erected position.

As shown in FIGURES 5 and 6, each knife 145 is mounted on a radial arm 152 having a rounded outer end, the arm being attached to a block 153 mounted on a vertical shaft 154 journaled in brackets 155. As shown in FIGURE 11, the knife structure is duplicated at opposite sides of the machine. The lower end of each shaft 154 includes a bevel gear 156 meshing with respective gears 157 mounted at opposite ends of a cross shaft 158, which is journaled in the brackets 155-155. Shaft 158 includes an actuating lever 160 connected by a link 161 to a cam lever 162 (FIGURE 13). The lower end of lever 162 is journaled on rock shaft 133 adjacent the cam lever 131 of the suction cup and erector arms. Cam lever 162 is actuated by a cam 163, the lever having a cam roller 164 confined in a cam track. The cam track (not shown) and associated linkage imparts rocking motion to cross shaft 158 which in turn, through the bevel gears 156-157 swings the knives in unison through an arc of approximately 90 degrees as shown in FIGURES 5 and 6. The timing is such that the knives swing into the case as the erecting arms 143 begin their upward motion, such that the case walls are partially separated to admit the knives. After the case is fully erected (FIGURE 6) and latched, cam 163 swings the knives back to the retracted position.

It will be noted in FIGURES 5 and 6, that the lower guide rails 119 project beyond the primary conveyor and extend along the lower run 12 of the secondary conveyor. It will also be noted that the upper run 11 of the secondary conveyor includes a pair of upper guide rails 165 which contact the upper wall of the case in its erected position. Accordingly, the case is guided between the upper and lower rails when it subsequently is advanced by the secondary conveyor to the transfer station 13.

Flap Opening Mechanism

After the case is erected, and while the conveyor system dwells after advancing the flat case from the magazine, the upper and lower flap arms, previously indicated at 82 and 83, swing from the retracted position (FIGURE 5) to the flap extended position (FIGURE 6). These arms are in duplicate at opposite sides of the machine and are actuated in common from a single cam and linkage system as described below. The flap arms remain in the active position of FIGURE 6 to hold the flaps open as the case is advanced during the next cycle to the transfer station 13. This provides clearance for the upper and lower loading plungers 26 and 27 and the upper and lower follower plungers 30 and 31, previously indicated in FIGURES 8 and 9.

Described in detail with reference to FIGURE 15, the upper flap arms 82 are pivotally supported by respective brackets 166-166 depending from the rails 167-167 of the machine frame. The lower arms likewise are pivotally supported by brackets 168-168 carried by side rails 170. Each arm is pivotally connected as at 171 to its bracket. The lower arms 83 each include a right angular actuating arm 172 interconnected by a link 173 to a mid-point along the companion upper arm 82. This ar-

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range ment shifts the upper arms in unison through an arc of approximately 90 degrees from the retracted position of FIGURE 5 to the extended position of FIGURE 6. This motion is imparted to the lower arms by the respective spiral gears 174—174 which are keyed to the stub shafts 171. The spiral gears 174 mesh with spiral gears 175—175 which are keyed to the rock shaft 176. Rock shaft 176 is actuated by an arm 177.

As shown in FIGURE 11, a link 178 is pivotally connected to the outer end of arm 177; the opposite end of the link 178 is connected to the swinging end of a cam lever 180. The lower end of the cam lever is pivotally connected to the cross shaft 133, previously indicated in FIGURES 10 and 11. Cam lever 180 includes a cam roller 181 (FIGURE 13) which rides in the track of a cam 182. Cam 182 is keyed on the cam shaft 97 adjacent cam 163. The cam track is configured to shift the flap arms 82 and 83 from the retracted position (FIGURE 5) to the active position (FIGURE 6) and to maintain the arms in the extended position during the next stepwise advancement of the conveyor system. Accordingly, the upper and lower flaps of the case 14 and 15 slide along the upper and lower arms in open position as the case is advanced to transfer station 13.

As noted earlier, the rotary flap folder 35 is rotated through an angle of 180 degrees during each stepwise advancement of the conveyor system. Accordingly, the side flap of the loaded case (FIGURE 6) is folded to closed position by rotary arm 80 during advancement of the loaded carton toward the discharge point. As the next case advances toward the transfer station, its upper flap 14 (now raised by flap arms 82) passes behind the intermediate arm 81 of the rotary flap closer 35. During the next dwell period of the conveyor system, the erected case will have advanced to loading position with its upper flap beyond the arm 82 and confined by the flap closer which will have advanced to the position shown in FIGURE 6. The lower flap on the side viewed in FIGURE 6 naturally assumes the downwardly inclined position after leaving the flap opening arm 83 and causes no interference with the follower plungers. The flaps on the opposite end of the case from that shown in FIGURE 6 are held in a non-interfering position for entry of the loading plungers as explained later.

Can Conveyors

As noted earlier, with respect to FIGURES 1 and 2, the supply of cans indicated at 179 is advanced to the transfer station 13 by the friction type can conveyors, consisting of the upper can conveyor 2 and the lower can conveyor 3. The upper and lower conveyors are in duplicate except that they reside in two planes as indicated diagrammatically in FIGURE 21; the conveyors are advanced in opposite directions as indicated by the arrows in this view toward the upper and lower dead plates 20 and 21. The chain conveyors are both driven from the motor 183 (FIGURE 10) through a variable speed pulley drive 184 to a common drive shaft 185. The driving system from shaft 185 to the conveyors 2 and 3 is completed to the conveyors by way of respective sprocket chains, one of which is indicated at 189 in FIGURE 18.

It will be understood that motor 183 advances the conveyors at a speed somewhat greater than is necessary to supply the cans to the transfer station. As noted earlier, the metering apparatus 23 accumulates solid rows of cans adjacent the upper and lower dead plates 20 and 21. The group of cans 17 and 18 subsequently are advanced to the dead plates in time with the advancement of the cases to the transfer station. Since the cans rest upon the conveyors 2 and 3 and are advanced frictionally, the conveyors advance with respect to the cans which are arrested by the metering apparatus.

As shown in FIGURES 1 and 2, each can conveyor comprises a series of parallel conveyor chains 186 meshing with individual sprockets 187 carried upon an idler

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shaft 188. Each idler shaft is carried in mounting brackets forming a part of a frame structure 190. Each conveyor chain is guided by individual channels 191 carried on the frame structure. The lanes, previously indicated at 22, are delineated by respective vertical partitions 192 located between the conveyor chains and supported by the frame structure 190. These partitions loosely confine the cans and prevent them from toppling during advancement.

The delivery ends of the conveyor chains 186 (FIGURE 21) pass about similar sprockets 187 carried upon drive shafts 193—193 suitably journaled in frame structure 190. The drive shafts 193 include respective power sprockets 199 meshing with the sprocket chains 189 (FIGURE 18), which are in driving connection with motor 183.

Can Metering Apparatus

As explained earlier, the can metering apparatus 23 is in duplicate for the upper and lower can conveyors. As best shown in FIGURES 17 and 21, each roller gate, previously indicated at 24, comprises a pair of cylindrical shafts or rollers 194—194 mounted for rotary motion in spaced side plates 195—195 along opposite sides of the upper and lower can conveyors 2 and 3. The portion of the rollers which extend across the conveyors is cut away as at 196 substantially across the diameter of the roller to form the flat 197. In the position of the roller shown in FIGURES 17 and 21, the flats 197 extend vertically in a position to engage the upper and lower rims of the leading row of cans on the conveyor. The rollers are periodically rotated through an angle of approximately 90 degrees to a release position in time with the machine, as explained later. In the release position the flats 197—197 of the upper and lower rollers reside in planes parallel with and spaced from the upper and lower ends of the cans to allow them to be advanced to the dead plates 20 and 21 by the pusher fingers 25.

The upper and lower rollers 194 are rotated in unison to release position by a cam-actuated rock shaft 198 journaled in the conveyor frame and having a gear 200 keyed thereto meshing with a pinion 201 (FIGURES 18 and 19); pinion 201 is keyed to the lower gate roller. An idler gear 202 meshes with pinion 200 and drives a second gear 200a carried by the upper gate roller. The idler gear is suitably journaled upon a shaft fixed to the conveyor frame. Accordingly, upon rocking motion of shaft 198, the gate rollers are rotated in the directions indicated by the arrows in FIGURE 21 to release position.

The rock shaft 198 (which actuates the roller gates) includes an actuating lever 203 (FIGURES 18 and 19). The outer end of lever 203 includes a slide bearing 204 which is traversed by a push rod 205. The push rod includes a pair of collars 206—206, with a pair of compression springs 207—207 confined between the collars 206 and seated against opposite sides of the slide bearing 204. The lower end of push rod 205 includes a yoke 208 slidably straddling the cam shaft 97; the yoke includes a cam roller 210 tracked in the groove of a roller gate cam 211. The track of cam 211 is configured to impart reciprocating motion to the push rod 205 and thereby to open and close the roller gates in time with the machine; the compression springs 207 provide for a slight over-travel of the push rod 205 in the open and closed positions of the roller gates.

Since the metering apparatus for the lower can conveyor 3 is identical to that of the upper conveyor 2 (FIGURE 21), its actuating mechanism is not detailed in the drawings. Described generally, the mechanism for actuating the roller gates of the lower can conveyor consists of a cam 211a (similar to cam 211); cam 211a is mounted upon the cam shaft 101 which is driven from power shaft 94 by way of the bevel gears 98 and 100. The lower roller gate mechanism is actuated by cam 211a

through a push rod connection 205a, similar to that described above with reference to FIGURE 18.

The pusher fingers 25 (FIGURE 17) are also in duplicate for the upper and lower can conveyors, as illustrated in FIGURE 17. The fingers of both conveyors are actuated in time with the upper and lower roller gates to eject the groups of cans 212 which reside between the fingers 25 and gates 24. The timing is such that the respective upper and lower sets of fingers 25 shift longitudinally toward one another from the position shown in FIGURE 17, when the gates open, thus shifting the two groups of cans 212 toward one another across the dead plates 20 and 21 (FIGURE 21). After the feeding stroke, the fingers 25 retract to the position of FIGURE 17 for the next feeding cycle. During the feeding cycle, the arresting fingers 26 remain in the lowered position as shown to restrain the cans upstream on the advancing can conveyors, as explained below. The feeding of the cans to the dead plates is indicated by the arrow in FIGURE 7, the final position of the cans being shown in FIGURE 8.

The fingers 25 (FIGURES 17 and 20) are disposed in pairs, one pair for each lane 22 of the can conveyor. Each finger 25 includes an upstanding lug 213 at its forward end engageable with the lower rim of each can at two points. The finger lugs 213 project above the plane of the can conveyor chains 186. During the retracting stroke of the fingers, the lugs 213 are shifted to a plane below the chains in order to clear the next supply of cans advancing toward the roller gates 24.

As shown in FIGURES 17 and 20, the fingers 25 are mounted in common upon a cross bar 214. The cross bar 214 is carried upon a pair of slide brackets 216, which are mounted on parallel slide bars 215-215. The slide bars 215 are arranged to be shifted vertically through an arc to advance the fingers alternately in elevated and lower planes (FIGURE 17). For this purpose, the slide bars 215 are carried by a swinging frame 217 having one end pivotally connected as at 218 to the frame 42 of the machine. The swinging end of frame 217 is pivotally connected to a link 220. The lower end of the link is slidably connected as at 221 to an actuating lever 222 carried on a rock shaft 223 of the machine frame. The lever 222 is actuated by a push rod 224 having a cam roller 225 tracked in the groove of a finger elevating cam 226. As shown in FIGURE 10, cam 226 is carried upon the cam shaft 51 extending crosswise of the machine frame.

The finger elevating mechanism for the lower can conveyor 3 is similar to the above, including the swinging frame 217. However, the frame faces in the opposite direction with its swinging end projecting toward the mechanism shown in FIGURE 17. Cam 226 operates the swinging frame of the lower feeder by way of a link 227 (FIGURE 17). The link is pivoted as at 228 to lever 222 and its opposite end (not shown) is similarly pivoted to a lever of the other swinging frame.

The fingers 25 are reciprocated longitudinally by a can feed cam 230 (FIGURES 17 and 20). This cam is also mounted upon cross shaft 51, as shown in FIGURE 10. Cam 230 includes a track traversed by a cam roller 231 journaled on a cam lever 232. The lower end of lever 232 is journaled on the rock shaft 133 (FIGURE 10) and its upper end is pivotally connected as at 233 to a link 234. The link 234 is slidably connected as at 235 to a bracket 236 which projects downwardly from the cross bar 214 of the fingers 25. The track of cam 230 is configured to advance the fingers 25 from the position of FIGURE 17 to an extended position beyond the edge 237 of the dead plates (FIGURE 21). It will be noted in FIGURE 17, that the flat 197 of the roller gate will reside substantially in plane with the upper surface of dead plate 20 in the open position of the roller gate to provide a guide engageable with the bottom of

the cans as they pass from the end of the can conveyor to the dead plate.

In order to absorb shocks and prevent damage to the machine in case of interference by the cans, the links 220 and 234 are yieldably connected to the swinging frame 217 and to the bracket 236. The yieldable connection is provided by the respective compressive springs 238 of the links. Each compression spring has one end seated against a collar 240 and its opposite end seated against its associated slide element 221 or 235.

The arresting fingers 26, which engage the upper ends of the cans (FIGURE 17) are carried by a rock shaft 241, which is journaled in hangers 239-239 depending from the elevated rails of the machine frame (FIGURE 20). Each finger 26 includes a mounting arm 242 clamped to the rock shaft 241, each arm having a pair of downwardly projecting stop elements 243 (FIGURE 20) which project downwardly into the lanes 22. In the lowered position shown, the stop elements engage the upper portion of each can at two points, similar to the lugs 213 of the feed fingers. In the elevated position, the stops 243 shift above the upper ends of the cans to allow them to advance toward the roller gates.

The arresting fingers are actuated by a lever 244 (FIGURE 17), the outer end of which is slidably connected as at 245 to a vertical push rod 246. The lower end of push rod 246 includes a yoke 247 having a cam roller 248. Yoke 247 slidably embraces the cam shaft 51 and its roller 248 rides in a track formed in an arresting cam 250 on shaft 51 (FIGURES 10 and 20). The cam track is configured to shift the arresting fingers 26 vertically in time with the other components of the machine to its arresting and release positions.

During the cycle of operation, with the parts of the metering apparatus positioned as in FIGURE 17, the roller gates 194 swing to an open (can release) position by operation of cam 211 of shaft 51. Thereafter, the pusher fingers 25 are shifted forwardly by cam 230 to advance the cans 212 through the open gates, while the arresting fingers 26 remain in the lowered arresting position. The pusher fingers thereupon shift to their lowered position and remain so as the fingers are retracted back to the position of FIGURE 17. Thereafter, the roller gates close and the arresting fingers 26 are elevated, allowing the next group of cans 212 to advance and be stopped by the closed gates. Thereafter, the pusher fingers 25 shift upwardly and the arresting fingers 26 shift downwardly for the next cycle of operation.

The metering apparatus is provided with sensing fingers 251 arranged to decommission the machine in the event that the can conveyors 2 and 3 become depleted. The fingers also decommission the machine should one of the cans in the lanes 22 fall to its side. For this purpose, each lane is provided with individual sensing fingers 251; the fingers are pivotally carried by respective brackets 252, with the outer ends of the fingers resting upon the tops of the cans. The fingers have their upper ends in common contact with a trip plate 253, which is pivotally connected as at 254 to the bracket 252. The outer end of the plate is in contact with the plunger 255 of a control switch 256 mounted above plate 253. Should one of the fingers drop from the position shown in FIGURE 17, plate 253 swings upwardly to actuate the switch 256.

The switches 256 are interconnected with a control circuit arranged to disengage the electric clutch 91 (FIGURE 10) upon dropping of either of the sensing fingers. This apparatus does not form a part of the present invention and is generally similar to that disclosed in prior Patent No. 2,815,848 to Wickliffe Jones.

Case Loading Mechanism

As noted earlier, after the groups of cans are advanced from the metering apparatus to the upper and lower dead plates 20 and 21 (FIGURE 21), the erected carton will have been advanced into endwise alignment with the dead

plates, as indicated in FIGURES 9 and 23. While the case conveyor system dwells at this point in the cycle, the follower plungers 30 and 31 enter the case and contact one end of the respective groups of cans on the dead plates. Thereafter, the loading plungers 27 and 28 (FIGURE 8) contact the opposite end of the group of cans, such that the groups are confined between the loading plungers and follower plungers. The plungers now move in unison to transfer both groups of cans laterally from the dead plates to the packing case. After transferring the cans, both plungers shift to their retracted positions, allowing the case conveyor system to advance the loading case (with its flaps closed) to the discharge conveyors 38 and 40. As the loaded case is delivered, the next case is advanced to the transfer station for loading.

Referring to FIGURES 23-25, the loading plungers 27 and 28 are mounted for transverse reciprocation upon a frame structure 259 projecting laterally from the frame of the machine. The upper and lower plungers are both pivotally connected to a reciprocating carriage 257 mounted on parallel slide bars 258 of frame 259. The outer ends of the plungers 27 and 28 are joined to carriage 257 by the pivot shafts 260-260. The outer or active ends of the plungers are guided by respective upper and lower trackways 261 (FIGURE 24), as described in detail later.

The carriage 257 is reciprocated by a cam lever 262 (FIGURE 23) pivoted to a rock shaft 263 of bracket 264. The upper end of lever 262 includes a pivoted link 265 slidably joined as at 266 to carriage 257. Link 265 includes a compression spring 267 to provide a yieldable driving connection, as described earlier with respect to several other components of the machine. Lever 262 is actuated by a driving link 268 pivotally connected as at 270 to the lever; link 268 has its opposite end connected to a crank pin 271 on one face of gear 103. The gear 103 is mounted upon the cam shaft 102, previously described with reference to FIGURE 10. As shown in FIGURES 10 and 23, the cam shaft 102 is driven by gears 103 and 93, meshing with the pinion 92 of shaft 90. The loading plungers are thus reciprocated in time with the other components of the machine.

In order to hold the groups of cans 17 and 18 in position on the dead plates as they are advanced by the metering apparatus, the machine is provided with a pair of swinging doors indicated generally at 273 in FIGURES 24 and 25. These doors reside along the edge of the dead plates 20 and 21 (opposite the loading plungers) and guide the groups of cans 212 as they advance from the lanes 22 of the can conveyors. The opposite edge of the groups of cans are guided by the stationary rails 274 extending along the opposite edges of the groups of cans.

As shown in FIGURE 23, the receiving end of the packing case 4 at the transfer station 13 is spaced outwardly from the gates 273. Before the loading plungers begin their loading stroke, the doors swing to an open position through an arc of approximately 90 degrees for lateral ejection of the group of cans. During this motion, the gates swing the side flaps 32 and 34 of the aligned packing case to an open position and also act as guide plates for guiding the groups of cans into the receiving end of the packing case. As the case is advanced to the transfer station, its upper and lower flaps 14 and 15 will have been folded outwardly by the flap arms 82 and 83 as described previously; hence, these flaps will be folded back as indicated in FIGURE 23 by the doors 273 as they swing to the open position.

In order to support the groups of cans during transfer, there is provided a swinging bottom guide plate 275, which extends from the edge of the lower dead plate 21 to the receiving end of the packing case. This plate is shifted alternately to the position shown in broken lines in FIGURE 23 in time with the reciprocations of the loading plungers, as described below. The actuating mechanism

for the doors 273 and guide plate 275 are described at a later point in this section.

As noted above, the loading plungers are reciprocated in two separate planes during their loading and retracting stroke by the trackways 261. During the loading stroke, the plungers pass across the dead plates in the active planes (with the doors 273 open) to transfer the cans; the plungers retract through the inactive planes spaced above and below the dead plates. The purpose of this arrangement is to allow the metering apparatus to advance a successive group of cans to the dead plates as the loading plungers are being retracted in their inactive planes after completion of a loading stroke.

Described in detail (FIGURE 24) each trackway is provided with an outer track 276 and an inner track 277 extending parallel with one another. The loading plungers 27 and 28 each include a roller 278 which traverses the outer track 276 during the retracting stroke and the inner track 277 during the loading stroke. As viewed in FIGURE 25, the two plungers 27 and 28 are in duplicate, each having a fork portion 280 joined to the opposite ends of the pivot shafts 260-260 of carriage 257. The outer or swinging end of each plunger includes a pusher plate 281 extending in cantilever fashion from the longitudinal shank 282 of the plunger. Each pusher plate extends approximately for the full width of the dead plates, and its outer edge is provided with four recesses 283 to mate with the cans on the dead plates. The two intermediate recesses reside outwardly as at 284, such that the two inner rows of cans are pushed slightly in advance of the outer rows. This arrangement reduces the effective width of the upper and lower groups to facilitate entry into the packing case.

In order to guide the rollers 278 in a positive manner from the outer tracks 276 to the inner tracks 277, the outer end of each trackway 261 is provided with an oscillating rocking track section indicated at 285 (FIGURE 24), which alternately connects with the outer end of the inner and outer tracks. The oscillating sections 285 of the two trackways are actuated by a linkage mechanism as described below. The oscillating track sections are in duplicate for the upper and lower trackways 261.

In the retracted position of the loading plungers, the rollers 278 of the plungers reside in the position shown in FIGURE 24, with the oscillating track sections in communication with the inner tracks 277-277. Accordingly, as the plungers advance in the loading stroke, their rollers move inwardly along the oscillating track sections (which are now stationary) to bring the pusher plates 281 to the active planes noted above. At the inner end of the stroke, the rollers pass from the inner tracks 277 and intercept and trip respective switch spurs 286, which are spring urged to the positions indicated in FIGURE 24.

At the inner end of the loading stroke, as shown in FIGURE 23, the rollers 278 will have passed beyond the ends of the spring loaded spurs 286, to the end portion 287 of the tracks. In passing, the rollers spring the spurs outwardly; thereafter, the spurs spring to the position of FIGURE 24. Accordingly, during the retracting stroke of the plungers, the rollers 278 climb the spurs and follow the outer tracks 276, with the pusher plates 281 in their inactive planes. As the rollers approach the outer ends of tracks 276, the rocking sections 285 are shifted from the position of FIGURE 24 into alignment with the outer tracks 276, such that the rollers advance into the inner track sections 277 during the next cycle. Thereafter, the track sections are shifted back to the position of FIGURE 24 for the next plunger stroke.

The oscillating track sections 285 are actuated in time with the plungers by a cam lever 290 carried by a rock shaft 291 and having a cam roller 292 (FIGURE 23). The roller follows a cam track formed in the cam 272 which is mounted on shaft 102. The cam track is configured to oscillate the track sections to the two positions in time with the strokes of the loading plungers,

as described above. The cam lever includes a link 293 having its outer end pivotally connected as at 294 to a lever 295 secured to a rock shaft 296. As seen in FIGURE 25, the rock shaft 296 is journaled in frame 259 and its outer end includes actuating levers 297—297 for the upper and lower oscillating track sections 285.

As shown in FIGURE 25, each track section 285 is mounted upon a respective stub shaft 298 journaled in the trackways 261, and each stub shaft includes a rocking lever 300. The rocking levers 300 are connected to the actuating levers 279 by respective links 301—301 (FIGURE 24). The links 301 each include compression springs 302 to provide a yieldable connection, as explained earlier. It will be seen that the cam and linkage mechanism oscillates both track sections 285 in unison and in time with the motion of the loading plungers.

The swinging bottom guide 275, is actuated in time with the loading plungers to allow the lower plunger to retract in a plane below the lower dead plate 21. After the cans are guided by bottom plate 275 into the receiving end of the packing case, plate 275 swings to the position shown in broken lines (FIGURE 23). As the roller of the lower plunger traverses the inclined surface of spur 286 during the retracting stroke, the lower pusher plate 281 passes downwardly through the opening previously occupied by plate 275 for retraction in a plane below the dead plate 21.

Swinging guide plate 275 is carried by a right angular arm 303 mounted on a rock shaft 304 journaled in bracket 305 (FIGURE 23). A lever 306 is attached to a shaft 304 and includes a link 307 connected to a cam lever 308. Lever 308 includes a cam roller 310 which follows the track of a cam 311 of shaft 94 (FIGURE 10). The lower end of lever 308 is carried upon a rock shaft 312. The track of cam 311 swings the guide plate 275 in time with the motion of the loading plungers as explained above.

The doors 273—273 are mounted upon respective vertical shafts 313 (FIGURE 23) journaled in a frame structure 314 carried by the upper portion of the machine frame. The doors are swung in unison by respective gear sectors 315—315 secured to the vertical shafts 313—313 and interconnected by idler gears 316—316 journaled on stub shafts 317—317 (FIGURES 26 and 27).

Referring to FIGURE 23, the lower end of one of the vertical shafts 313 is journaled in a bracket 318 of the machine frame and includes a bevel gear 320, meshing with a bevel gear 321. Bevel gear 321 is carried on a stub shaft journaled in the bracket 318; an actuating lever 322 is secured to the opposite end of the shaft.

As seen in FIGURES 10 and 23, the actuating lever 322 is linked to a cam lever 323 of rock shaft 324. The cam lever is in driving connection with a door actuating cam 325. Cam lever 323 includes the usual cam roller which is tracked in the groove of the cam 325 of shaft 101 (FIGURE 10). Shaft 101 is driven from the shaft 94 as explained earlier. The track of cam 325 is configured to open the doors 273 slightly in advance of the forward stroke of the loading plungers 27 and 28, as explained earlier, and to close the doors as the retracting plungers are clear of the door opening.

It will be noted in FIGURE 23, that the upper dead plate 20 comprises a relatively thin metal plate. As the upper and lower groups of cans are advanced by the loading plungers and guided by the upper and lower follower plungers 30 and 31, the upper group of cans slide from the edge of the thin dead plate 20 to rest upon the tops of the cans of the lower group. Since the cans are restrained by the follower plungers, they are not displaced relative to one another as they drop from the edge of the dead plate.

Referring now to FIGURES 28 and 29, the upper and lower follower plungers 30 and 31 are slidably supported by a frame structure 326 secured to and extending laterally from the machine frame on the side opposite the

loading plungers. The follower mechanism also appears generally in FIGURES 1, 2 and 9. The follower plungers reciprocate in axial alignment with the loading plungers.

As seen in FIGURE 28, the upper portion of frame structure 326 includes a pair of parallel bars 327 slidably mounting the plungers 30 and 31. The plungers are secured to a slide block 328 which is bored to slidably interfit the bars 327. Each follower plunger comprises a horizontal shank 330 having its rearward end secured to the slide block. The forward end of each shank includes a right angular pusher 331 having a length to extend across the packing case in contact with the advancing cans, as seen in FIGURE 9. The follower plungers are actuated by a lever 332 having its lower end pivotally connected to frame 326 as at 333. The upper end of lever 332 is pivotally linked as at 334 to the slide block 328.

Lever 332 is actuated by a cam 335 carried on a shaft 336. Shaft 336 includes a gear 337 meshing with the gear 93 (FIGURES 10 and 23). As explained earlier, gear 93 is in mesh with pinion 92 of drive shaft 90. Gear 93 thus drives both the follower plungers and the loading plungers, as described earlier with respect to FIGURE 23.

Cam 335 of the follower plungers includes a cam lever 338 mounted on a rock shaft 340 and having a cam roller 341 tracked in the groove of cam 335. The cam lever 338 is connected to the follower lever 332 by the link 342.

The track of cam 335 is configured to shift the follower plungers through the packing case and into contact with the leading ends of the groups of cans after the doors 273 open, but before the loading plungers advance. Thereafter, the loading plungers advance through the loading stroke in contact with the cans (with doors 273 open) while the follower plungers retract as seen in FIGURE 9. At the end of the loading cycle, the follower plungers dwell in the position of FIGURE 28, while the loading plungers retract for the next loading cycle. The flaps of the loaded case are now folded to closed position and the case is advanced by the case conveyor system to the delivery conveyors 38 and 40 as explained earlier. These conveyors advance the loaded case to the flap gluing apparatus which forms no part of the present invention.

Having described my invention, I claim:

1. An automatic machine for packing articles into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected packing case in a generally horizontal plane to a position having an open end disposed transversely adjacent the load transfer station, stationary generally horizontal article support means at said transfer station, article conveyor means for advancing a segregated group of articles longitudinally in a generally horizontal path to said support means, a pair of door elements mounted for pivotal motion about respective vertical axes, said door elements being normally closed and extending along one side of the article support means adjacent the packing case, said door elements in said closed position guiding said segregated group of articles during longitudinal advancement along the support means, loading means disposed relative to the opposite side of the support means and movable from a retracted position transversely across said article support means toward the open end of the packing case, and actuating means connected in common to said door elements and loading means, said actuating means pivoting said door elements from said closed position to an open position in which said door elements extend transversely from said article support means toward the open end of the packing case, said actuating means thereafter shifting the loading means from said retracted position transversely across the article support means, whereby the articles on the support means are advanced transversely while said open door elements guide the articles into the open end of the packing case.

2. An automatic machine for packing articles into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected packing case to a position having an open end disposed transversely adjacent the load transfer station, a stationary dead plate at said transfer station, article conveyor means for advancing a segregated group of articles longitudinally to said dead plate, a pair of door elements mounted for pivotal motion about respective vertical axes, said door elements being normally closed and extending along an edge of the dead plate adjacent the packing case, said door elements in said closed position guiding said segregated group of articles during longitudinal advancement from said article conveyor means along the dead plate, a loading plunger disposed relative to the edge of the dead plate opposite said door elements, said plunger movable from a retracted position transversely across said dead plate toward the open end of the packing case, and actuating means connected in common to said door elements and loading plunger, said actuating means pivoting said door elements from said closed position to an open position in which said door elements extend transversely from said dead plate toward the open end of the packing case, said actuating means thereafter shifting the loading plunger from said retracted position transversely across the dead plates, whereby the articles on the dead plates are advanced transversely while said open door elements guide the articles into the open end of the packing case.

3. An automatic machine for packing articles in group formation one above the other into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected case to a position having an open end disposed transversely adjacent the load transfer station, an upper and lower dead plate disposed one above the other at said transfer station, article conveyor means for advancing segregated groups of articles longitudinally to upper and lower dead plates, a pair of door elements mounted for pivotal motion about respective vertical axes, said door elements being normally closed and extending along an edge of said dead plates adjacent the packing case, said door elements in said closed position guiding said segregated groups of articles during longitudinal advancement from said article conveyor means along the upper and lower dead plates, respective upper and lower loading plungers disposed relative to the edge of the dead plates opposite said door elements, said plungers movable from a retracted position transversely across said dead plates toward the open end of the packing case, and actuating means connected in common to said door elements and upper and lower plungers, said actuating means pivoting said door elements from said closed position to an open position in which said door elements extend transversely from said upper and lower dead plates toward the open end of the packing case, said actuating means thereafter shifting the loading plungers from said retracted position transversely across the upper and lower dead plates, whereby the groups of articles on the upper and lower dead plates are advanced transversely from the dead plates while said open door elements guide the groups of articles into the open end of the case, with the groups residing one above the other.

4. An automatic machine for packing articles in group formation one above the other into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected packing case to a position having an open end residing transversely adjacent the load transfer station, upper and lower dead plates residing one above the other at the transfer station, respective upper and lower article conveyors extending longitudinally from opposite sides of the transfer station and communicating respectively with the upper and lower dead plates, said article conveyors advancing respective segregated groups of articles longitudinally in op-

posite directions to said upper and lower dead plates, whereby said groups reside one above the other on the dead plates, a pair of door elements mounted for pivotal motion about respective vertical axes, said axes disposed at opposite sides of the dead plates, said door elements being normally closed and extending along an edge of the plates on the side adjacent the open end of the packing case, said door elements in said closed position guiding said upper and lower groups of articles during longitudinal advancement thereof from said article conveyors to said dead plates, upper and lower loading plungers movable transversely from a retracted position across said upper and lower dead plates toward the open end of the packing case, and actuating means connected in common to said door elements and to said loading plungers, said actuating means pivoting said door elements from said closed position to an open position extending transversely from the dead plates toward the open end of the packing case, said actuating means thereafter advancing said loading plungers from said retracted position, whereby the loading plungers advance said groups of articles transversely across said dead plates while said open door elements guide said groups of articles into the open end of the packing case.

5. An automatic machine for packing upright cylindrical cans in group formation into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected packing case to a position having an open end disposed transversely adjacent the load transfer station, stationary can support means at said transfer station, article conveyor means for advancing a segregated group of cans longitudinally to said support means, a pair of door elements mounted for pivotal motion about respective vertical axes, said door elements being normally closed and extending along one side of the can support means adjacent the packing case, said door elements in said closed position guiding said segregated group of cans during longitudinal advancement along the support means, a loading plunger disposed relative to the opposite side of the support means, said plunger movable from a retracted position transversely across said can support means toward the open end of packing case, and actuating means connected in common to said door elements and loading plunger, said actuating means pivoting said door elements from said closed position to an open position in which said door elements extend transversely from said can support means toward the open end of the packing case, said actuating means thereafter shifting the loading plunger from said retracted position transversely across the can support means, said loading plunger having a forward portion engageable with the cans on the support means, said forward portion having a profile mating with the upright cylindrical cans of the group and advancing the intermediate cans in leading relationship and thereby reducing the effective width of the group, said plunger advancing the cans toward the packing case while said open door elements guide the cans into the open end of the packing case.

6. An automatic machine for packing articles into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected packing case to a position having an open end residing transversely adjacent the transfer station, article support means disposed at said transfer station, article conveyor means for advancing a segregated group of articles to said support means, article loading means movable from a retracted position transversely across said support means toward the open end of the packing case, actuating means connected to said loading means at a point outwardly from the load transfer station, a stationary trackway means extending along the article support means, guide means slidably connecting a portion of the article loading means to said trackway, said guide means guiding the article loading means in an active plane during

transverse motion from said retracted position across the article support means, said trackway means guiding the loading means in an inactive plane across the support means during motion thereof in the reverse direction toward said retracted position, said loading means advancing the group of articles transversely from the support means through the open end of the packing case during advancement in said active plane and being spaced outwardly from said support means during return motion in said inactive plane, whereby said article conveyors are effective to advance a successive group of articles longitudinally to the support means during the retracting motion of the loading means.

7. An automatic machine for packing articles into an end loading packing case, said machine comprising a load transfer station, conveyor means for advancing an erected packing case to a position having an open end residing transversely adjacent the transfer station, a dead plate disposed at said transfer station, an article conveyor communicating with said dead plate, said article conveyor advancing a segregated group of articles longitudinally to said dead plate, a reciprocating loading plunger movable from a retracted position transversely across said dead plate toward the open end of the packing case, actuating means connected to said loading plunger at a point outwardly from the dead plate, a stationary trackway extending along the dead plate, means slidably interconnecting a portion of the loading plunger to said trackway, said trackway guiding said plunger in an active plane during transverse motion from said retracted position across the dead plate, said trackway guiding the plunger through an inactive plane across the dead plate during motion thereof in the reverse direction toward said retracted position, and actuating means connected to said plunger for advancing and retracting the same, said plunger advancing the group of articles transversely from said dead plate through the open end of the packing case during advancement in said active plane and being spaced outwardly from said dead plate during the retracting motion in said inactive plane, whereby said article conveyor is effective to advance a successive group of articles longitudinally to said dead plate during the retracting motion of said plunger.

8. An automatic machine for packing articles in group formation one above the other into an end loading packing case, said machine comprising a load transfer station, means for advancing an erected packing case to a position having an open end residing transversely adjacent the transfer station, respective upper and lower dead plates disposed at said transfer station and residing one above the other, a pair of article conveyors communicating with the upper and lower dead plates, said article conveyors advancing groups of articles longitudinally to said upper and lower dead plates, upper and lower loading plungers movable from a retracted position transversely across said dead plates toward the open end of the packing case, a respective trackway for said upper and lower loading plungers, said trackways guiding said plungers in respective active planes during transverse motion from said retracted position across the dead plates, said trackways guiding the plungers through respective inactive planes across the dead plates during motion thereof in the reverse direction toward said retracted position, and actuating means connected to said plungers for advancing and retracting the same in unison, said plungers contacting and advancing the group of articles transversely from said dead plates through the open end of the packing case during advancement in said active planes and being spaced outwardly from said dead plates during return motion in said inactive plane, whereby said article conveyors are effective to advance a successive upper and lower group of articles longitudinally to said dead plates during the transverse retracting motion of said plungers across the dead plates.

9. An automatic machine for packing articles in group

formation into a collapsible, end loading packing case, said packing case having opposite open ends, said machine comprising a load transfer station, a primary case conveyor, a magazine mounted along said conveyor, said magazine arranged to confine a stack of collapsed packing cases with the open ends thereof disposed transversely relative to said conveyor, case withdrawal means mounted relative to said magazine for withdrawing the forward end said collapsed cases individually from the magazine, means on said conveyor engageable with the rearward edge of the withdrawn case for ejecting the collapsed case longitudinally from the magazine during advancement of the conveyor, case erecting means mounted relative to said conveyor and engageable with said collapsed case, actuating means in common driving connection with said case conveyor, withdrawal means, and case erecting means, said actuating means operating said withdrawal means to withdraw said collapsed case and thereafter advancing said conveyor through a stepwise advancement to eject the withdrawn case, said actuating means thereafter stopping the conveyor and operating the case erecting means, thereby erecting the case while the same is in stationary position on the conveyor, said actuating means subsequently advancing the conveyor and erected case longitudinally to said transfer station with an open end of the case presented to the transfer station, and loading means at said transfer station for advancing a group of articles transversely into the open end of the erected case.

10. An automatic machine for packing articles in group formation into a collapsible end loading packing case, said packing case having opposite open ends including upper and lower closure flaps, said machine comprising a load transfer station, a primary case conveyor, a magazine mounted along said conveyor run, said magazine arranged to confine a stack of collapsed packing cases with the flaps thereof disposed at opposite sides of said conveyor, a suction apparatus mounted at the lower end of said magazine for withdrawing the forward end of said collapsed cases individually from the magazine, lug elements on said conveyor engageable with an edge of the withdrawn case and ejecting the collapsed case longitudinally from the magazine during advancement of the conveyor, a case erecting mechanism mounted along said conveyor run engageable with said collapsed case, normally retracted flap handling elements disposed along the conveyor engageable with the upper and lower flaps of the erected case for opening the flaps, actuating mechanism in common driving connection with said case conveyor run, suction apparatus case erecting mechanism, and flap handling elements, said actuating mechanism operating said suction apparatus to withdraw said collapsed case and thereafter advancing said conveyor through a stepwise advancement to eject the withdrawn case, said actuating mechanism thereafter stopping the conveyor and actuating the case erecting mechanism for erecting the case while the same is in stationary position on the conveyor, said actuating mechanism thereupon shifting the flap handling elements from said retracted position to open the upper and lower flaps, said actuating means subsequently advancing the conveyor and erected case longitudinally to said transfer station with an open end of the case presented to the transfer station, and means at said transfer station for advancing a group of articles transversely into the open end of the erected case.

11. A load transfer apparatus for an automatic case packing machine, said machine having a dead plate and having a metering apparatus for advancing groups of articles longitudinally to said dead plate, said transfer apparatus transferring the articles transversely from the dead plate into an end loading packing case, said load transfer apparatus comprising, a reciprocating loading plunger movable transversely across said dead plate in forward and return strokes, an active track and an inactive track extending parallel with the path of motion of the plunger,

guide means on said plunger traversing said tracks, said active track guiding said plunger in an active plane during said forward stroke across said dead plate and thereby transferring the articles transversely from the dead plate into the packing case, means on the active track for transferring the guide means to the inactive track at the end of said forward plunger stroke, said inactive track guiding said plunger through an inactive plane spaced outwardly from the dead plate during the return stroke of the plunger, said inactive track spacing the plunger sufficiently from the dead plate to adapt the metering apparatus to advance the articles longitudinally to the dead plate without interference by the plunger during the return stroke thereof.

12. A load transfer apparatus for an automatic case packing machine, said machine having a dead plate and having a metering apparatus for advancing groups of articles longitudinally to said dead plate, said transfer apparatus transferring the articles transversely from the dead plate into an end loading packing case, said load transfer apparatus comprising, a reciprocating loading plunger movable transversely across said dead plate in forward and return strokes, an active track and an inactive track extending parallel with the path of motion of the plunger, guide means on said plunger traversing said tracks, said active track guiding said plunger in an active plane during said forward stroke across said dead plate and thereby transferring the articles transversely from the dead plate into the packing case, said inactive track guiding said plunger through an inactive plane spaced outwardly from the dead plate during the return stroke of the plunger, said inactive track spacing the plunger sufficiently from the dead plate to adapt the metering apparatus to advance the articles longitudinally to the dead plate without interference by the plunger during the retracting stroke thereof, a shiftable switching device at the forward portion of said tracks providing communication from the active track to the inactive track, said switching device intercepted by said guide element as the plunger approaches the limit of said forward stroke and directing the guide element toward said inactive track, whereby the plunger follows the inactive track during the return stroke of the plunger, a second switching device at the rearward portion of said tracks, said second switching device providing communication from the inactive track to the active track, said second switch element intercepted by the guide element as the plunger approaches the limit of said retracting motion and directing the guide element toward said active track during forward motion of the plunger.

13. A load transfer apparatus for an automatic case packing machine, said machine having a dead plate and having a metering apparatus for advancing groups of articles longitudinally to said dead plate, said transfer apparatus transferring the articles transversely from the dead plate into an end loading packing case, said load transfer apparatus comprising, horizontal guide way extending transversely relative to said dead plate, a slide element mounted for transverse motion on said guide way, a loading plunger having a rearward portion pivotally connected to said slide element, said loading plunger having a forward portion movable in forward and return strokes transversely across said dead plate, said plunger having a forward portion which pivots relative to said slide element, said forward portion being engageable with the articles on the dead plate for transferring the articles transversely

therefrom, a trackway having an active track and an inactive track residing in a generally horizontal plane, means on the forward portion of said plunger slidably traversing said tracks, said active track guiding the forward portion of said plunger in an active plane during transverse motion across said dead plate for transferring the articles, said inactive track guiding the forward portion of the plunger through an inactive plane spaced outwardly from the dead plate during the return stroke of the plunger, and means at opposite ends of said tracks for directing the guide means to the inactive track at the limit of said forward stroke and for directing the guide element to the active track at the limit of the return stroke of the plunger.

14. A load transfer apparatus for an automatic case packing machine, said machine having a dead plate and having a metering apparatus for advancing groups of articles longitudinally to said dead plate, said transfer apparatus transferring the articles transversely from the dead plate into an end loading packing case, said load transfer apparatus comprising, a horizontal guide way extending transversely relative to said dead plate, a slide element mounted for transverse motion on said guide way, a loading plunger having a rearward end pivotally connected to said slide element, said loading plunger movable in forward and return strokes transversely across said dead plate, said plunger having a forward portion which pivots relative to said slide element, said forward portion being engageable with the articles on the dead plate for transferring the articles transversely therefrom, a trackway having an active and an inactive track residing in a generally horizontal plane, means on the forward portion of said plunger slidably traversing said tracks, said active track guiding the forward portion of said plunger in an active plane during transverse motion across said dead plate for transferring the articles, said inactive track guiding the forward portion of the plunger through an inactive plane spaced outwardly from the dead plate during the return stroke of the plunger, a switch spur at the forward portion of said tracks intercepting said guide element as the plunger approaches the limit of said forward stroke and guiding the same to said inactive track during the return stroke of the plunger, an oscillating track section mounted at the inner portion of said tracks, said oscillating track section receiving the guide element as the plunger approaches the limit of said return stroke, and actuating means connected to said plunger and to said oscillating track section, said actuating means shifting the track section into communication with the active track and thereafter shifting said plunger through said forward stroke, whereby the guide element traverses the active track during said forward stroke.

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