Nov. 18, 1947. W. D. KIMBALL 2,430,878

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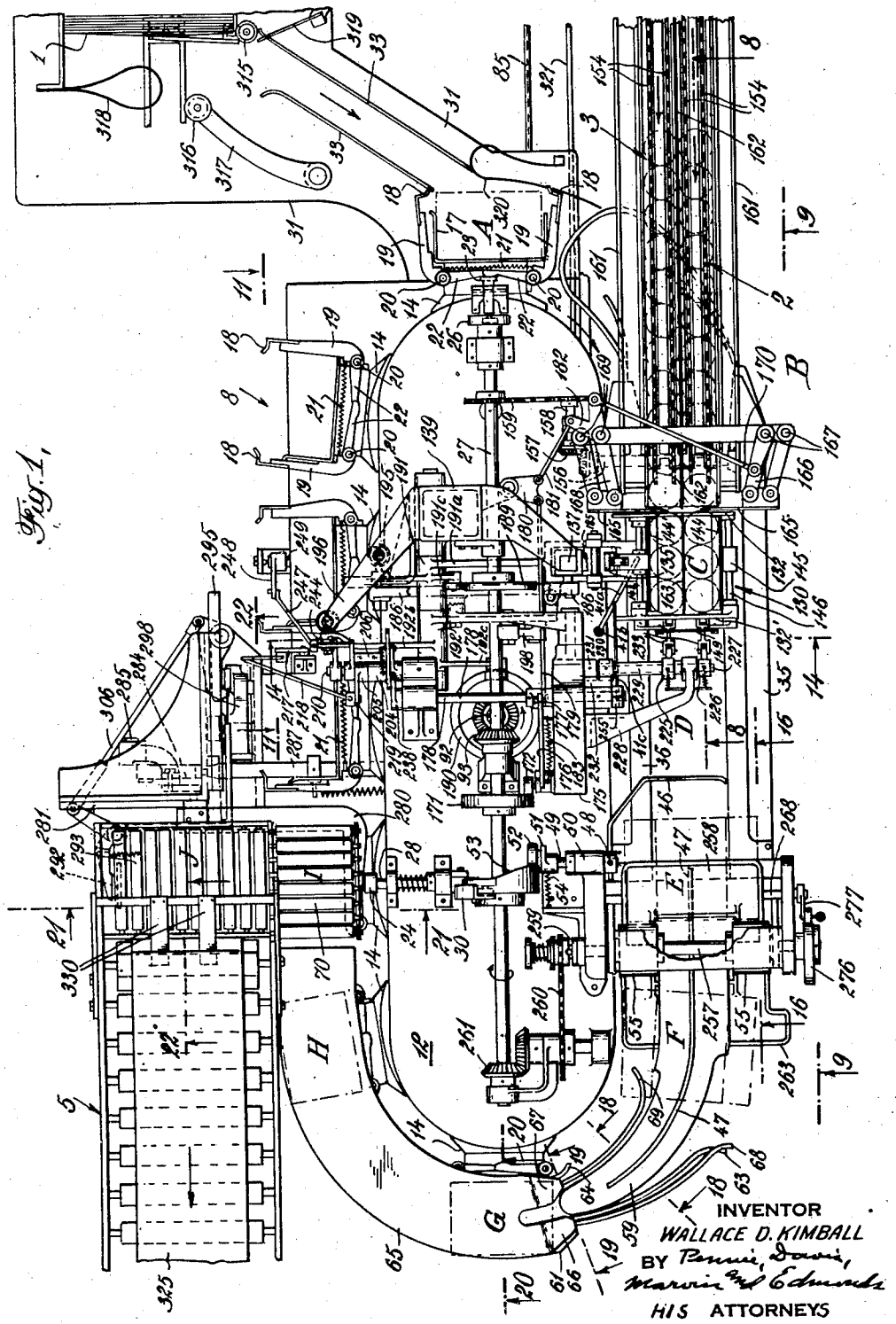


Fig. 1.

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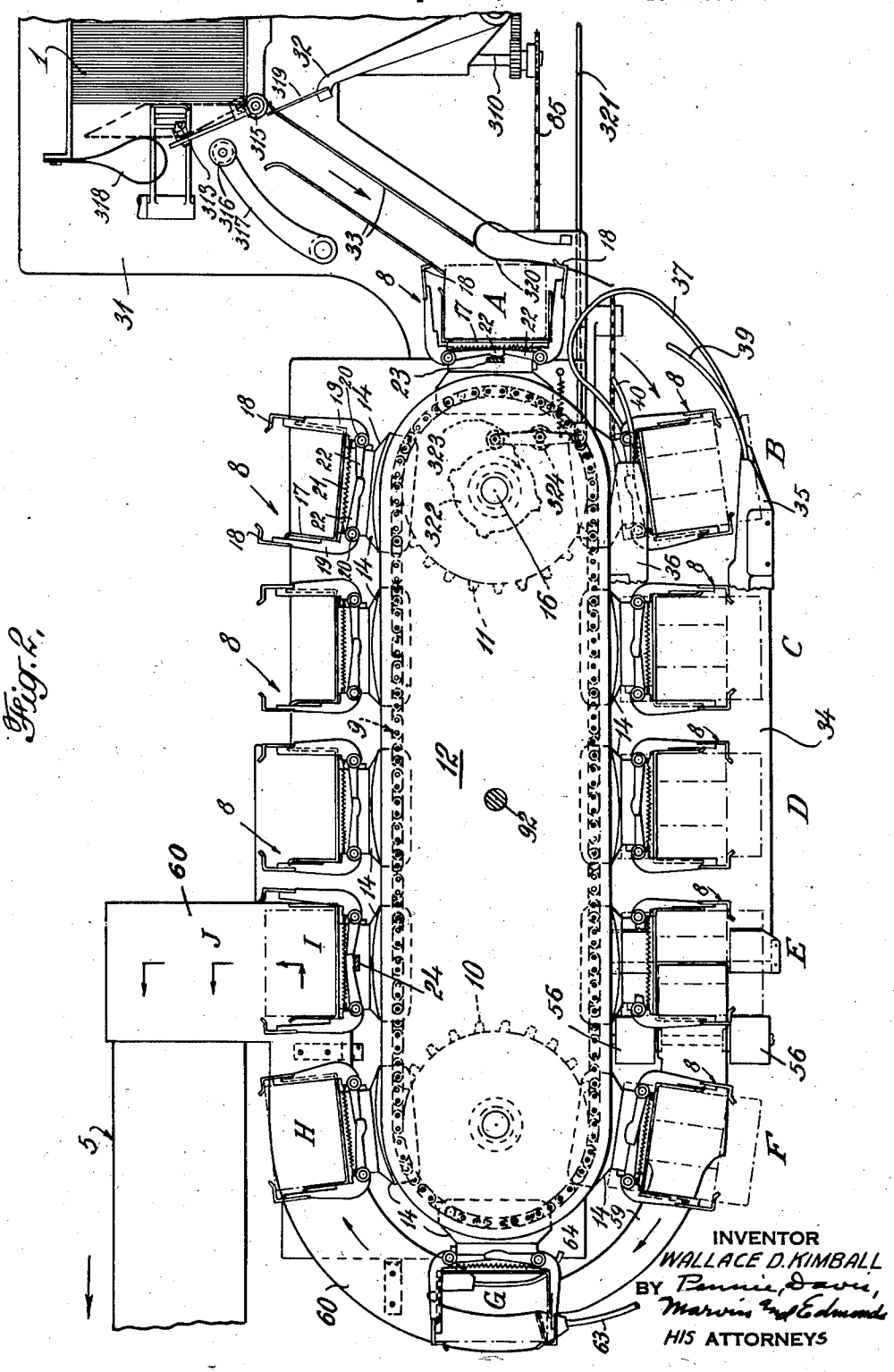


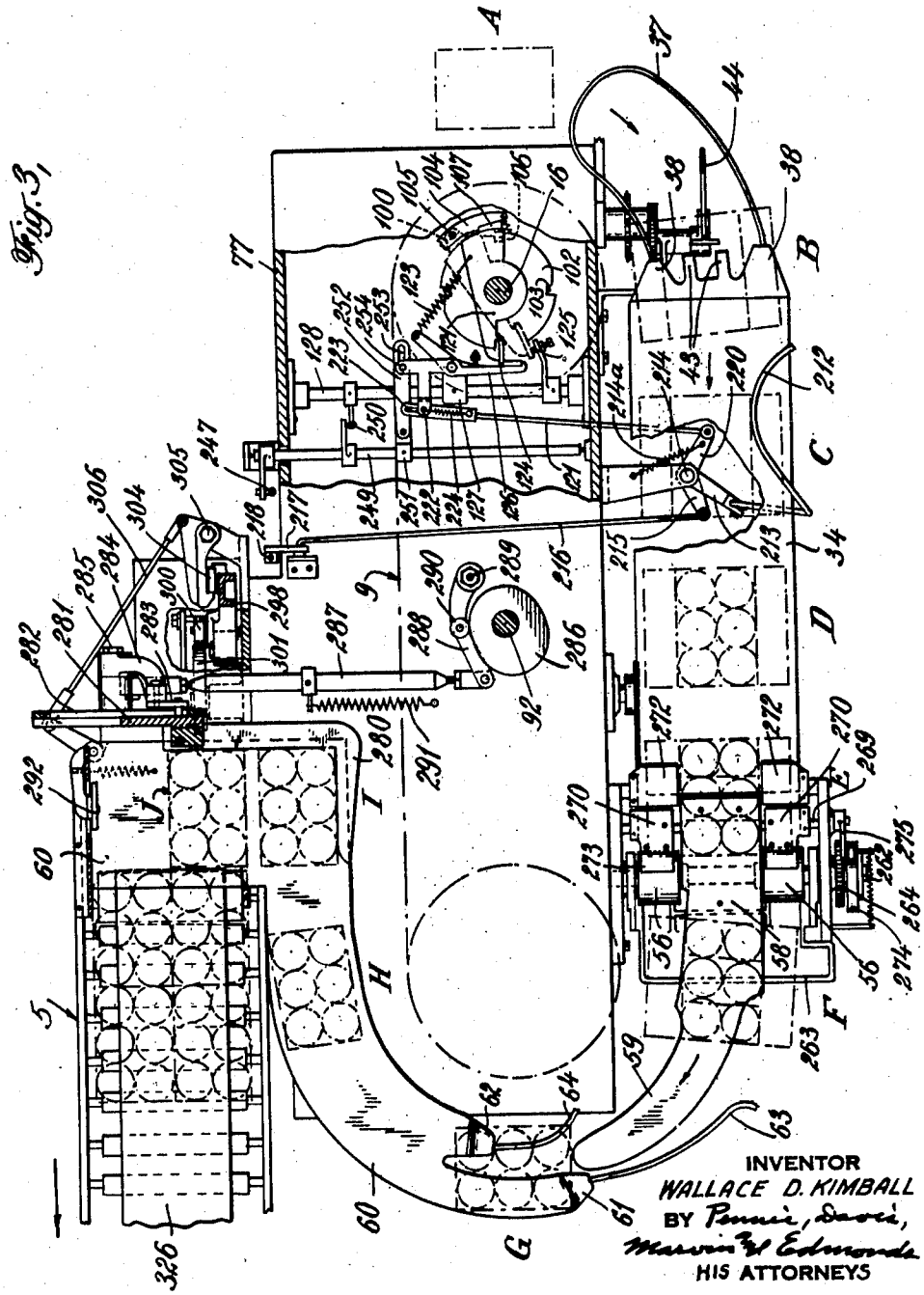
Fig. 2.

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Fig. 3.

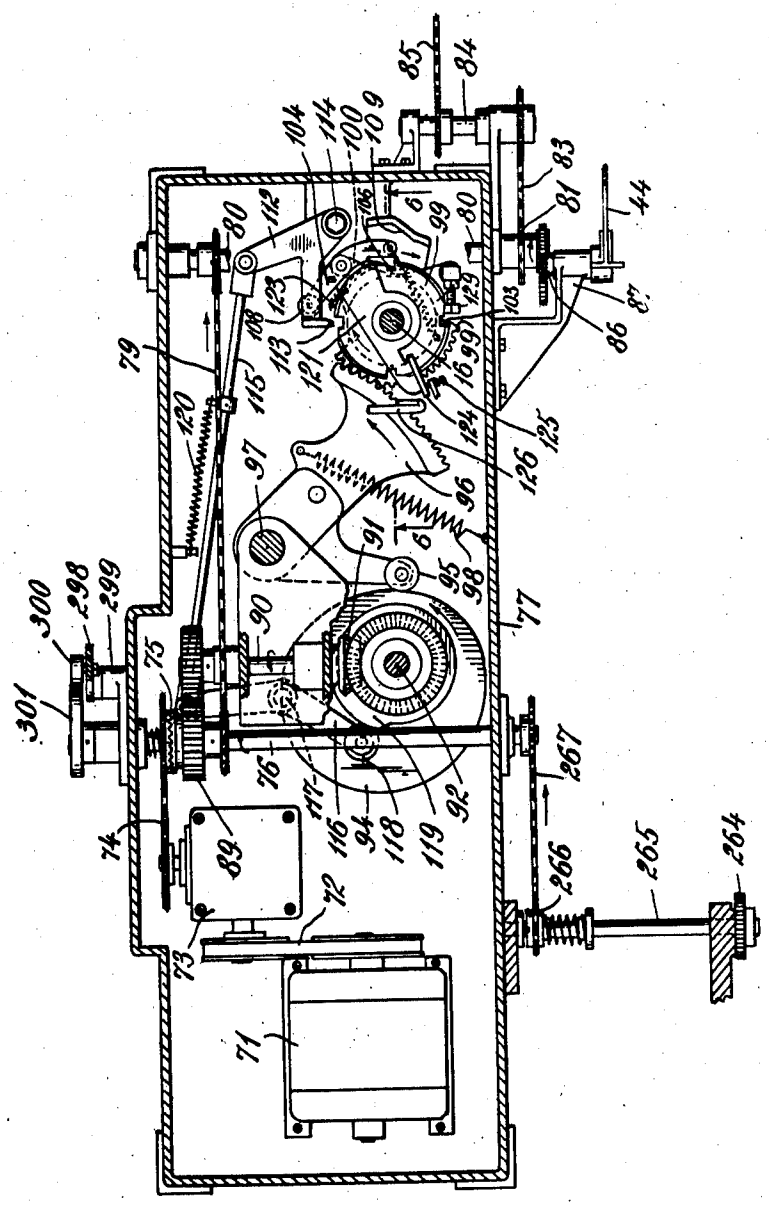


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Fig. 4,



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Fig. 5,

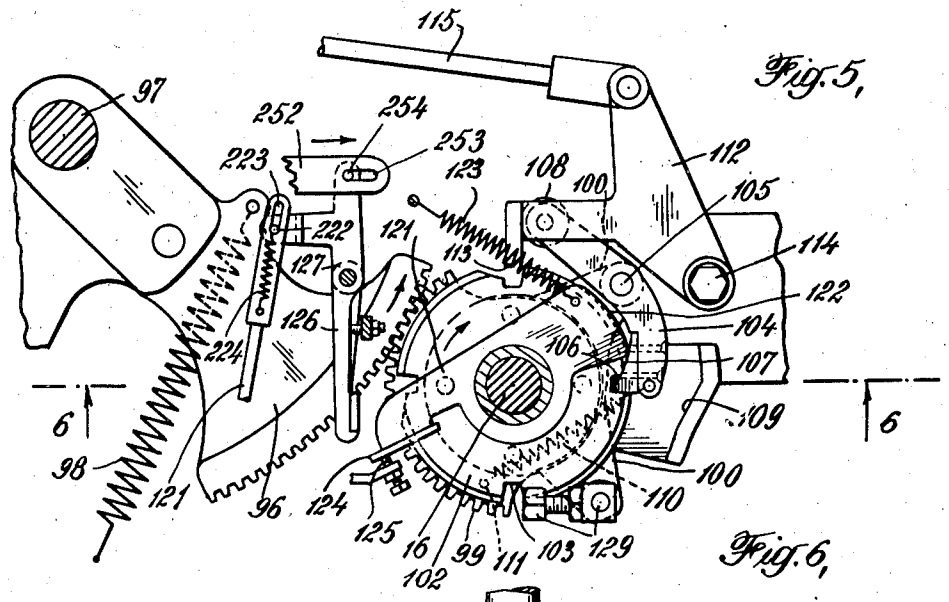


Fig. 6,

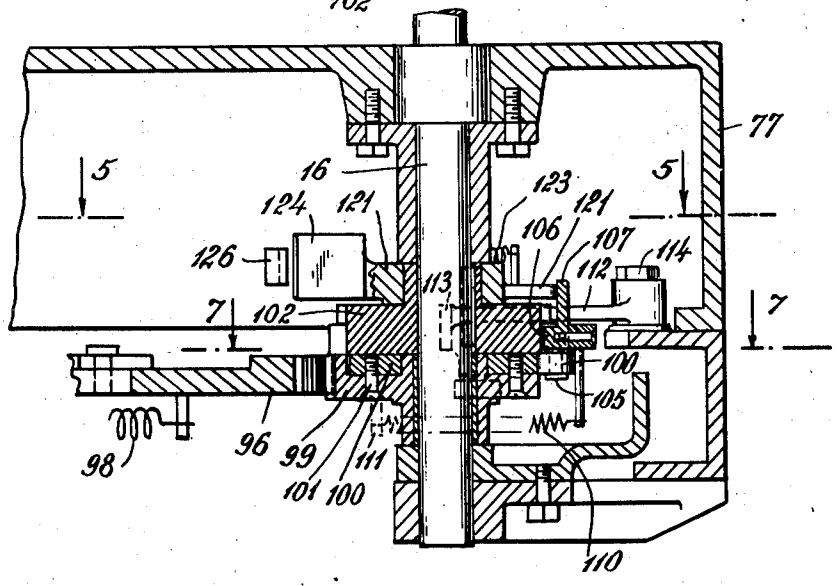
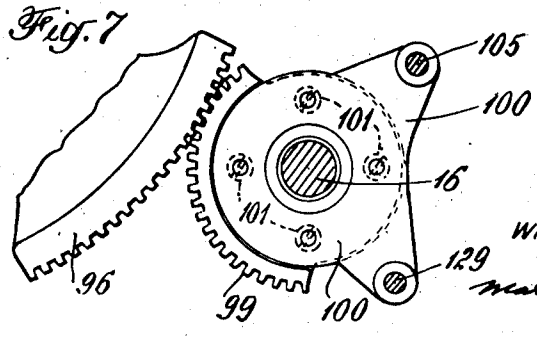


Fig. 7



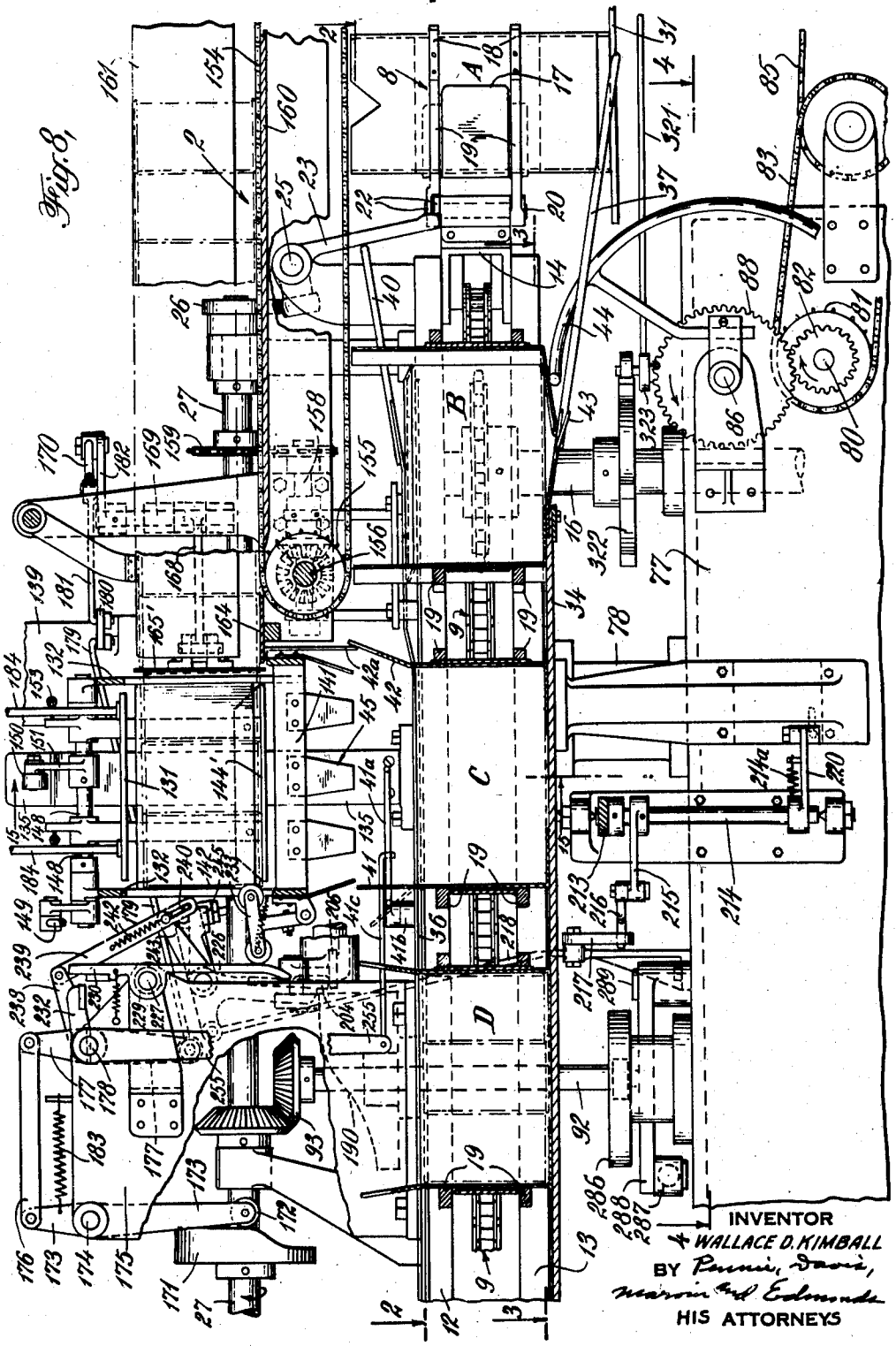
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Fig. 8.



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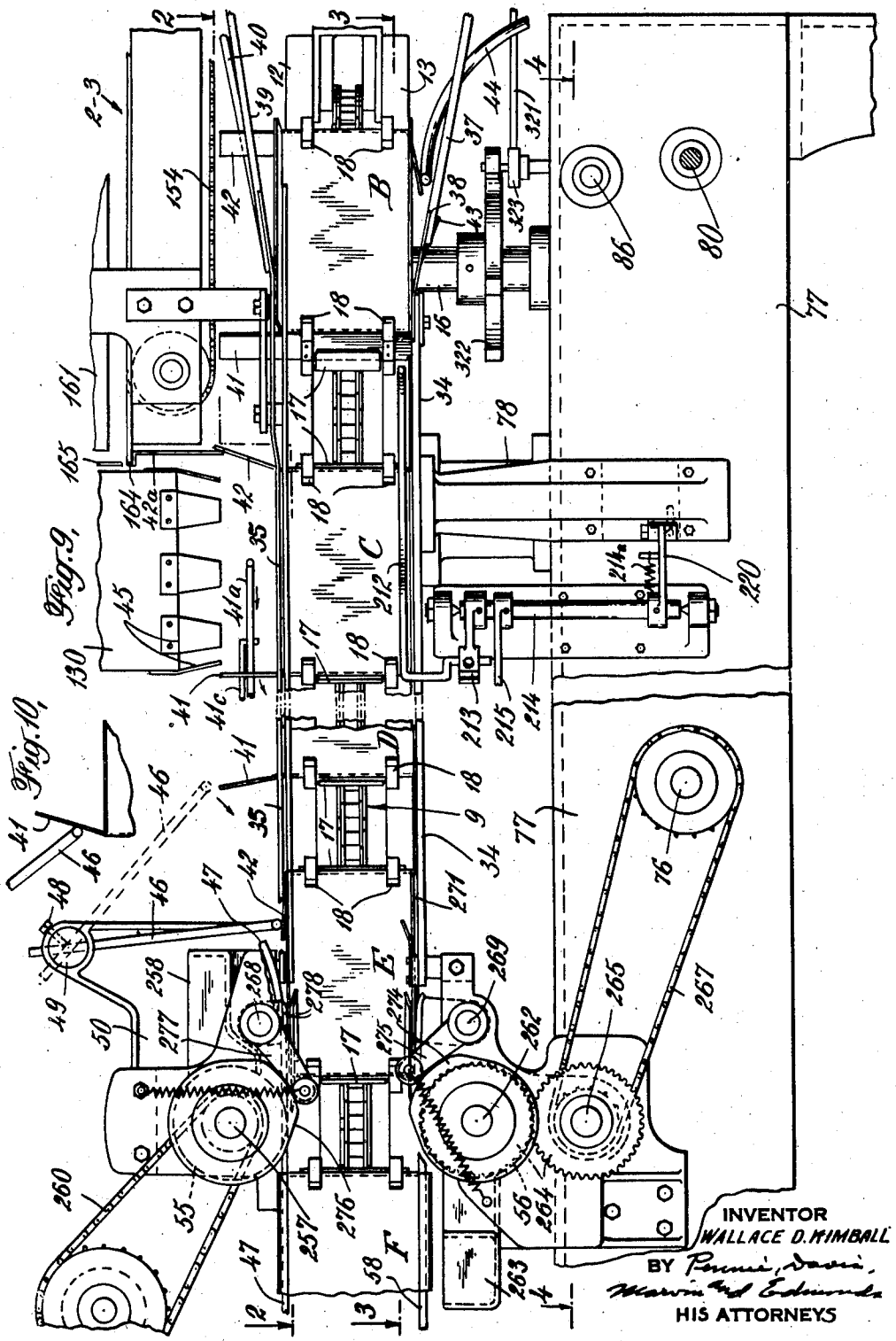


Fig. 9.

Fig. 10.

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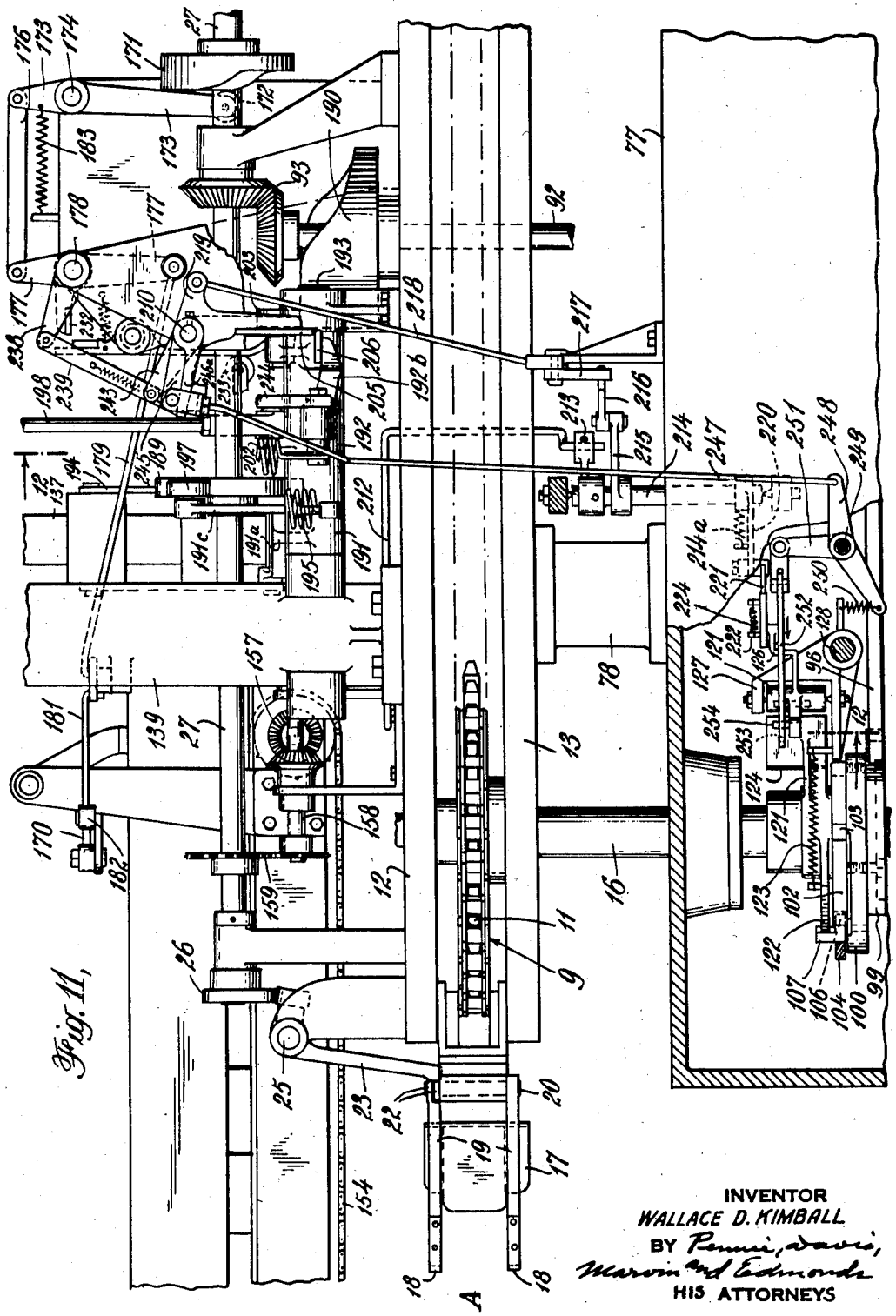


Fig. 11.

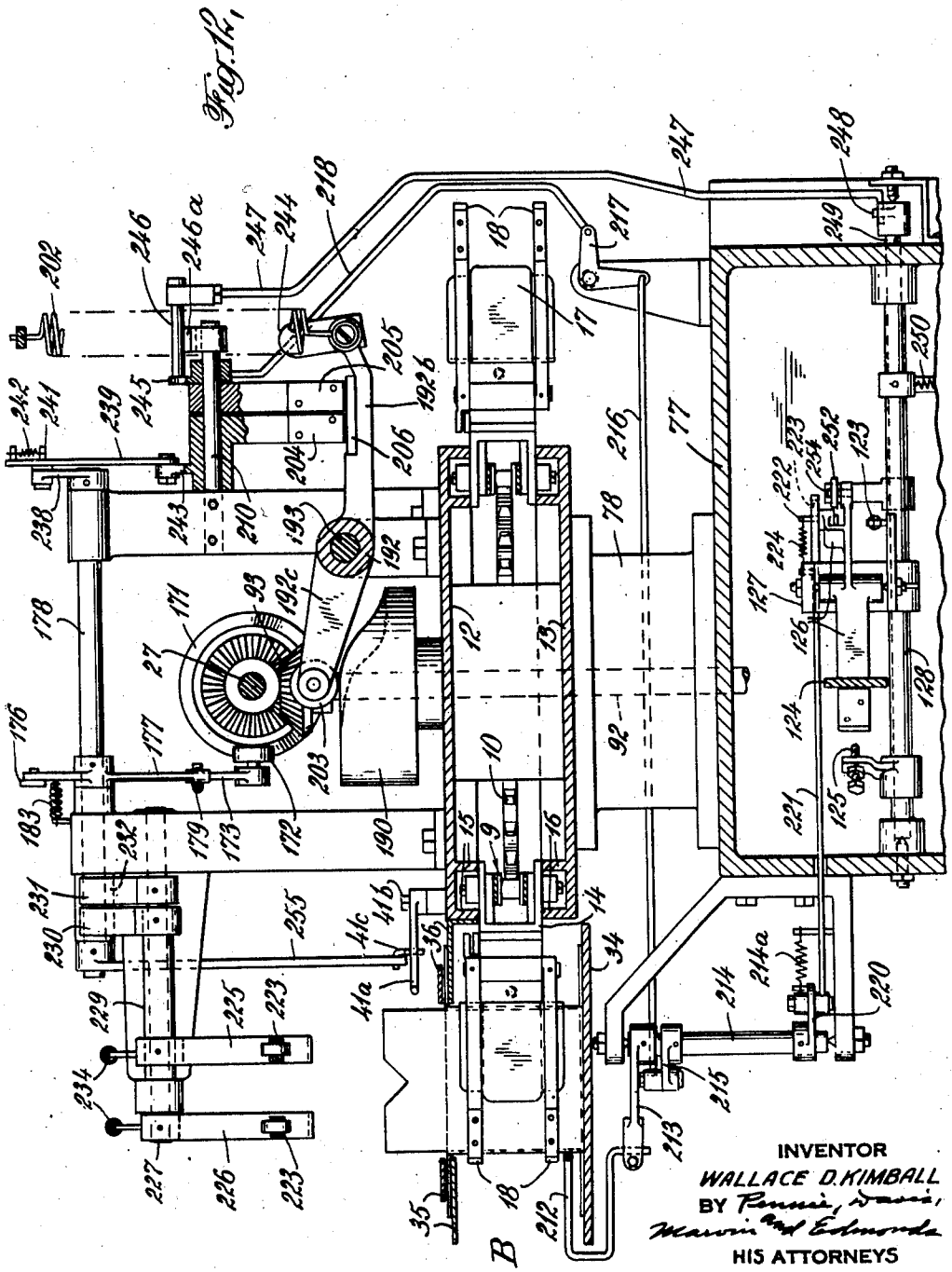
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Fig. 12,



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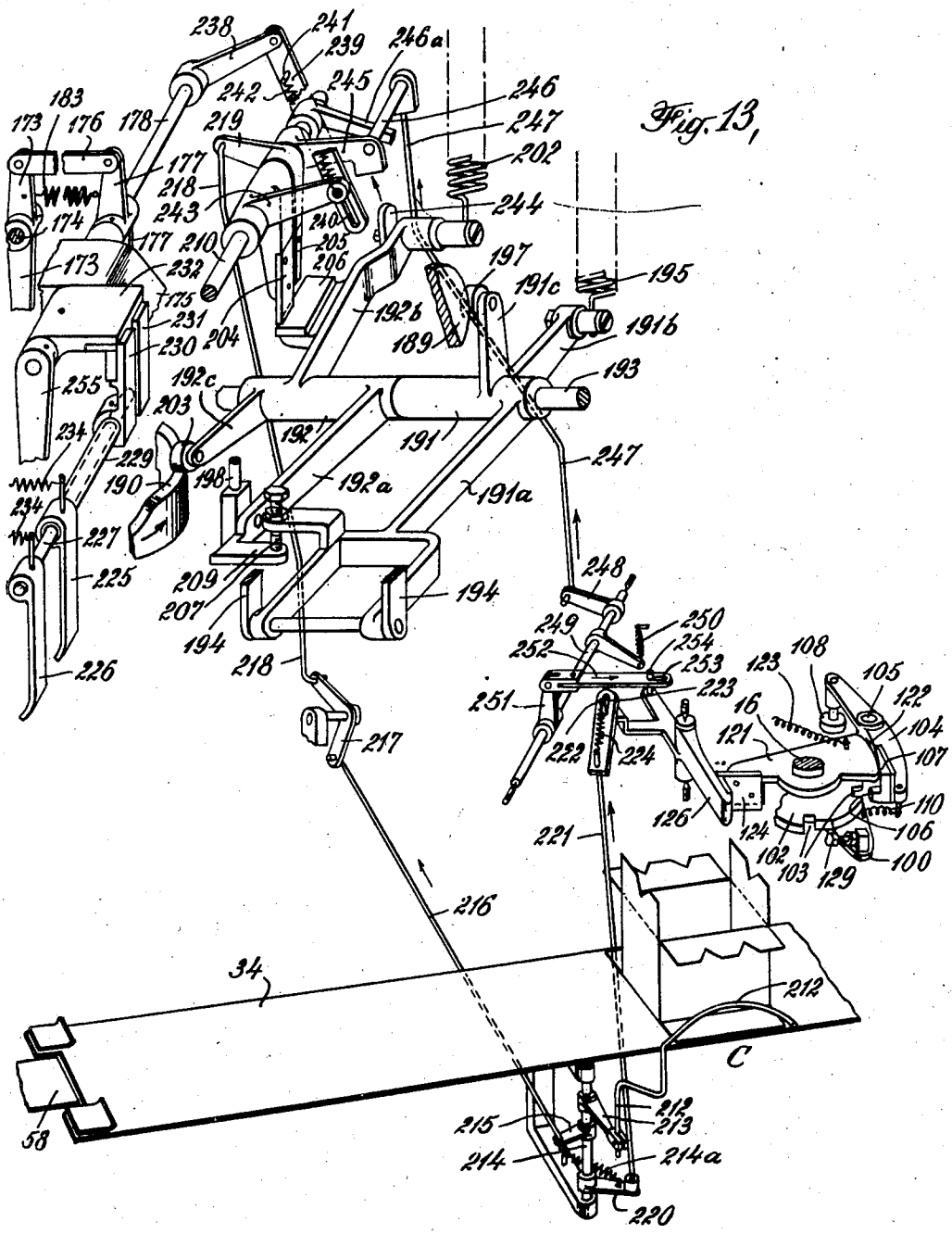


Fig. 13.

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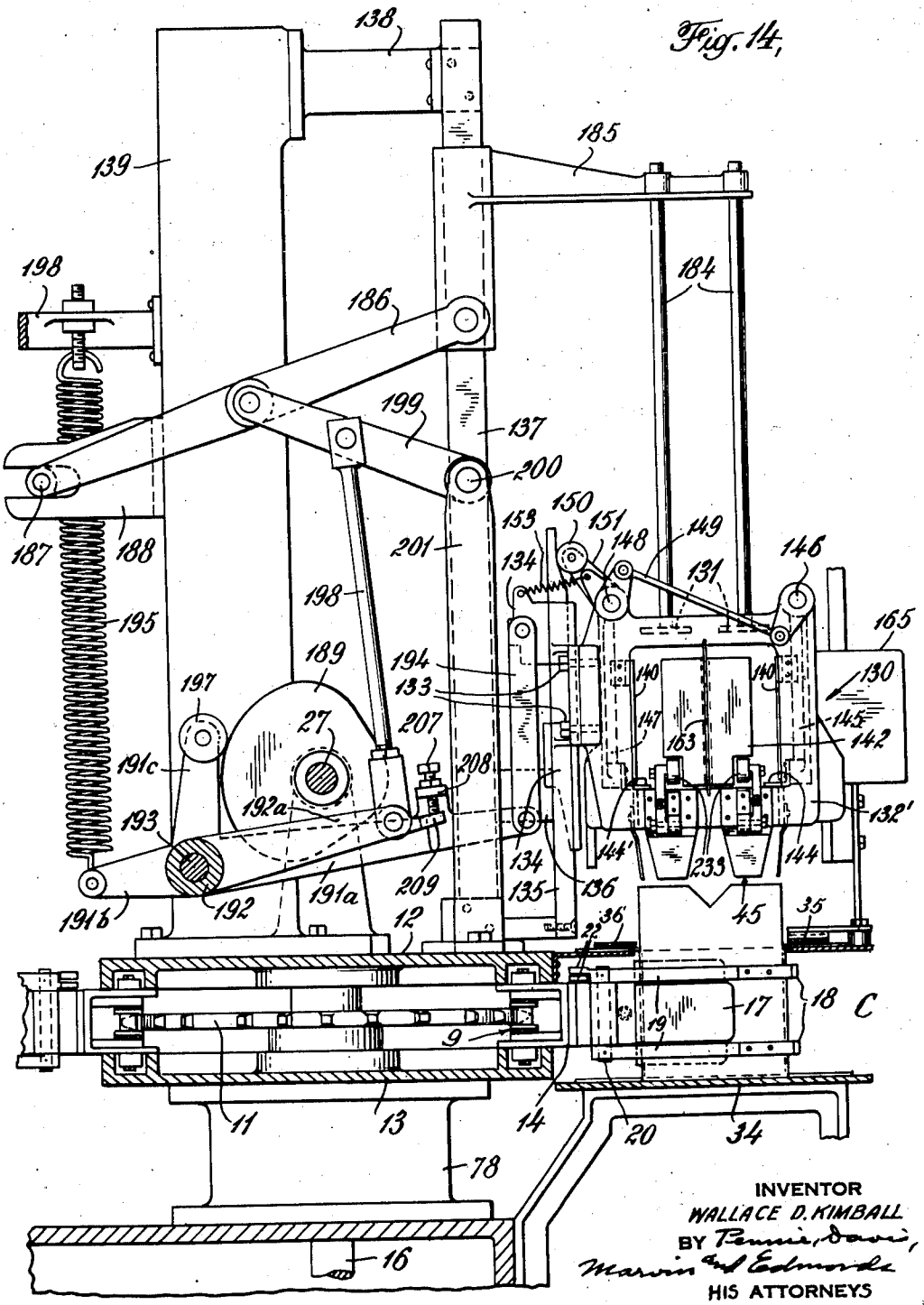
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Fig. 14,



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Fig. 15,

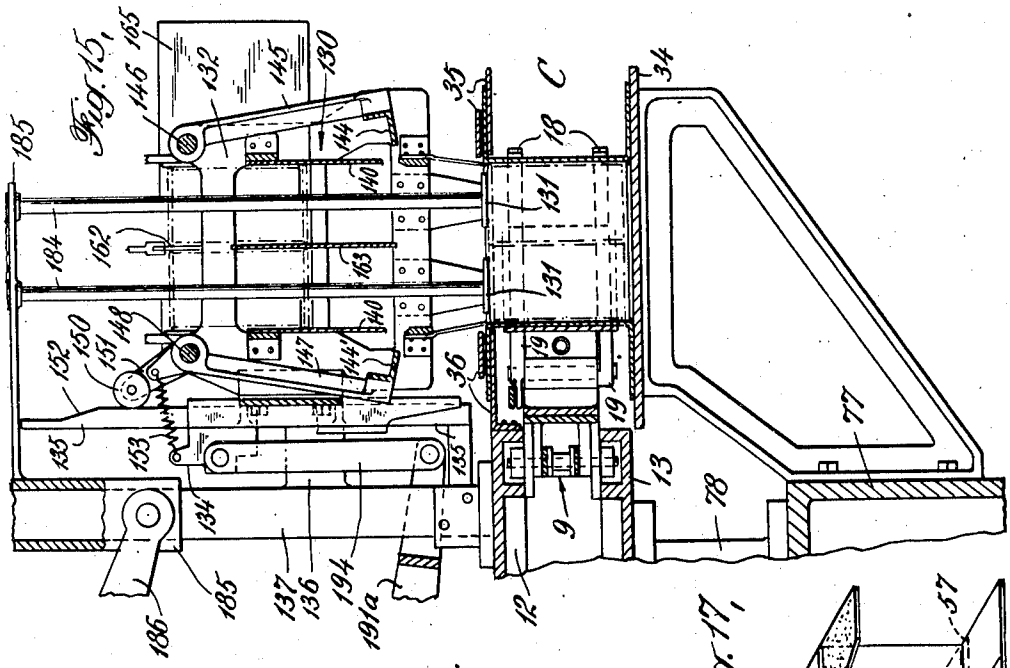


Fig. 16,

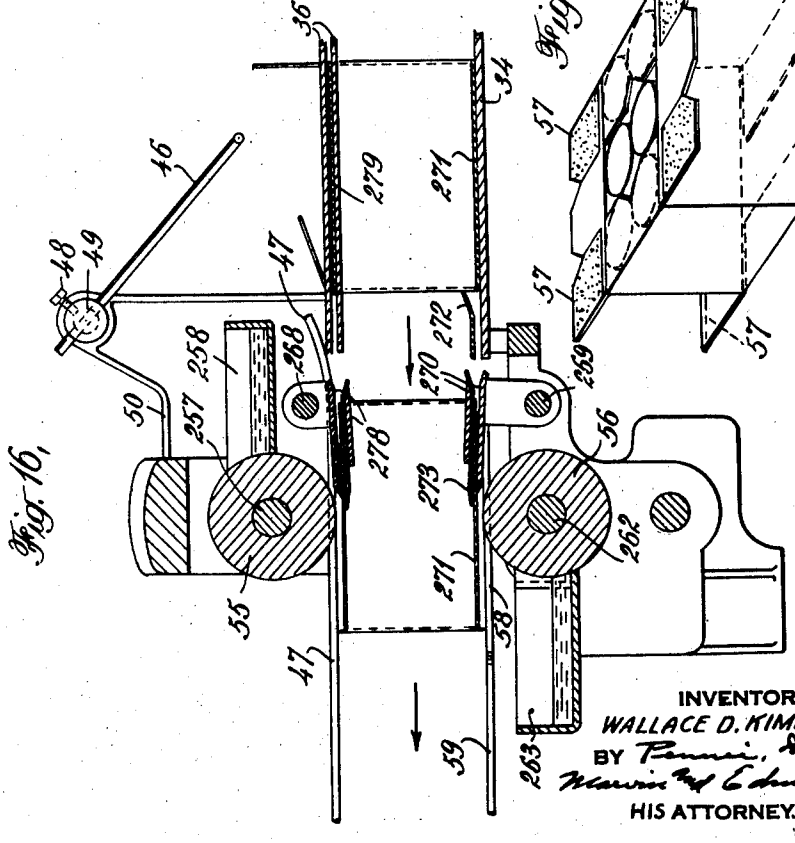


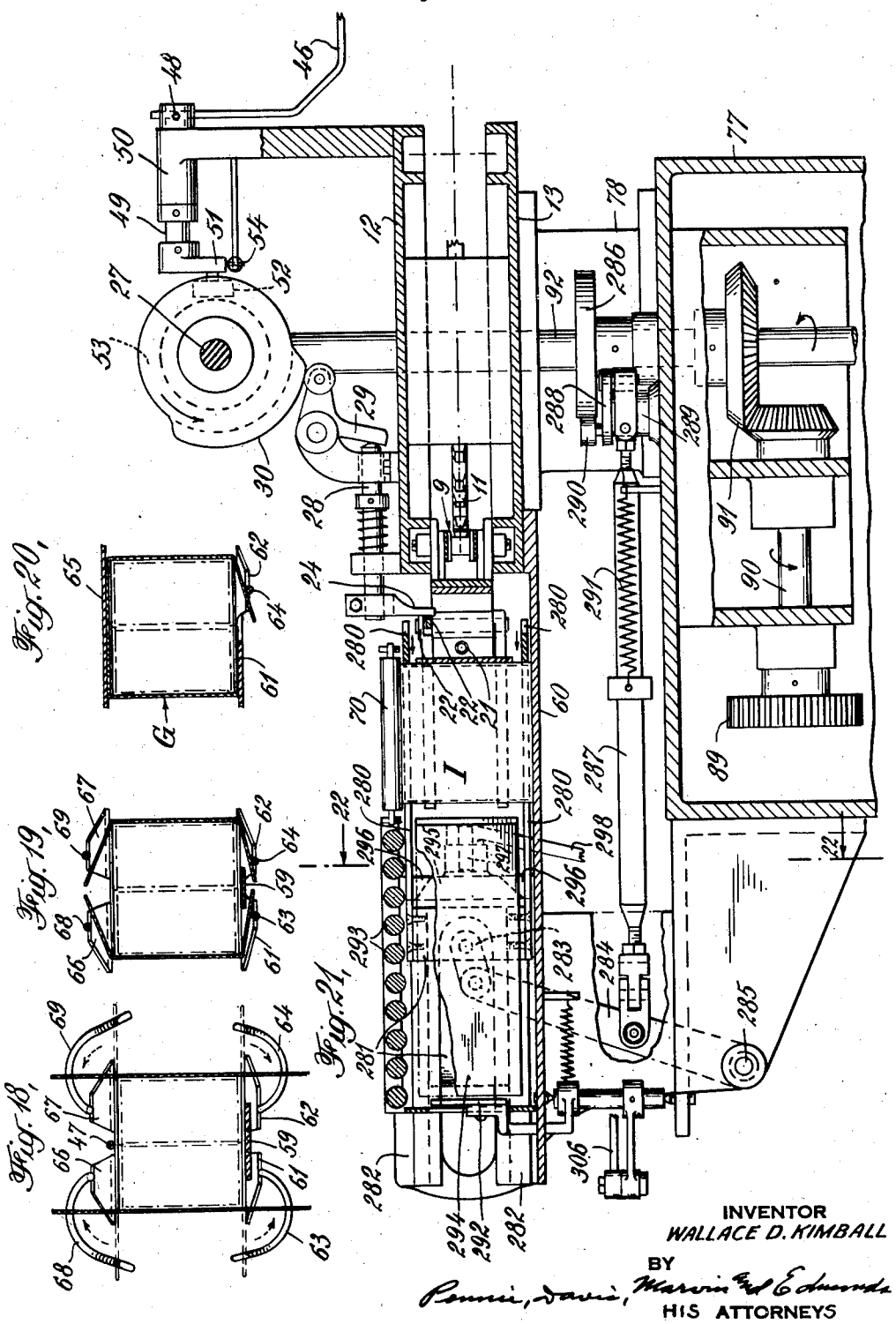
Fig. 17,

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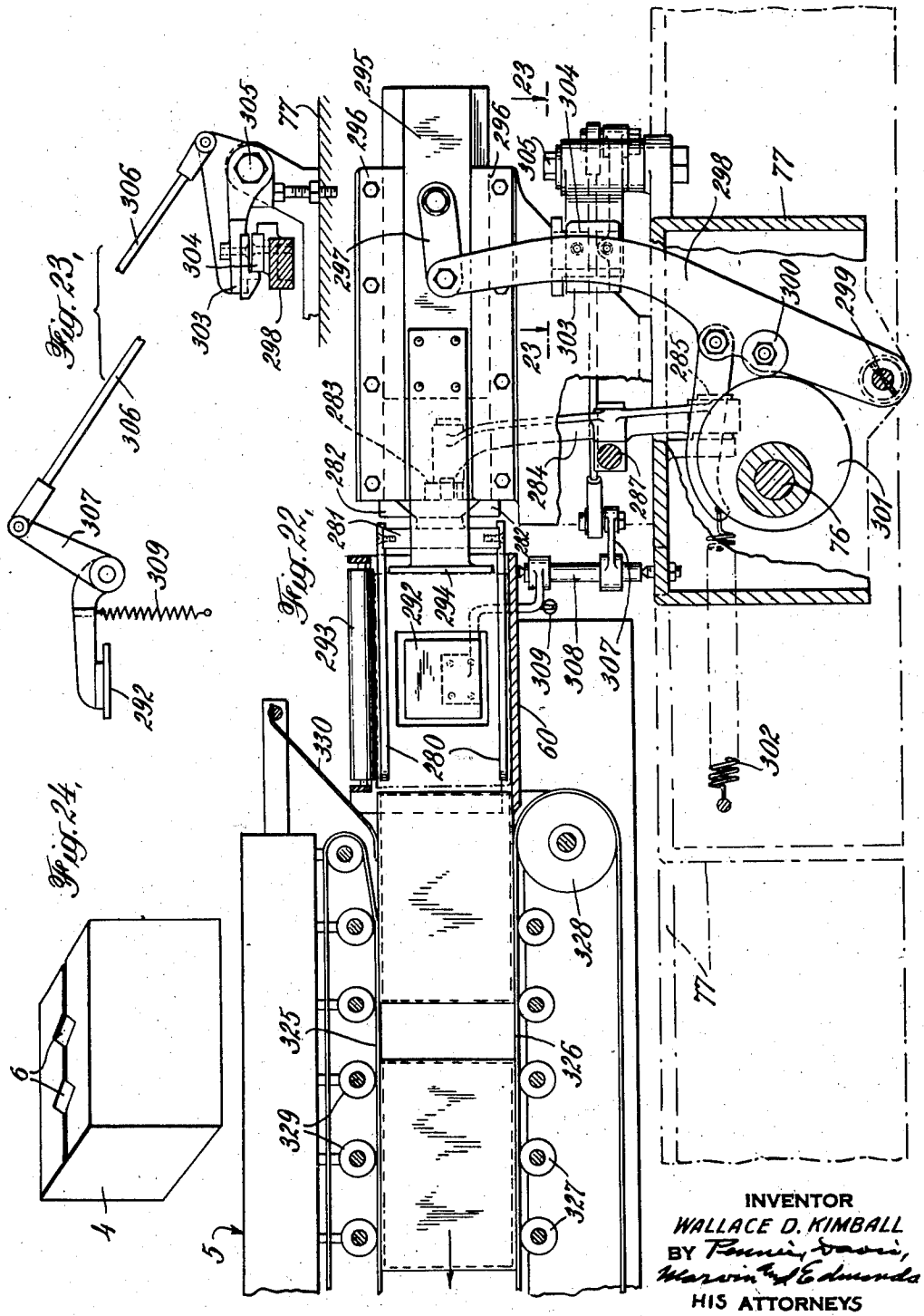


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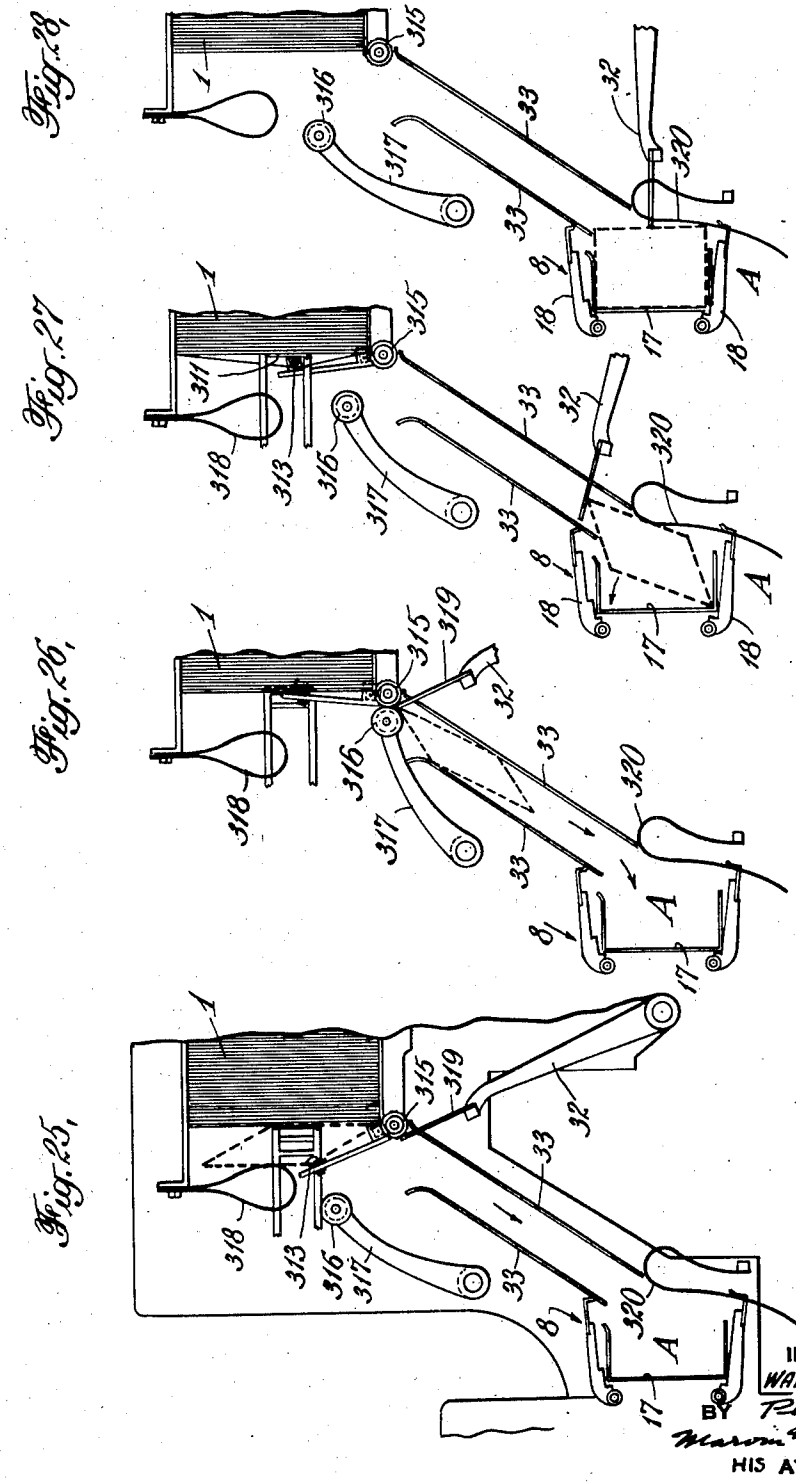
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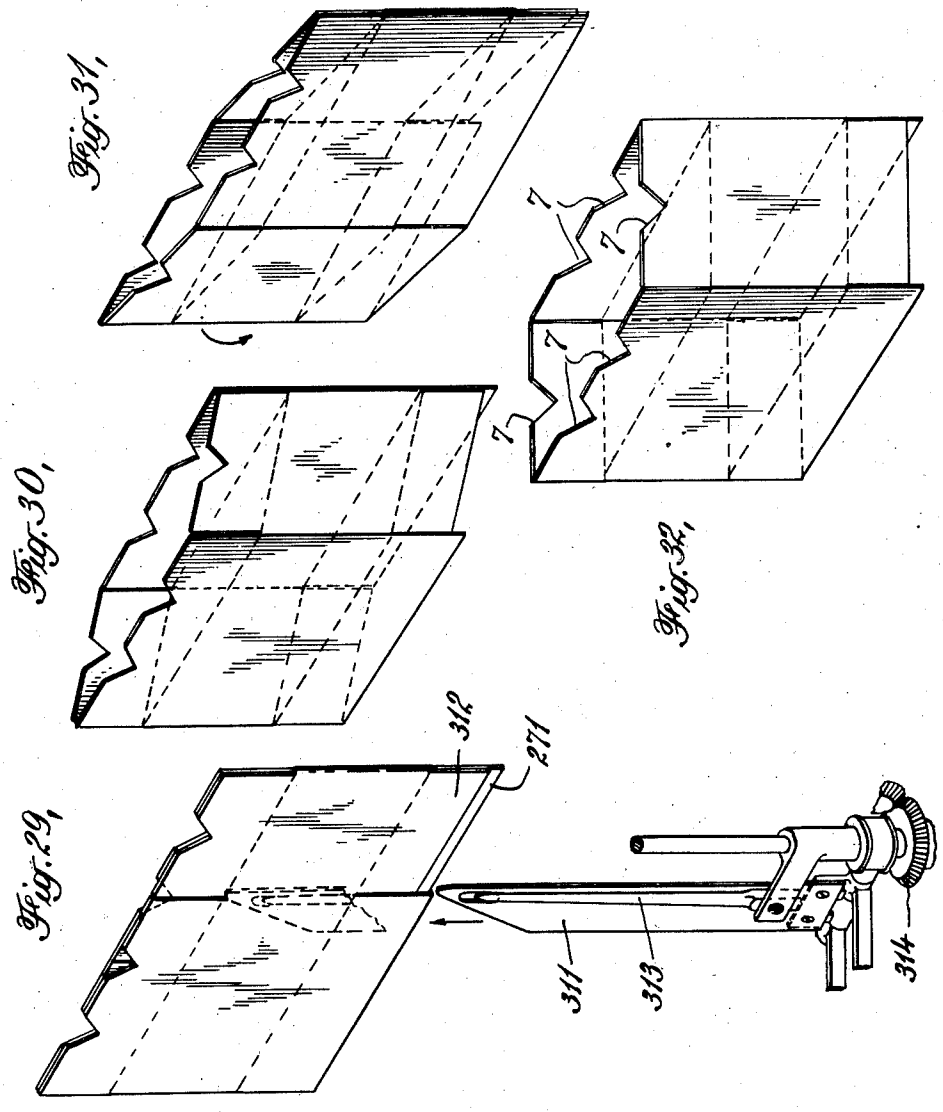


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Patented Nov. 18, 1947 2,430,878

UNITED STATES PATENT OFFICE

2,430,878

CASE PACKER

Wallace D. Kimball, Jackson Heights, N. Y., assignor to Standard Knapp Corporation, Portland, Conn., a corporation of New York

Application April 12, 1941, Serial No. 388,284

25 Claims. (Cl. 226—14)

1

This invention relates to case packing and sealing machines for packing articles such as cans, bottles and the like, in cases for transportation, and the general object of the invention is to provide an improved case packing and sealing machine.

The cases are made of fibreboard, corrugated board or other fibrous material of suitable strength, when properly formed and sealed, to protect their contents, and the users of case packing machines—manufacturers of food products, beverages, etc.—obtain the cases in the form of collapsed blanks.

The articles to be packed in the cases sometimes come to the packing machine from a filling machine and sometimes a labeling machine. In either event they are delivered to the case packer at a high rate, that is, a large number of articles per minute, by a suitable conveyor, or conveyors.

The object of the present invention is to provide a machine which is completely automatic in its operation, that is to say, one which receives the cases in the form of a bundle or bale of collapsed blanks, and the articles in a continuous line, or lines, from suitable conveying means, and which successively squares out and forms the blanks into cases, inserts or packs an appropriate group or charge of the articles in each case and discharges the cases properly closed and sealed ready for delivery to a customer.

Another object of the invention is to provide a machine of this sort which, because of its particular construction, will operate at a high rate, as to the number of cases packed per minute, and which will operate continuously without interruption so long as case blanks and articles to be packed are supplied to the machine.

A further object of the invention is to provide a case packing machine, capable of performing the necessary operations of squaring out and forming the shipping cases, packing the articles therein and closing and sealing the cases, which is compact and occupies a small amount of floor space.

The numerous advantages of the present invention will appear from the following description, given by way of example, of a machine for packing a charge of six small, or No. 1, cans in two rows of three cans each in a small fibreboard case. In these drawings:

Fig. 1 is a plan view (with certain parts omitted or broken away for clearness) of the improved case opening, packing, gluing and sealing machine of my present invention. It also shows the article conveyors and, in diagrammatic illustration, part of the case blank squaring out and feeding mechanism;

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Fig. 2 is a horizontal section taken on the plane indicated by line 2—2 in Figs. 8 and 9 and illustrating particularly the case holders and their endless step-by-step operated carrier including the feeding of a squared-out case blank to the holder at the right hand end of the carrier;

Fig. 3 is a horizontal section taken on the plane indicated by line 3—3 in Figs. 8 and 9. It illustrates particularly the supports (in top view) for the cases and their contents from the position preceding the packing position until the cases are delivered to the sealing mechanism. This view is broken away in order to show a plan view of part of the control mechanism for the step-by-step carrier-advancing mechanism and the packing mechanism. This includes a case-actuated control (operated by the case at the packing position) and an article-actuated control, actuated by the can at the head of each row in the packing mechanism. (See also Figs. 9, 11, 12 and 13);

Fig. 4 is a horizontal section indicated by line 4—4 in Figs. 8 and 9 and illustrating the driving mechanism for the machine and especially the mechanism for imparting the step-by-step movement to the case holder carrier;

Figs. 5, 6 and 7 are enlarged sectional views showing certain details of the carrier step-by-step drive mechanism;

Fig. 8 is an enlarged vertical section as indicated by line 8—8 of Fig. 1. It illustrates the folding of certain bottom and top flaps that takes place between the case-receiving position at the right hand end of the carrier and the point where the cases pass onto the front end of the table at the position preceding the packing position. It also shows in vertical section the article conveyors and packing mechanism;

Fig. 9 is a partial side elevation with parts broken away and drawn to an enlarged scale looking in the direction of the arrows 9—9 in Fig. 1. It shows in side view one of the supports for the cases and the guides for the top outer flaps; also the glue applying mechanism and in addition a side-view of part of the control mechanism.

Fig. 10 shows a detail;

Fig. 11 is an enlarged side elevation looking at the rear side of a portion of the machine in the direction of the arrows 11—11 of Fig. 1. It includes a rear view of the control mechanism

referred to in connection with Figs. 3 and 9;

Fig. 12 is a transverse vertical section which is indicated by broken line 12—12 of Fig. 11. It shows especially latches, levers and linkages of the control mechanism;

Fig. 13 is a diagrammatic perspective view of the control mechanism;

Fig. 14 is an enlarged transverse vertical section looking toward the right, indicated by line 14—14 of Fig. 1. It illustrates the packing mechanism and its actuating levers, etc. It also shows the case support and the guides for the top outer flaps. It shows further the carrier supporting plates.

Fig. 15 is an enlarged transverse section taken centrally of the packing mechanism and showing this mechanism in its can-depositing position;

Fig. 16 is an enlarged longitudinal vertical section as indicated on line 16—16 of Fig. 1 showing the mechanism for interrupting the application of adhesive to the central portions of the top and bottom outer flaps;

Fig. 17 is a perspective view of a filled case showing the positions of the outer flaps during packing and the adhesive applied to these flaps;

Figs. 18, 19 and 20 are vertical transverse sections taken as indicated by the correspondingly numbered lines of Fig. 1 and showing the outer top and bottom flaps in varying stages of closing;

Fig. 21 is an enlarged fragmentary transverse section taken on line 21—21 of Fig. 1 showing the mechanism for ejecting the filled and closed cases from the case-holders of the step-by-step carrier;

Fig. 22 is an enlarged fragmentary longitudinal vertical section taken on broken line 22—22 of Fig. 1 (also on line 22—22 of Fig. 21) showing the automatic feeding mechanism for receiving the cases from the ejecting mechanism and feeding them into the entrance end of the sealing mechanism;

Fig. 23 is a horizontal section on line 23—23 of Fig. 22 showing the case-actuated tripping mechanism for the feeding mechanism just referred to;

Fig. 24 is a perspective view of a filled and sealed case as it is discharged from the machine;

Figs. 25–28, inclusive, are diagrammatic plan views showing the different stages of removing the collapsed case blanks one at a time from the magazine and feeding them in squared-out conditions successively to the case holders, as referred to in connection with Fig. 1;

Fig. 29 is a perspective view of the mechanism for separating the individual collapsed case blanks from the supply and opening them to tubular position; and

Figs. 30–32, inclusive, show various stages of this opening process.

Describing the general arrangement of the machine in reference to Figs. 1, 2 and 3, the supply 1 of case blanks is in the form of a horizontal block of collapsed blanks standing on their ends and contained in a suitable magazine. The supply conveyors for the two lines of cans are indicated at 2 and 3 (Figs. 1 and 8). The cases 4 (Fig. 24) packed and sealed are delivered at the left end (not shown) of the sealing mechanism 5. The sealed case 4 is preferably provided with at least two openings 6 to facilitate the handling and opening of the case, and also, to allow circulation of cooling air over the surfaces of the cans therein in order that the case while still sealed may be placed in a refrigerator or ice box for cooling. These openings may be formed in various ways,

but as indicated they are formed by V-shaped notches 7 (Fig. 32) in the portions of the blank which form the top flap extensions which, when closed, form the top end of the case.

The case holders 8, twelve in number, are shown in top view in Fig. 2 assembled on the carrier indicated generally by numeral 9. Carrier 9 comprises an endless chain carried upon two large sprockets 10 and 11, and two spaced horizontal oblong supporting and guiding plates 12 and 13 (Figs. 2 and 12). Each of the case holders 8 has a body member 14 secured to the endless chain, and, as the chain moves, these body members move in an oblong path sliding along horizontal guideways formed by the opposite edges of flanges 15 and 16 which extend around the peripheries of plates 12 and 13 (see Fig. 12).

The oblong path outlined by the peripheries of the plates 12 and 13 has two parallel sides connected by semicircular end portions which are concentric with the centers of sprockets 10 and 11. The case holders 8 are arranged in closely spaced relation along the sides of the oblong path of the carrier but separate from one another as they successively pass around each of the rounded ends of the oblong path. The carrier 9 and case holders 8 are advanced in the direction of the arrows in a step-by-step movement by means of a ratchet drive mechanism at the lower end of vertical shaft 16 (Figs. 11 and 4) for sprocket 11 which is the driving sprocket.

At each operation of this ratchet drive, or step advancing mechanism, the case holder carrier 9 is advanced a distance equal to the distance between centers of adjacent case holders 8 so that each time the carrier comes to rest in its step-by-step advancement, the case holders 8 are in the position indicated in the several figures of the drawings but the case holders have each been moved forward one position. Inasmuch as there are twelve case holders 8, there are twelve case holder positions. The first position A where the successive case holders 8 receive squared out case blanks is at the right hand end of the apparatus as shown in Figs. 1, 2, 3, 8 and 9. As the cases are moved successively through the subsequent positions up to the ninth position I on the rear side of the machine where the filled and closed cases are ejected and fed to the sealing mechanism 5, the desired operations are performed upon the cases.

Describing the general operation of the machine, the case blank squaring-out mechanism, shown diagrammatically at the right hand end of Figs. 1 and 2, places a case blank squared out to upright tubular form in a "pocket," or case holder, 8 each time a case holder arrives at position A. By the time the case arrives at position C, the packing position, it is ready to receive a charge of cans, and if a complete charge of cans has been received in the packing mechanism from conveyors 2 and 3, the packing mechanism operates to charge the cans vertically downward into the case. Towards the end of the inserting stroke of the packing mechanism, the step control member of the ratchet drive mechanism is actuated and the carrier 9 is advanced one step. If this movement brings a second case to packing position C, and a second charge of cans has been received in the packing mechanism from conveyors 2 and 3, the operation is repeated, and continues to be repeated so long as completely squared-out cases are successively fed to position C, and complete charges of cans are promptly received in the packing mechanism.

However, should a complete charge not be received in the packing mechanism, due to failure of the supply of cans on conveyors 2 and 3, or for some other reason, the packing mechanism will be prevented from operating, and, if there is a completely-squared-out case at position C, the carrier 9 will remain stationary. Also should a "pocket," or case holder, 8 arrive at position C empty, or without having the case blank therein completely squared out, due to an interruption in the supply 1 of case blanks, or to failure of the squaring-out mechanism properly to operate, or for some other cause, carrier 9 will continue to advance step-by-step at each operation of the ratchet drive mechanism until a completely squared-out case arrives at position C, at which time the carrier will stop. If there is now a complete charge of cans in the packing mechanism, the packing mechanism will operate and place the charge in the case, the operation of the packing mechanism then causing the ratchet drive mechanism to advance the carrier one step, as before.

The case holders 8 are adapted to receive and hold the case blanks squared out to tubular form as illustrated in Fig. 32 and in upright position with the flap extensions which are to form the top and bottom ends projecting vertically in line with the sides of the case. To maintain the sides of the case square, each of the case holders 8 is provided with a U-shaped form 17 having its open end directed outwardly so as to permit the case blank to be fed in horizontally and the case to be ejected horizontally. Forms 17 correspond approximately to the dimensions of the case, and, to retain the case within this form, two pairs of fingers 18 carried by arms 19 are provided. Each pair of arms 19 is fixed to a shaft 20 which is pivoted in the body 14 of the case holder in order that fingers 18 may be spread apart or opened to receive the squared out case blank at the right hand end of the machine and again at the ejecting position to permit the filled case to be removed from the case holder.

The two pairs of arms 19 are biased towards one another by means of a helical spring 21 and in order to open them for the purpose of receiving and ejecting the case, each of shafts 20 is provided at one end with a finger 22. The inner ends of these fingers overlap one another so as to be engaged by a common actuating lever 23 at the receiving position at the right hand end of the machine and again at the ejecting position in back of the machine by a second actuating member 24 (Figs. 2 and 1).

Actuating member 23 is illustrated in Fig. 8 and is in the form of a bell crank lever pivoted at 25 and actuated by a cam 26 on the end of a cam shaft 27. Actuating member 24 at the ejecting position is illustrated in Fig. 21 and is fixed to the end of a horizontally slidable rod 28 which is shifted by bell crank lever 29 actuated by a cam 30 on cam shaft 27. Cam shaft 27 rotates continuously making one revolution for each advance of the case holders 8 so that the actuating members 23 and 24 operate to open or release the case holders as they reach successively the receiving position and the ejecting position.

The collapsed or flattened case blanks 1 stand endwise in mass formation on a horizontal platform 31. An individual blank, after being separated and opened up into tubular form by mechanism illustrated in Figs. 25–29, inclusive, to be later described, is swept by means of an oscillating

arm 32 into the case holder 8 which is at the receiving position A as shown in Figs. 1, 2 and 3, the case passing between a pair of vertical guides 33. Arm 32 is oscillated in timed relation to the step-by-step advance of carrier 9 so as to deliver a case blank to each case holder as it arrives at the receiving position A. Immediately after the case is received in tubular vertical squared out condition between the sides of form 17, the fingers 18 close over the outer corners of the case and the forward pair of arms 19 engage the front side of the case and force the opposite or rear side against the rear projecting wall of form 17. In this way regardless of variation in the length of the cases the location of the cases in the holders is made uniform so that the cases will register accurately with the packing mechanism when they reach it.

Platform 31 is placed at the proper elevation to cause the cases to be centered vertically, as shown in Fig. 8, with respect to the case holders 8. In order to support the cases during the operations of packing and folding the top flaps an elongated table 34 is arranged along the front side of the machine, this table being wider than the cases so as to support the side or outer bottom flaps in horizontally extended position. During this time the side or outer top flaps are to be held in a similar horizontally extended position and for this purpose two pairs of closely spaced guide plates 35 and 36 are provided.

Both the bottom and top side flaps are folded or bent outwardly to this horizontal position during the movement of the case holder from the receiving station A to position B immediately preceding the packing station C. The bottom side flaps are folded outwardly by a U-shaped folding rod 37, the legs of which engage the respective bottom flaps. The ends of the legs of this rod are secured to the downwardly bent forward end portions 38 of table 34. The top side flaps are folded out by suitably curved folding rods 39 and 40. These are secured respectively to the upwardly bent forward ends of the upper guides 35 and 36.

The end top flaps, 41 and 42, of the cases are left projecting upwardly as may be seen in Fig. 9 until the cases pass the packing position C. The end bottom flaps, however, are folded to closed position to receive the contents of the case. This folding is done as the case passes onto the end of table 34 at position B. The forward end flap is bent backwardly and folded closed by two downwardly bent projections 43 at the end of table 34 while the rear end flap is folded by a rotary folder 44 (Fig. 8) which rotates continuously and makes one revolution for each station or step advance of the case carrier 9.

On the next advance of carrier 9, the case moves from position B to packing position C, no change in the position of the flaps taking place, and the case sliding along the surface of table 34. At position C the case is in vertical alinement with the funnel member 45 of the packing mechanism.

A charge of cans is segregated by the packing mechanism from the supply of cans advancing on conveyors 2 and 3, and whenever a case reaches position C and the charge in the packing mechanism is complete, the packing mechanism is caused to descend to the position shown in Fig. 15 and place the six cans of the charge squarely in the case. The end bottom flaps having previously been closed, the two cans at each end of the case rest upon these flaps, the two center cans resting on table 34 in between these flaps.

To prevent the end top flaps 41 and 42 from being damaged by the downward movement of the packing mechanism they are bent outwardly as shown in Fig. 8. Rear flap 42 is bent backward slightly by a stationary finger or plate 42a which the upper portion of the flap engages just before the case comes to rest at position C. The front flap 41 is bent forward to the dotted position of Fig. 8 by the swinging of an arm 41a which is pivoted at 41b to the top of upper guide and frame plate 12. This arm is actuated by a link 41c connected to operating mechanism which will be described later.

On the next step advance of carrier 9 the case under consideration advances to position D. At this position no operation is performed on the case except that of bending the forward top flap 41 backward towards closed position as indicated in Fig. 10. This is done by means of an oscillating arm 46 (Figs. 9, 10 and 1) and occurs on the back or upward stroke of arm 46. On its downward stroke this arm folds to completely closed position the rear end top flap 42 of the case at gluing station E. Arm 46 is actuated in timed relation to the movement of the carrier so as to tuck flap 42 under the upwardly curved front end of a flap holder rod 47. Rod 47 holds the two end or inner top flaps closed during the progress of the cases through the gluing station E to station F and station G, during which time the side or outer top flaps, after having adhesive applied to them at the station E, are folded from their outwardly extended horizontal position to closed position over the inner flaps.

Oscillating arm 46 is adjustably pivoted at 48 to a short horizontal shaft 49 (Fig. 1) carried in a bracket 50. On the inner end of this shaft there is a short arm 51 (Fig. 21) carrying a roller 52 which works on a face cam 53 on camshaft 27. The roller is biased against the vertical surface of the cam by means of a helical spring 54.

The next step advance of carrier 9 moves the case from position D to position E where the case is just entering between upper and lower pairs of glue rolls 55 and 56. When the case passes to the glue rolls the flaps are in the position shown in Fig. 17, the inner or end flaps at both top and bottom being closed and the side or outer flaps at both top and bottom being outwardly extended. The gluing mechanism applies adhesive to the flaps at the areas 57 indicated in Fig. 17, that is to say, only at the areas which are in contact with the inner flaps after the outer flaps have been closed.

Position E has been referred to as the gluing position. More accurately it is the commencement of the gluing operation, this operation taking place during the next advance of the carrier or while the case moves from position E to position F.

During the following step movement of the carrier, taking the case from position F to position G, the side flaps at the bottom and the side flaps at the top are folded to closed position against the inner flaps. While the cases pass between the glue rollers they are supported by a plate 58. During the closing of the side flaps they are supported first on a horizontally curved tongue 59, extending from plate 58, and, subsequently, on a horizontally curved plate 60 which has two tongue portions 61 and 62 of unequal length. Tongue 59 and plate 60 are in the same horizontal plane and tongue 59 overlaps but is slightly spaced from tongue 61 and spaced to a greater extent from tongue 62 for the purpose of permitting the side flaps to pass between

them at the end of their folding movement as they are coming into contact with the inner flaps.

The folding of these side bottom flaps is accomplished by means of two stationary curved rods 63 and 64. Rod 63 is secured to the end of tongue 61 which is bent downwardly in the direction of this rod. Rod 64 is similarly secured on the end of tongue 62. The progress of the folding of the side bottom flaps is illustrated in Figs. 18, 19 and 20, these flaps being folded from the dotted position shown in Fig. 18 in the direction of the dotted arrows. The tongue 59 is enough narrower than the bottom of the cases so that even though the cases are commencing to move on a curve at the position F (Fig. 1) the bottom side flaps as shown in the dotted lines in this figure are permitted to hang downwardly under their own weight in a position to be engaged by the curved outer ends of the folder rods 63 and 64.

These swing the flaps downwardly through the vertical position shown in section in Fig. 18 and thence upwardly towards the under surface of tongue 59 as shown in Fig. 19. The two side flaps pass successively to closed position in contact with the inner bottom flaps. The outer flap at the outside edge of the case is closed first, as may be seen in Fig. 3, and then the flap at the inside edge of the case, as may be seen in this figure and also in Fig. 20.

As is shown in Fig. 3, the ends of tongues 59, 61 and 62 are so arranged relative to one another that the case is in stable equilibrium at all times. Before the case reaches position G it is supported by all three of the tongues. At position G the case is just past the tip end of tongue 59 and is supported along the outside by tongue 61 and prevented from tilting by the support it receives from tongue 62.

During the closing of the bottom flaps, somewhat similar closing operations are being performed upon the top flaps. To accomplish this a curved horizontal plate 65 (Fig. 1) similar in shape and extent to plate 60 is provided and has tongue portions 66 and 67 bent upwardly at its ends and supporting folding rods 68 and 69. The rod 47 for holding down the inner top flaps is curved horizontally to follow the center of tongue 59 and terminates at a distance from tongues 66 and 67 which is less than the length of the cases so that the side top flaps are folded to closed position and pass underneath the tongues 66 and 67 at the front end of the case while the inner flap at the rear end is still being held down by rod 47.

The progress of the folding of the top side flaps is indicated in the upper portions of Figs. 18, 19 and 20. Tongues 66 and 67 which complete the closing of the top side flaps are of substantially equal length and these top flaps are closed simultaneously instead of successively, as is the case with the bottom side flaps.

During the next two successive step movements of carrier 9 a case advances from position G to position H and then to the ejecting position I. During this time the pressure of the curved plate 65 and rollers 70 on the top flaps and the pressure of the lower plate 60 on the bottom flaps maintains the inner and outer flaps at both the bottom and top of the cases in sealing engagement with one another. At position I the cases are removed from the case holders 8 in a transverse lateral movement in the direction of the arrow shown in Figs. 1 and 2 by ejecting mechanism which will be described later. After the cases

pass from beneath rollers 70 they are acted upon by a feeding mechanism, also to be described later, which feeds them into the receiving or left-hand end of the sealing mechanism 5.

The curved plate 65 is adjustable vertically and is so adjusted as to exert a considerable downward pressure upon the cases, such as is necessary to maintain the flaps in close contact with one another during the initial setting of the adhesive. The pressure applied by rollers 70 is less than that applied by curved plate 65 so as to facilitate the operation of the ejecting mechanism, and the pressure is due solely to the weight of these rollers which are preferably solid in order to make them heavy. Rollers 70 are individually removable from their supporting frame so that one or all of them may be quickly removed to permit of inspection or removal of a case.

The arrangement of the driving mechanism of the machine is illustrated in plan view in Fig. 4. An electric motor 71 through a belt 72 drives reduction gearing 73. The output shaft of this gearing is connected by a chain 74 through suitable sprockets and a friction or slip drive device 75, to main shaft 76 which is rotated continuously in the direction of the arrow. These parts are beneath an inverted box-like casing 77 at the lower part of the machine and on which the carrier guide plates 12 and 13 are supported by suitable spacer blocks 78 (Figs. 11 and 12).

Shaft 76 is connected by means of a chain 79 and suitable sprockets to drive a parallel shaft 80 near the front end of box-like housing 77. One end of shaft 80 extends through the side of housing 77 and has fixed to it a sprocket 81 and a gear 82. Sprocket 81 by means of a chain 83 drives a short shaft 84 carried in brackets mounted on the front end of housing 77. A chain 85 extending from a sprocket on shaft 84 drives feeding arm 32 and the other moving parts of the case squaring-out mechanism (Fig. 2).

Gear 82 on shaft 80 drives the rotary flap folder 44 (Fig. 8) which is adjustably mounted upon a short shaft 86 carried in bracket 87 secured to housing 77. On the inner end of shaft 86 there is a gear 88 which meshes with gear 82.

By means of gearing 89 main shaft 76 drives a parallel shaft 90 which is connected by beveled gearing 91 to drive a vertical shaft 92. The direction of rotation of these shafts are indicated by the arrows in Figs. 4 and 13. The upper end of vertical shaft 92 is connected by means of a second beveled gearing 93 to drive cam shaft 27, previously referred to, and which (Fig. 1) is mounted above oblong plate 12 and extends substantially from end to end thereof.

The step-by-step drive mechanism for vertical shaft 16 shown at the right hand end of Fig. 4 is operated by a large elliptical cam 94 fixed to vertical shaft 92 which, by means of a roller 95, causes the oscillation of a gear sector 96 pivoted at 97 on a bracket mounted centrally of box-like housing 77. Gear sector 96 is moved in the direction of the arrow in Fig. 4 by the cam and in the opposite direction by means of a large helical spring 98. Gear sector 96 meshes with the teeth of a second gear sector 99 (Figs. 4–7 and 11). Gear sector 99 is mounted free on vertical shaft 16 and is caused to oscillate continuously through an angle of slightly more than 90° through the continuous rotation of cam 94.

This motion is transmitted to shaft 16, moving this shaft through an angle of 90° and advancing the carrier 9 and its case holders 8 one step at a time, that is to say, the distance between the successive positions of the carriers previously referred to. To accomplish this, a pawl-carrying member 100 having two projections or lugs, as shown in Fig. 7, is secured by means of four screws 101 to the upper side of gear sector 99, and these two members 99, 100 constitute the drive members of the ratchet drive mechanism. Keyed to shaft 16 alongside of member 100 is the driven member in the form of a notched wheel 102 having in its periphery four notches 103. A pawl 104 is centrally pivoted at 105 to one of the projections on drive member 100.

This pawl has at its front end a replaceable member having a driving tooth 106 for engaging notches 103 in driven member 102 and an upwardly extending cam 107 (Fig. 6). This replaceable member is secured at one end of pawl 104 by the screws shown. A roller 108 at the opposite end of pawl 104 is engaged by a fixed cam 109 which is positioned to force the pawl tooth 106 out of its engaged notch 103 at the end of each operating stroke of drive members 99, 100, i. e., when these have rotated substantially 90°. Pawl 104 is biased to tooth 106 into engagement with notches 103 by means of a helical spring 110, one end of which is attached to a pin on the bottom of the pawl and the other end of which is attached to a pin 111 on the bottom of the gear segment 99.

It is necessary to provide for accurate stopping and secure holding of carrier 9 at the end of each step movement in order to make the case at position C register beneath funnel 45 of the packing mechanism; also in order to bring the case holder 8 at station A in proper position to receive the case from the squaring out mechanism, and finally in order to place the case at position I in proper relation to the ejecting mechanism. To accomplish this, a locking member 112 (Fig. 5) having a wedge-shaped tooth 113 and pivoted at 114 on a portion of frame 77 is provided.

Locking member 112 is connected by a link 115 to a bell crank lever 116 (Fig. 4) which is pivoted at 117 and which has a roller 118 cooperating with a cam 119 fixed to shaft 92. The arrangement is such that just prior to the commencement of each working stroke of drive members 99, 100 and pawl 104, the wedge-shaped tooth 113 is lifted out of the notch in which it has rested. Before the completion of the working stroke of pawl 104, tooth 113 is returned into contact with the surface of notched wheel 102 against which it is urged by helical spring 120 connected between the machine frame and link 115. On the completion of the working stroke of pawl 104, tooth 113 drops into another notch 103, stops the advance of the carrier at the right position and locks it there. If the control mechanism for the machine is in position to prevent pawl 104 from causing a 90° rotation of driven member 102, tooth 113 is lifted out of and returns to the same notch.

As drive members 99, 100 and driving pawl 104 oscillate continuously it is necessary to permit or prevent the engagement of the pawl tooth 106 with one of the notches in the driven member 102, in order to cause or prevent a step movement of the carrier 9 and case holders 8. This is accomplished by means of a pawl holding member 121 which is mounted for pivotal movement upon the hub of driven member 102. Member 121 has an arcuate portion 122 with which cam 107 on pawl 104 coacts.

When pawl-holding member 121 is in the position shown in full lines in Fig. 3 (also in Fig. 13), which is the carrier-stopping position, then, on

the back stroke of oscillating driving pawl 104, cam 107 engages the lower corner of arcuate portion 122 and is thereby forced outwardly and held there, preventing pawl tooth 106 from entering the next notch 103 of driven member 102. Arcuate portion 122 serves as a shield for the notch 103 which is in position to be engaged by pawl tooth 106 at the end of the back stroke of driving pawl 104.

When, however, pawl-holding member 121 is in the dotted position of Fig. 3 (also shown in Figs. 4, 5 and 6), arcuate portion 122 has been moved out of its notch shielding position and pawl tooth 106 is allowed to enter notch 103 and drive member 102 around 90°, causing a step advance of carrier 9. The holding out member 121 is biased to the carrier advancing position by means of a helical spring 123 (Fig. 5) that urges its opposite end, which is provided with a latch plate 124, against an adjustable fixed stop 125.

A step control member 126 is provided which has a latch at its lower end to engage latch plate 124 of pawl holding-out member 121 and hold this member in the non-carrier-advancing position (Figs. 3 and 13) when it is desired to stop the advance of carrier 9. Step control member 126 is pivoted on a bracket 127 which is fixed to a stationary cross rod 128 mounted at each end on the sides of box-like casing 77.

During a working stroke of oscillating driving members 99, 100 (and their driving pawl 104), and towards the end of such stroke, an adjustable resetting stud 129 (Fig. 5) carried on the end of of the lower arm of member 100 engages latch plate 124 and rotates pawl-holding member 121 moving the latch plate into position to be engaged by the latch of step control member 126. However, if both case and cans are in their proper positions for the next packing operation, step control member 126 will have been again moved by the control mechanism to be described, to the non-latching (carrier-advancing) position (Fig. 13). Hence, when resetting stud 129 recedes on the return or back stroke of members 99, 100, pawl-holding member 121 will rotate with it back to the carrier-advancing position (Fig. 5) where latch plate 124 is against stop 125 and arcuate portion 122 is out of notch-shielding position, so that driving pawl 104 and its tooth 106 will again be allowed to engage a notch 103 in driven member 102 on the next working stroke of oscillating member 99, 100 without this member losing a stroke.

It will be recalled that among the objects of this invention are the desire to provide for reliability of operation and for packing a large number of cases per minute. This machine is intended to pack, and does pack, as many as 48 cases per minute. That is to say, the ratchet mechanism oscillating driving member 99, 100 oscillates 48 times per minute, and when the supply of cases and cans is continuous, and a properly prepared case is present in each case holder as it reaches the packing position C, and each charge is inserted in its case without jamming, the carrier advances a step for each reciprocation of the ratchet drive mechanism.

The packing of 48 cases per minute allows only 1¼ seconds for the assembly segregation and inserting of each charge. Gravity alone for placing the charge in the case by dropping is inadequate when a speed as high as this is required and the charge closely fits the case and encounters frictional resistance in entering it. Also when a group of articles such as cans is dropped into a case, for one reason or another, the cans do not always drop together, and if one can should get on top of the rest of the charge the machine would have to be stopped until cleared of the damaged cans and case. Accordingly, in the present machine the cans are packed by dropping the charge vertically, and gravity is assisted by means of a vertically reciprocating plunger which pushes the cans downward faster than they would fall by gravity and keeps all of the cans of the charge abreast of one another. This not only prevents jamming but bottoms the charge squarely in the case so that even though the charge may make a snug fit in the case, the cans will not be left with some of them resting on the beads of adjacent cans.

The packing mechanism is illustrated in Figs. 8, 14, 15 and 1. It is arranged at the left hand end of the can conveyors 2 (Fig. 1) and comprises a vertically reciprocable charge-former 130 and funnel 45, and a vertically reciprocable packing plunger 131.

The charge-former 130 consists of two rectangular frame members 132 and 132', one at its front end near conveyors 2 and the other at its rear end. These frame members are bolted at 133 to a carriage 134 which slides up and down on a vertical rectangular bar 135. Bar 135 is fixed at its lower end to one of the plates 12 and is additionally supported by a tie 136 which extends laterally to a square upright bar 137 also secured at its foot to plate 12. This bar is firmly anchored at its upper end by cross member 138 to a post 139 which is bolted at its foot to plate 12.

The square end frames 132, 132' of the charge-former 130 are tied together longitudinally by side plates 140 and at the bottom by two side bars 141. An end plate 142 extends across the rear end of the charge-former. The sheet metal members which form funnel 45 are secured to side bars 141 and to the end frames 132 and 132'.

A U-shaped charge-forming space is formed by the two side plates 140 and end plate 142, the open end of this space being adjacent the conveyors 2. The cans on the conveyors are advanced over a scuff plate 164 (Fig. 8) into this U-shaped charge-forming space where they are supported by two parallel "shutter" rails 144 and 144' simultaneously shiftable like a camera shutter to allow the cans to descend into the case at the proper time. Shutter rails 144 are carried at the bottom ends of a pair of outwardly swingable arms 145 which are secured at their upper ends to a rock shaft 146 pivoted in lugs in end frames 132 and 132'. Shutter rails 144' are carried on a somewhat similar pair of arms 147 fixed to a second rock shaft 148 also pivoted in the same end frames.

These two rocks shafts are interconnected to swing in opposite directions by a link 149 and two oppositely directed arms, one on each of the rock shafts. The rock shafts are actuated by a roller 150 on arm 151 which is pinned to shaft 148. Roller 150 coacts with a cam 152 on the upper portion of rectangular bar 135 with which it is held in engagement by a helical spring 153. The arrangement is such that as the charge-former and funnel 130, 45 are lowered, cam 152 and roller 150 actuate rock shafts 148 and 146 simultaneously so as to shift the shutter rails 144 and 144' outwardly from beneath the cans in the charge-former allowing the charge to descend through the funnel into the case beneath.

The position of cam 152 is such that the shut-

ter rails 144 and 144' release the charge shortly after the descent of the charge-former 130 commences. The plungers are above the tops of the cans at the commencement of their stroke, but are arranged to move at considerably higher speed than the charge-former and charge and the plungers make contact with the tops of the cans at about the time they are released by shutter rails 144 and 144'. From that point down the plungers are pushing the cans downward.

The conveyors 2 (Figs. 1 and 8) each comprise two endless chains 154 on which the cans rest in upright position, these chains passing around driving sprockets 155 on a shaft 156 near the packing mechanism. Shaft 156 is driven through beveled gearing 157, shaft 158 and chain 159 from cam shaft 27. The upper stretches of chains 154 are suitably supported upon a plate 160 and the cans resting on the chains are maintained in alinement by side plates 161 and by a central guide plate 162. The U-shaped chamber of the charge-former 130 is subdivided by a central partition 163 arranged in alinement with guide 162 and supported by the end frames 132 and 132'. The cans in passing from the end of the conveyor chains 154 slide over scuff plate 164 and into the charge-former when it is in its upper or charge-receiving position as shown in Fig. 8.

In order to segregate the charge of cans received within the charge-former 130 from the supply of cans on the conveyors, a pair of transversely shiftable oppositely moving gates 165 and 165' in the form of flat metal plates sharpened at their inner edges is provided. These plate-like gates are mounted for reciprocation in a common plane closely adjacent the end frame member 132 of the charge former and are shown in closed position in plan view in Fig. 1.

Gate 165 is mounted on a parallelogram linkage indicated generally by numeral 166 pivoted at 167 on a suitable bracket attached to the machine frame, while gate 165' is mounted on a similar parallelogram linkage 168 (Fig. 8) pivoted at 169 on the inner side of the conveyors 2. To cause the gates to move in opposite directions a cross link 170 is connected to two short arms extending in opposite directions from a shaft forming one of the pivots 167 and a second shaft forming one of the pivots 169, respectively.

Gates 165 and 165' are actuated by a cam 171 on cam shaft 27 which engages a roller 172 on the lower end of an arm 173 pivoted at 174 in a bracket 175 which extends upwardly from plate 12 of the machine frame. The upper end of lever 173 is connected by a link 176 to a second lever 177 which is pinned to a rock shaft 178. The lower end of lever 177 is connected by a link 179 to a bell crank lever 180 and thence by a link 181 to an arm 182 which is secured to a pivot shaft of one of the parallelogram linkages 168. Roller 172 is biased against cam 171 by means of a helical spring 183 attached to the upper end of arm 173. In closing, the gates move the line of cans on the conveyor chains backward slightly so as to separate the charge from the supply.

The packing plunger 131 consists of two flat horizontal plates shown in side view in Fig. 8 and in end view in Figs. 14 and 15. These two plates are fixed at the lower ends of four vertical rods 184, two of these rods being used to support each plate. The upper ends of rods 184 are secured in a manner to permit their vertical adjustment in a carriage 185 which is arranged to be vertically slidable on the square vertical bar 137.

Plunger carriage 185 is supported and reciprocated by means of a lever 186 pivoted at one end to carriage 185 and has a laterally shiftable pivot 187 at its opposite end in a bracket 188 mounted on post 139. The reciprocation of charge-former 130 with its funnel 45 and their carriage 134 is caused by a cam 189 on cam shaft 27 and that of plungers 131 and plunger carrier 185 by a cam 190 on vertical shaft 92. Actuating members 191 and 192 (Fig. 13) are provided, arranged side-by-side for rocking movement on a fixed horizontal shaft 193.

Each of these members consists of a three-armed lever, one arm of which is connected to one of the vertically shiftable carriages 185 or 134, a second arm being connected to an operating or biasing spring and a third arm carrying the roller which coacts with one of the cams 189 or 190. Thus actuating member 191 has an arm 191_a which is forked at its end and connected by a pair of links 194 to operate carriage 134 for the charge-former 130. A second arm 191_b is connected to the lower end of a large helical spring 195 which is anchored at its upper end to a bracket 196 secured to post 139. The third arm 191_c of this actuating member carries a roller 197 which coacts with cam 189.

Arm 192_a of actuating member 192 is connected by means of a link 198 to a lever 199 which is pivoted at 200 at the upper end of a bracket 201. The opposite end of lever 199 is pivoted to the center of actuating lever 186 for the plunger carriage 185. The second arm 192_b of actuating member 192 is connected to the lower end of a second heavy helical spring 202 which, like spring 195, is secured at its upper end to bracket 196. The third arm 192_c carries roller 203 which coacts with cam 190. Springs 195 and 202 respectively bias rollers 197 and 203 against their cams, and the movements of the charge-former 130 (with funnel 45) and the plunger 131 are produced by gravity aided by these springs.

The packing mechanism is caused to make a packing stroke by permitting rollers 197 and 203 to follow their respective cams, and prevented from making a packing stroke by restraining actuating members 191 and 192. This is done by means of two latch members 204 and 205 coacting with a single latch plate 206 carried by arm 192_b of actuating member 192. When these latches are in the position shown in Fig. 13 actuating member 192 will be held in the position shown when the high portion of cam 190 leaves roller 203. This prevents the actuation of the packing plunger 131. To prevent the actuation of the charge-former 130 an interlock between actuating members 192 and 191 shown in Figs. 13 and 14 is provided.

This interlock consists of an adjustable screw 207 threaded into a projection 208 extending upwardly and laterally from arm 191_a towards arm 192_a, the lower end of this screw engaging an ear 209 on arm 192_a. This prevents the descent of arm 191_a so long as arm 192_a remains in its upper position. The contour and timing of cams 189 and 190 are such that when a packing operation takes place the plunger 131 and charge-former 130 commence to move downwardly substantially simultaneously and also return to their upper positions simultaneously, but the motion of plungers 131 in both directions is faster

than the charge-former. In view of this interlock, when either or both of latches 204, 205 engage latch plate 206, the entire packing mechanism is prevented from operating, i. e., the charge-former 131, funnel 45 and the packing plunger 131'. Latch 204 is controlled by the cans in the charge-former 130 and latch 205 by the case at position B just ahead of the packing position C.

The control mechanism by which this is accomplished (packing control mechanism) and the carrier advance control mechanism, are illustrated in Figs. 13, 12, 11, 9, 8 and 3. This control mechanism provides that so long as an adequate supply of cans is maintained on conveyors 2, and squared-out cases are regularly supplied to the carrier 9, the carrier continues to advance at each reciprocation of the continuously oscillating gear segment 99 and its drive member 100 carrying driving pawl 104. If the supply of cans fails, the packing mechanism will be prevented from operating. If one or more case holders 8 arrive at the packing position C, either empty or containing incompletely squared-out cases, this will also prevent the packing mechanism from operating, but will cause the ratchet drive mechanism to continue to advance the carrier step by step until a case holder 8 containing a completely squared out case arrives at the packing position C, at which time the carrier 9 will stop advancing. If a complete charge of cans is in charge-former 130, the packing mechanism will operate to place the charge in the case.

The case-responsive latch 205 and the article-responsive latch 204 are mounted side by side on a shaft 210 (Fig. 12) on which they are freely turnable, this shaft being fixed to the machine frame. To cause case-responsive latch 205 to be shifted into or out of position to engage latch plate 206 of the packing mechanism, there is provided a horizontally swinging case-actuated arm 212 alongside table 34 (Fig. 13), consisting of a rod appropriately bent to be pushed outwardly by the case at packing position C.

The left hand end of this arm is turned downwardly and held in a friction clamp (for adjusting purposes) at the end of a small arm 213 which is pinned to a vertical supporting shaft 214 mounted in brackets on the machine frame. To connect latch 205 with this shaft an arm 215 is pinned thereto and is connected by a link 216, a bell crank 217 and a link 218 to an arm 219 which extends rearwardly and horizontally from the hub of latch 205. Arm 212 is biased into the path of the cases and latch 205 into engagement with latch plate 206 of the packing mechanism by a helical spring 214a operatively connected to shaft 214.

Case actuated arm 212 controls the operation of the packing mechanism (through latch 205 and latch plate 206) to prevent its operation if no case is present, and, in addition, it controls the operation of the step-by-step carrier advancing mechanism to cause the carrier to advance if no case is present at position C. For this purpose vertical shaft 214 has fixed to it an arm 220 which is connected by a link 221 to a pin 222 on step control member 126. This connection is by means of a slot 223 and a helical spring 224. When arm 212 is moved outward by a case to the position shown in Figs. 3 and 13, step control member 126 is actuated to cause its latch to engage latch plate 124 and hold pawl-shielding member 121 in position to prevent or stop the advance of carrier 9. If no case is in engagement with arm 212 it moves inwardly and causes the latch of member 126 to release latch plate 124 so that pawl-shielding member 121 immediately springs into the dotted position shown in Fig. 3, thereby causing the ratchet drive mechanism to advance carrier 9 step by step until a case does arrive at position C and again shift arm 212 outwardly.

The arrangement of the mechanism for operating the article-responsive latch 204 and the step control member 126 to cause a step or advance movement of carrier 9 will now be described. This mechanism is illustrated in Figs. 13, 12, 11, 8 and 1. In line with the left-hand end of each of the two can conveyors 2 there are two elongated downwardly extending article or can-actuated levers 225 and 226 (Figs. 1 and 13). Lever 226 is fixed to a shaft 227 arranged for rocking movement in a bracket 228 which is mounted on the machine frame, and lever 227 is fixed to a sleeve 229 surrounding shaft 227. At the opposite end of this sleeve is fixed a latch member 230 and at the opposite end of shaft 227 a latch member 231.

These two latches are arranged to cooperate with a common latch lever 232 fixed on shaft 178. Levers 225 and 226 are indirectly actuated by the can at the head or left hand end of each line or row of cans within the charge-former 130 by means of pivoted T-shaped members 233, each carrying two rollers, one to be engaged by the can at the end of the row and the other to engage and move the corresponding lever 225 or 226. By this arrangement levers 225 and 226 are pushed to the left and they are held in this position at the commencement of the down stroke of the packing mechanism in delivering the charge to the case below. Latches 230 and 231 are swung out of engagement with latch lever 232 against the tension of biasing springs 234, and both of these latches must be moved (requiring a complete row of cans in each of the two rows in the charge-former) before lever 232 is released.

On the right hand end of shaft 178, referring to Fig. 12, an arm 238 is fixed to which a link 239 is pivoted (Fig. 13). This link at its lower end is connected by a slot 240, pin 241 and a helical spring 242 (which urges pin 241 against the top of slot 240) with an arm 243 which projects integrally from the hub of article control latch 204.

By reason of this arrangement whenever both of latches 230 and 231 release latch lever 232, roller 172 (Fig. 8) is permitted to move to the left as cam 171 rotates in the direction of the arrow. This movement of roller 172 under the action of helical spring 183 causes, through arm 173 and link 176, the rocking of shaft 178 and the descent of latch plate 232 below the latching shoulders of latch levers 230 and 231. The rocking of shaft 178 causes arm 238 to move downwardly, thereby swinging article control latch 204 to the left (Fig. 13) out of the path of latch plate 206. As shown in Figs. 12 and 13, both latches 204 and 205 are out of engagement with latch plate 206 when the packing mechanism is held in its upper position by the engagement of roller 203 with the high part of cam 190 and roller 197 with the high part of cam 189.

Assuming that case controlled latch 205 has been shifted to the left by a case at position C, and that article controlled latch 204 has also been shifted to the left by cam 171 in the manner just described, a packing operation will follow promptly under the control of cams 190 and

189 (timed slightly behind cam 171), the rollers of these respective cams following the cam contours under the tension of springs 202 and 195. This causes arm 192b and latch plate 206 to move upwardly, and toward the end of the uppermost movement of arm 192b which corresponds to the end of the downward movement of the plungers 131, a projection 244 on arm 192b rises into engagement with the outer end of an arm 245 which is pivoted on shaft 210 independently of latch levers 205 and 204. This lifts the outer end of arm 245 and raises a rod 246 which projects outwardly from the side of this arm, away from a stop arm 246a which is fixed to the outer end of shaft 210.

The lifting of arm 245 causes the actuation of step control member 126 of the ratchet drive mechanism, or step-by-step actuating mechanism through the linkages illustrated in Fig. 13, so as to cause the carrier 9 to be advanced a single step. Describing these linkages, a long link 247 is pivoted at its upper end to rod 246 and at its lower end to an arm 248 which is fixed to a freely rockable shaft 249. A spring 250 connected to an arm on the opposite side of shaft 249 tends to hold the parts in their normal position with rod 246 resting on stop arm 246a. Another arm 251 fixed to shaft 249 has a link 252 pivoted at its upper end, and the opposite end of this link is connected by means of a slot 253 with a pin 254 on step control member 126. Hence the lifting of link 247 by the contact of projection 244 with arm 245 causes link 252 to shift to the right, thereby releasing the latch of step control member 126 from engagement with pawl shielding member 121. On the next oscillation of drive member 99, 100 and driving pawl 104, pawl tooth 106 engages one of the notches 103 of the driven member and rotates shaft 16 90°, thereby advancing the carrier 9 one step.

Since the lifting of arm 245 by the projection 244 is momentary only, rod 246 immediately returning to its position in contact with stop arm 246a, the shifting of link 252 is also momentary so that step control member 126, after releasing pawl-shielding member 121, is immediately returned to the latching position shown in Fig. 13, by the tension of spring 224. Therefore at the end of the working stroke of drive member 99, 100, resetting stud 129 immediately returns pawl-shielding member 121 into position to be latched by step control member 126. In the ordinary operation of the machine, however, pawl-shielding member 121 will not be latched by step control member 126 because member 126 will have again been actuated out of latching position by the re-engagement of projection 244 with arm 245 at the end of the next succeeding operation of the packing mechanism. This will take place (if there is no failure in the supply of cans) at about the same instant that pawl-shielding member 121 reaches the end of its resetting movement under the actuation of resetting stud 129.

In other words, so long as there is no interruption in the can supply, or the case supply, step control member 126 is shifted out of latching position with relation to latch plate 124 of pawl-shielding member 121 substantially at the end of each packing or inserting operation and also just before driving pawl 106 reaches the end of its back stroke, so that, under these conditions, this pawl engages one of the notches 103 of the driven member 102 and advances the carrier 9 at each working stroke of oscillating driving member 99, 100.

Should there be a failure of cans, however, article-control latch 204 will be returned into the path of latch plate 206 and prevent the operation of the packing mechanism and hence also prevent the actuation of step control member 126 and consequently prevent the advance of carrier 9. Also, should there be failure in the supply of cases at position C, the step control member 126 will be immediately actuated to actuate step control member 126 away from the position shown in Fig. 13, thereby causing the carrier to be advanced until a case again reaches position C. The inward movement of arm 212 due to a failure of cases will also shift case control latch 205 into the path of latch plate 206 and prevent the operation of the packing mechanism until the carrier has advanced a case into position C.

The rocking of shaft 178 after the release of latch lever 232 by the can actuated latches 230 and 231, that is to say, the same rocking of shaft 178 that releases latch 204 from the path of latch plate 206, also operates the can gates 165, 165' at the entrance to charge-former 130, closing these gates and segregating the charge within the charge-former from the supply on conveyors 2 and 3. The operation of these gates is through the connection of link 179 with the lower end of arm 177 on shaft 178.

The same rocking movement of shaft 178 in addition operates the oscillating flap bending arm 41a (Figs. 12, 8 and 1) to bend forward the top flap 41 of the case at the packing position. The actuation of this arm is through the connection of line 41c at its left hand and as viewed in Fig. 8 with a long depending arm 255 which is fixed on the end of shaft 178.

The gluing mechanism (Figs. 16, 9, 3 and 1) to which reference has already been made, has upper and lower pairs of glue rolls 55 and 56 for applying adhesive to the two upper flaps and the two lower flaps as indicated. The upper glue rolls 55 are mounted upon a horizontal shaft 257 on which they are spaced apart slightly more than the width of the case. They receive their adhesive from a U-shaped adhesive receptacle 258 (Fig. 1) one leg of which cooperates with each of the two rollers. Shaft 257 is journaled in brackets on the frame of the machine and is rotated continuously through a friction or slip drive device 259 by means of a chain 260 and beveled gearing 261 from cam shaft 27.

The lower glue rolls 56 are carried upon another shaft 262 which is parallel to shaft 257 but below table 34. Glue rolls 56 receive their adhesive from a receptacle 263 (Fig. 3). Glue roll shaft 262 is rotated in the opposite direction from shaft 257 by means of spur gearing 264 (Fig. 9), the lower gear of which is on a parallel shaft 265. Near the inner end of this shaft there is a second slip drive device 266 (Fig. 1) to which a driving chain 267 is connected, this chain being driven from a sprocket on one end of shaft 76 outside of box-like housing 77 (Fig. 4).

Instead of moving the rollers up and down in order to prevent the application of adhesive to the central portions of the flaps as shown in Fig. 17, the two pairs of top and bottom flaps are themselves shifted slightly by mechanism illustrated in Figs. 16, 9, 3 and 1. For this purpose two parallel rock shafts 268 and 269 are mounted in the machine frame adjacent and in front of the pairs of glue rolls 55 and 56, respectively.

Secured to lower shaft 269 in line with each of the glue rolls 56 there is a pair of guide plates 270 spaced apart slightly more than the thickness of the case flaps and serving, when shaft 69 is rocked in one direction, to direct the flaps against the surface of glue rolls 56, and, when rocked or tilted in the opposite direction, serving to lift the flaps out of contact with these rollers.

Guide plates 270 manipulate the lower side flaps 271 on both sides of the case which normally rest upon the table 34 as the case advances towards the glue rollers. Should one of these flaps become lifted above the surface of table 34, it is directed between the pairs of guides 270 by a stationary flaring guide 272 placed above the left hand end of table 34 on each side. In order to assist the pairs of guides 272 in properly directing the flaps passing between them, a flexible guide member 273 is secured to the upper guide 270 of each pair, having its left hand end bent downwardly as shown in Fig. 16, so as to permit the flap to move horizontally when guides 270 are in the position shown, and so as to direct the flaps against the glue rolls 56 when guides 270 are tilted in the opposite direction.

Shaft 269 is rocked for the purpose of tilting the guides 270 to control the application of the adhesive to the flaps as described, by means of a cam 274 on the outer end of glue roll shaft 262 which engages a roller on the end of a rock arm 275 mounted on the end of shaft 269 and spring held against a cam as shown in Fig. 9.

A similar cam 276 is mounted on the end of the upper glue roll shaft 257 and cooperates with a roller on a second rock arm 277 fixed to the outer end of the upper flap guide shaft 268. This arm is biased towards the cam by means of a spring shown in Fig. 9. Cams 274 and 276 are angularly placed on their respective shafts to actuate rock shafts 268 and 269 simultaneously in opposite directions for the purpose of lifting the lower flaps and depressing the upper flaps of the case.

Shaft 268 is provided with two pairs of flap engaging guides 278 similar to pairs of guides 270 and arranged to manipulate the upper side flaps 279 of the case. These flaps are held in outwardly extended horizontal position parallel with the lower side flaps 271 by guides 36 as the case is advanced along table 34. Guides 36 direct the flaps between the pairs of rocking guides 278.

The mechanism for ejecting the cases from carrier 9 at position I is shown more especially in Figs. 21 and 22 and also in Figs. 3 and 1. There are two ejecting members 280 which are L-shaped members as shown in Figs. 3 and 1 so as to reach around the rear side of the case at position I and move it at right angles to the carrier 9. One of these ejecting members engages the case near the bottom and the other engages the case near the top, as shown in Fig. 21. During the ejecting movement the cases rest upon plate 60 which has a curved portion extending around the left hand end of the apparatus and also a lateral extension as shown in Fig. 2 which extends across the front end of the sealing mechanism 5.

The L-shaped ejecting members 280 are mounted on the lower and upper sides, respectively, of a reciprocating carriage 281 (Figs. 21 and 22). This carriage has a dovetail portion shown in Fig. 22 by which it is supported for reciprocation in ways 282. On the back of carriage 281 and shown in dotted lines in Figs. 21 and 22, a short link 283 is pivoted. The opposite

end of link 283 is connected to the upper end of a driving lever 284, the lower end of this lever being pivoted to the frame of the machine at 285. Driving lever 284 is reciprocated by means of a cam 286 on vertical shaft 92, being operatively connected therewith by link 287 pivoted at one end to lever 284 and at its opposite end to a cam follower lever 288 (Fig. 3) which is pivoted to the machine frame at 289 and which has a cam follower roller 290. Roller 290 is held in engagement with cam 286 by means of a helical spring 291 which is connected at one end to the frame and at its opposite end to a collar on link 287. Link 287 is adjustable in length as shown in Figs. 21 and 3, and by this means the positions of the L-shaped ejecting members 280 at the opposite ends of their stroke can be adjusted.

The ejectors 280 reciprocate continuously; that is to say, they make one complete stroke for each rotation of operating cam 286 which rotates continuously. Ejectors 280 perform an ejecting movement whether or not a case has been advanced to position I, and if a case is at position I it is shifted out of its case holder 8, the arms 18 of which are opened at this position by actuating member 24 and its operating cam 30 (Fig. 21). The stroke of the ejector members 80 is such as to shift a case from its position in the carrier 8 shown at I in Fig. 3 to the position indicated by the letter K. The following case to be ejected by ejectors 280 advances the case at position K farther out on plate 60 until it strikes a tripping plate 292 which causes the operation of the feeding mechanism shown more especially in Fig. 23, and this mechanism moves the two cases which are now in front of the sealing mechanism 5 into this apparatus.

As the closed and filled cases are ejected from position I in the carrier 9 the tops of the cases pass from beneath rollers 70 and under a second set of rollers 293. Rollers 70 and also rollers 293 are arranged in supporting side frames in such a way as to be readily removed in the event a case becomes jammed, so that access may be had to the case and the case itself removed from the machine. The weight of these rollers serves to maintain sealing pressure upon the tops of the cases during the ejection and feeding operations.

The feeding mechanism comprises a plunger plate 294 (Figs. 21 and 22) mounted on a carriage 295 which reciprocates in a second set of stationary dovetail shaped sliding ways 296 arranged at right angles to ways 282. Carriage 295 is connected by a link 297 to the upper end of a vertical operating lever 298 which is pivoted at its lower end at 299 on the outside of box-like casing 77 (Figs. 22 and 4). Operating lever 298 is provided with a roller 300 which coacts with a cam 301 on the outer end of main shaft 76 which projects through the wall of box-like casing 77. Operating lever 298 is provided with a heavy helical operating spring 302 which provides the operating force for feeding plunger 294. The operation of plunger 294 is, however, under the control of tripping plate 292 so that roller 300 is not permitted to follow cam 301 unless two cases have been received on plate 60 in front of the sealing mechanism.

Tripping plate 292 actuates a latch lever 303 for operating lever 298 by the connections shown in Figs. 23 and 22. Latch lever 303 is provided with a latch hook as shown in Fig. 23 which engages a latch plate 304 mounted on the inner

surface of lever 298. Latch lever 303 is pivoted at 305 to a bracket on frame 77 and is swung about this pivot by means of a link 306 which connects the latch lever with an arm 307 fixed to a vertical supporting shaft 308 for tripping plate 292. The tripping plate and latch lever 304 are biased towards latching engagement with operating lever 298 by means of a helical spring 309.

Referring to Figs. 25–32, inclusive, the arrangement and operation of the case blank separating, opening and squaring-out mechanism will now be briefly described. This mechanism is driven by chain 85 (Figs. 2 and 4) which passes over a sprocket on a shaft 310 which, through a suitable arrangement of parts (not shown) causes the operation of the various elements of the mechanism. In Fig. 29 there is illustrated in perspective view a single collapsed case blank in the condition in which it arrives at the head of the column of blanks of the supply 1.

Arranged to reciprocate vertically immediately below this foremost blank is a separating blade 311 (Fig. 29) having a pointed upper end as shown. The case blanks are each constructed with one of the end bottom flaps 312 shorter than the adjacent side bottom flap 271. In the lowermost position of blade 311 the lower edge of flap 271 is pressed against the side of the blade tip by the pressure of the feeding mechanism (not shown) of the supply 1, which feeds these cases toward the left as shown in Figs. 25–28. This bends flap 271 slightly to the right as shown in Fig. 29, making a separation between this flap and flap 312 for the entrance of blade 311.

Blade 311 is reciprocated upwardly in timed relation to each advance of carrier 9 and moves to the position shown in dotted lines in Fig. 29 and in top view in Fig. 27. While in this upper position an opening bar 313 is rotated about the axis of its operating beveled gear 314 to open the case blank to trapezoidal tubular form as shown in perspective in Fig. 30 and in dotted lines in Fig. 25. The swinging movement of bar 313 continues for substantially 180° from its original position, thereby opening the case beyond the square condition of Fig. 32 and partially recollapsing the case, as illustrated in Fig. 31, and feeding the corner of the case engaged by opening bar 313 between a rotating feed roller 315 and a coacting gripping roller 316. This roller 316 is mounted on the end of a swinging arm 317 which is operated in timed relation with the swinging movement of opening bar 313.

During this opening movement of the case blank one side of the case engages a spring loop 318 which, during the opening movement of the blank from the position shown in Fig. 25, engages the rear end of the case and aids in feeding it between rollers 315 and 316. These two rollers feed the case forward to the position shown in dotted lines in Fig. 26 between the two parallel guides 33 and as the case emerges from the feeding rollers 315, 316, a flexible case engaging member 319 mounted on the end of oscillating arm 32, previously referred to, engages the case and this arm moves the case along between the guides and feeds it past a second resilient loop 320 into the case holder 8 at position A of carrier 9.

The reverse bending of the corners of the case during the recollapsing by the swinging movement of opening bar 313 and the feeding between rollers 315 and 316, enables the natural spring of the case to cause it to square out into square

condition in the form 17 of case holder 8 as it passes the resilient loop 320 at the delivery end of guides 33. Arms 18 now close against the case in the manner previously described and hold it firmly in the case holder.

The case blank separating, opening and squaring out mechanism has its own cycle of operation which is independent of the operation of the case-forming, packing, closing and sealing mechanism previously described. Hence it is necessary to coordinate the two mechanisms. The cycle of operation of the case blank separating, opening and squaring out mechanism which has been described in the paragraphs immediately preceding is initiated by the shifting toward the left as viewed in Figs. 1 and 2 of a control rod 321, which is connected at its right hand end to the control device (not shown) of the case blank separating, opening and squaring out mechanism. It is necessary to shift rod 321 to the left for each cycle of operation of this mechanism and after such a shifting movement of this rod, a single case blank is separated from the supply 1 by the upward reciprocation of blade 311, opened to tubular form and partially recollapsed by opening bar 313, fed between rollers 315, 316 and advanced by the motion of oscillating arm 32 into the case holder at position A.

In order to coordinate the operation of the two mechanisms so that a case blank will be delivered to the case holder at position A, at each advance of the carrier 9, control rod 321 is actuated by the mechanism shown in Figs. 2 and 8. This comprises a star wheel cam 322 on shaft 16 of carrier driving sprocket 11, and a lever 323 which is pivoted at 324. This lever has at one end a roller which cooperates with cam 322 and at its outer end is connected to control rod 320. In this way if carrier 9 should stop advancing in its step-by-step movement because, for example, of failure of the article supply, the case blank separating, spacing and squaring out mechanism cannot operate until this has been corrected and the carrier has advanced another step.

The case sealing mechanism which is indicated generally by reference numeral 5 is illustrated in detail in Figs. 1, 3 and 22. This mechanism comprises a pair of vertically spaced horizontal belts, an upper belt 325 and a lower belt 326. The upper reach of the lower belt 326 is supported on table rollers 327 at the same level as plate 60. This belt passes over a drum 328, located adjacent plate 60 and over a somewhat similar driving drum (not shown) which is located at the opposite end of the belt. An electric motor (not shown) is arranged to operate this driving drum continuously at a speed which is adjustable to the rate at which pairs of cases are fed to the sealing mechanism by the feeding plunger 294. Successive pairs of cases pushed forward by pusher plate 294 will be separated from one another in the sealing mechanism, somewhat as indicated in Fig. 22.

It will be understood that the upper belt 325 is provided with a series of rollers 329 which are yieldingly mounted in their side frames so as to cause belt 325 to exert a predetermined pressure against the upper flaps of the cases. These belts 325 and 326 extend to a sufficient length so that by the time the cases have emerged from the delivery end, the adhesive will be set and the cases ready for shipment.

The sealing pressure on the upper case flaps is not released from the time the flaps are first closed at position G to the time the cases emerge

from the sealing apparatus, for otherwise the strength of the adhesive would be impaired. For this reason the rollers 70 and 293 previously described, are provided and in addition there are also provided a pair of spring members 330 which serve to continue the pressure on the tops of the cases as they pass out from beneath rollers 293 in between the sealing belts 325 and 326.

By means of the present invention there has been provided an inserting machine which is capable of automatically setting up cases, inserting cans therein and closing and sealing the cases, which is capable of reliable operation at an unusually high rate of speed as to the number of cases packed per minute.

Among the features of the present apparatus is the fact that the step advance mechanism for the carrier 9 is arranged to move the carrier forward at constant velocity through the greater portion of each of the step-by-step advance movements, this velocity being the same as the surface speed of the glue rollers 55 and 56 so that these rollers can be rotated at a constant speed. That is to say, the driving cam 94 (Fig. 4) of the step advance mechanism is provided with a contour which causes the driving pawl 106 of the ratchet advancing mechanism to be quickly accelerated on its forward stroke to a final and constant velocity at which it moves until near the end of the stroke. Thus, during the time that the carriers 8 are carrying cases from position E to position F, between which the glue rollers are located, the cases are being moved forward at a constant and like speed with that of the surfaces of the glue rollers.

It will be understood that changes can be made in the apparatus of the invention without departing from the spirit of the invention and that the scope thereof is set forth in the accompanying claims.

I claim:

1. In a machine of the class described, a case support for supporting a case in upright position with the top thereof open to receive a charge of articles, a charge-former arranged to receive successive charges of articles at a charge-receiving position above the case support, the charge-former having a delivery chute and releasable charge-supporting means for releasing the charge through the chute, a plunger above the charge-former adapted to coact with the articles of the charge, means for reciprocating the charge-former downwardly into coaction with the top of the case to guide the charge thereto and upwardly to return the charge-former to the charge-receiving position, means for actuating the charge-supporting means to release the articles of the charge and allow them to fall by gravity, and means for reciprocating the plunger to aid the action of gravity in delivering the articles into the case and to cause the articles to be placed squarely on the bottom of the case.

2. In a machine of the class described, a case support for supporting a case in upright position with the top thereof open to receive a charge of articles, a charge-former arranged to receive successive charges of articles at a charge-receiving position above the case support, the charge-former having a delivery chute and releasable charge-supporting means for releasing the charge through the chute, a reciprocating plunger above the charge former adapted to coact with the articles of the charge, means for reciprocating the charge-former downwardly into coaction with the top of the case, to guide the charge thereto, and upwardly to return the charge-former to the charge-receiving position, means for actuating the charge-supporting means to release the articles of the charge and allow them to fall by gravity, and means for reciprocating the plunger at a greater speed on its downward stroke than that of the charge former.

3. In a machine of the class described, a case support for supporting a case in upright position with the top thereof open to receive a charge of articles, a charge-former arranged to receive successive charges of articles at a charge-receiving position above the case support, the charge-former having a delivery chute and releasable charge-supporting means for releasing the charge through the chute, a reciprocating plunger above the charge-former adapted to coact with the articles of the charge, means for reciprocating the charge former downwardly into coaction with the top of the case, to guide the charge thereto, and upwardly to return the charge-former to the charge-receiving position, means for actuating the charge-supporting means to release the articles of the charge and allow them to fall by gravity, and means for reciprocating the plunger at a greater speed than the charge-former on both its downward and upward strokes.

4. In a machine of the class described, a case support, a charge-former arranged to receive successive charges of articles at a charge-receiving position above the case support, the charge-former having a delivery chute and releasable charge-supporting means for releasing the charge through the chute, means for feeding successively to the case support cases in upright position with the tops thereof open to receive a charge, means for reciprocating the charge-former from its charge-receiving position into coaction with the top of the case to deliver the charge thereto and back to the charge-receiving position, means for actuating the charge-supporting means to release the articles of the charge and allow them to fall by gravity, and a reciprocating plunger above the charge-former adapted to coact with the articles of the charge to aid the action of gravity in delivering the articles into the case and to arrange the articles in a predetermined position in the case.

5. In a machine of the class described, a case support, a carrier adapted to advance a plurality of cases along said support successively to a packing position thereon, vertically reciprocating packing mechanism at said packing position adapted to receive successive charges of articles at a charge-receiving position above said support and pack them in the case at the packing position, mechanism for causing a step-by-step movement of said carrier to advance the cases to the packing position, a control device for said advancing mechanism to cause a step advance of said carrier, and means operated by the packing mechanism for actuating the control device and causing the carrier to advance one step.

6. In a machine of the class described, a packing mechanism comprising a reciprocating charge-former and a reciprocating plunger cooperating therewith, a charge-former operating mechanism having a predetermined operating cycle, plunger-operating mechanism having an approximately simultaneous operating cycle adapted to commence not later than the commencement of the cycle of the charge-former operating mechanism and to terminate not later than the end of the cycle of the charge-former operating mechanism, control means for restrain-

ing the operation of the plunger operating mechanism, and an interlock between said operating mechanisms for restraining the operation of the charge-former operating mechanism.

7. In a machine of the class described, feeding means for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, mechanism for advancing the case feeding means in a step-by-step movement, case actuated control means for stopping the case feeding means when a case is at the packing position, article actuated means for causing an operation of the packing mechanism to place a charge of articles in said case, and means actuated by the packing mechanism at the end of each packing operation for causing a step advance of the case-feeding mechanism.

8. In a machine of the class described, feeding means for successively feeding cases to packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, continuously operating step-by-step actuating mechanism for the case-feeding means, case-actuated control means for said step-by-step actuating mechanism to stop the case feeding means when a case is at the packing position, article-actuated means for causing an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated control means for the step-by-step actuating mechanism to cause a step advance of the case feeding mechanism.

9. In a machine of the class described, an endless carrier for carrying a plurality of cases and moving them successively to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, continuously operating step-by-step actuating mechanism for advancing the carrier in a step-by-step movement, case actuated control means for the step-by-step actuating mechanism to stop the carrier when a case is at the packing position, article-actuated means for causing an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated control means for the step-by-step actuating mechanism to cause a step advance of the carrier after the charge has been placed in said case so as to bring an empty case to the packing position.

10. In a machine of the class described, an endless carrier for carrying a plurality of cases and moving them successively to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and carrier step-by-step actuating mechanism continuously operated in timed relation to one another, case actuated control means for the step-by-step actuating mechanism to stop the carrier when a case is at the packing position, article-actuated means for permitting an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated control means for the step-by-step actuating mechanism to cause a step advance of the carrier after the charge has been placed in said case so as to bring an empty case to the packing position.

11. In a machine of the class described, feeding means for successively feeding cases to packing position, packing mechanism at said position

for packing articles in a case, a conveyor for supplying articles to said packing mechanism, continuously operating step-by-step actuating mechanism for the case-feeding means, case-actuated control means for said step-by-step actuating mechanism to stop the case feeding means when a case is at the packing position and case-actuated control means for permitting an operation of the packing mechanism to place a charge of articles in said case.

12. In a machine of the class described, feeding means for successively feeding cases to packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, continuously operating step-by-step actuating mechanism for the case-feeding means and case-actuated means for simultaneously controlling the step-by-step actuating mechanism to stop the case feeding means when a case is at the packing position and permitting an operation of the packing mechanism to place a charge of articles in said case.

13. In a machine of the class described, feeding means for successively feeding cases to packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, continuously operating step-by-step actuating mechanism for the case-feeding means, case-actuated control means for said step-by-step actuating mechanism to stop the case feeding means when a case is at the packing position, case-actuated control means for causing an operation of the packing mechanism to place a charge of articles in said case, and packing mechanism actuated control means for the step-by-step actuating mechanism to cause a step advance of the case feeding mechanism.

14. In a machine of the class described, feeding means for successively feeding cases to packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, continuously operating step-by-step actuating mechanism for the case-feeding means, case actuating means for simultaneously controlling the step-by-step actuating mechanism to stop the case-feeding means when a case is at the packing position and cause an operation of the packing mechanism to place a charge of articles in said case, and packing mechanism actuated control means for the step-by-step actuating mechanism to cause a step advance of the case-feeding mechanism.

15. In a machine of the class described, an endless carrier for carrying a plurality of cases and moving them successively to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and carrier step-by-step actuating mechanism continuously operated in timed relation to one another, case-actuated control means for the step-by-step actuating mechanism to stop the carrier when a case is at the packing position, and article-actuated and case-actuated means for permitting an operation of the packing mechanism to place a charge of articles in said case.

16. In a machine of the class described, an endless carrier for carrying a plurality of cases and moving them successively to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mech-

anism operating means and carrier step-by-step actuating mechanism continuously operated in timed relation to one another, case-actuated control means for the step-by-step actuating mechanism to stop the carrier when a case is at the packing position, article-actuated and case-actuated means for permitting an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated control means for the step-by-step actuating mechanism to cause a step advance of the carrier after the charge has been placed in said case so as to bring an empty case to the packing position.

17. In a machine of the class described a case support, a carrier adapted to advance a plurality of cases along said support successively to a packing position thereon, reciprocating packing mechanism at said packing position adapted to receive successive charges of articles and pack them in the case at the packing position, mechanism for causing step-by-step movement of said carrier to advance the cases to the packing position, a control device for said advancing mechanism to cause a step advance of said carrier, and means operated by the packing mechanism for actuating the control device and causing the carrier to advance one step.

18. In a machine of the class described, an endless carrier for carrying a plurality of cases and moving them successively to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and carrier step-by-step actuating mechanism continuously operated in timed relation to one another, control means for the step-by-step actuating mechanism, a latch for preventing the operation of the packing mechanism, mechanism actuated by each case when it reaches the packing position to operate said control means and to release said latch thereby stopping the advance of the endless carrier and permitting the operation of the packing mechanism to place a charge of articles in the case.

19. In a machine of the class described, an endless carrier for carrying a plurality of cases and moving them successively to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and carrier step-by-step actuating mechanism continuously operated in timed relation to one another, control means for the step-by-step actuating mechanism to stop the carrier, a latch for preventing the operation of the packing mechanism, mechanism actuated by each case when it reaches the packing position to operate said control means and to release said latch, a second latch for the packing mechanism releasable by articles received therein from said conveyor, the release of both of said latches permitting an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated means for causing the step-by-step actuating mechanism to advance the carrier after the charge has been placed in said case so as to bring an empty case to the packing position.

20. In a machine of the class described, feeding means for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, continuously operating step-by-step actuating mechanism for the case-feeding means, control mechanism for said step-by-step actuating mechanism releasable to cause the advance of the case-feeding means and latchable at each step advance thereof to stop further advance, means actuated by the case at packing position for latching said control mechanism to stop the case feeding means when a case is at the packing position, means for causing an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated means for releasing said control mechanism to cause the case-feeding means to advance step-by-step until another case arrives at the packing position.

21. In a machine of the class described, feeding means for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, continuously operating step-by-step actuating mechanism for the case-feeding means, control mechanism for said step-by-step actuating mechanism releasable to cause the advance of the case-feeding means and latchable at each step advance thereof to stop further advance, means actuated by the case at packing position for latching said control mechanism to stop the case-feeding means when a case is at the packing position, means actuated by the case at packing position for causing an operation of the packing mechanism to place a charge of articles in said case and packing mechanism actuated means for releasing said control mechanism to cause the case-feeding means to advance step-by-step until another case arrives at the packing position.

22. In a machine of the class described, feeding means for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and step-by-step actuating mechanism for the case-feeding means continuously operating in timed relation to one another, control mechanism for said step-by-step actuating mechanism releasable to cause the advance of the case-feeding means and latchable at each step advance thereof to stop further advance, means actuated by the case at packing position for latching said control mechanism to stop the case feeding means when a case is at the packing position, a latch for preventing operation of the packing mechanism, combined case and article actuated means for releasing said latch to permit operation of the packing mechanism to place a charge of articles in said case, and packing mechanism actuated means for releasing said control mechanism to cause the case feeding means to advance step-by-step until another case arrives at the packing position.

23. In a machine of the class described, feeding mechanism for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and step-by-step actuating mechanism for the case-feeding means operating continuously in timed relation to one another, control mechanism for said step-by-step actuating mechanism releasable to cause the advance of the case feeding means and latchable at each step advance thereof to stop further advance, a latch for preventing operation of the packing mechanism, case-actuated means for simultaneously latching said control mechanism to stop the case feeding means when a case is at the packing position and releasing the latch for the packing mechanism to

permit operation thereof to place a charge of articles in said case, and packing mechanism actuated means for releasing said control mechanism to cause the case feeding means to advance step-by-step until another case arrives at the packing position.

24. In a machine of the class described, feeding means for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and step-by-step actuating mechanism for the case-feeding means continuously operating in timed relation to one another, control mechanism for said step-by-step actuating mechanism releasable to cause the advance of the case-feeding means and latchable at each step advance thereof to stop further advance, means actuated by the case at packing position for latching said control mechanism to stop the case feeding means when a case is at the packing position, a latch for preventing operation of the packing mechanism, combined case and article actuated means for releasing said latch to permit operation of the packing mechanism to place a charge of articles in said case, and means for releasing said control mechanism to cause the case feeding means to advance step-by-step until another case arrives at the packing position.

25. In a machine of the class described, feeding mechanism for successively feeding cases to a packing position, packing mechanism at said position for packing articles in a case, a conveyor for supplying articles to said packing mechanism, packing mechanism operating means and step-by-step actuating mechanism for the case-feeding means operating continuously in timed relation to one another, control mechanism for said step-by-step actuating mechanism releasable to cause the advance of the case feeding means and latchable at each step advance

thereof to stop further advance, a latch for preventing operation of the packing mechanism, case-actuated means for simultaneously latching said control mechanism to stop the case feeding means when a case is at the packing position and releasing the latch for the packing mechanism to permit operation thereof to place a charge of articles in said case, and means for releasing said control mechanism to cause the case feeding means to advance step-by-step until another case arrives at the packing position.

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