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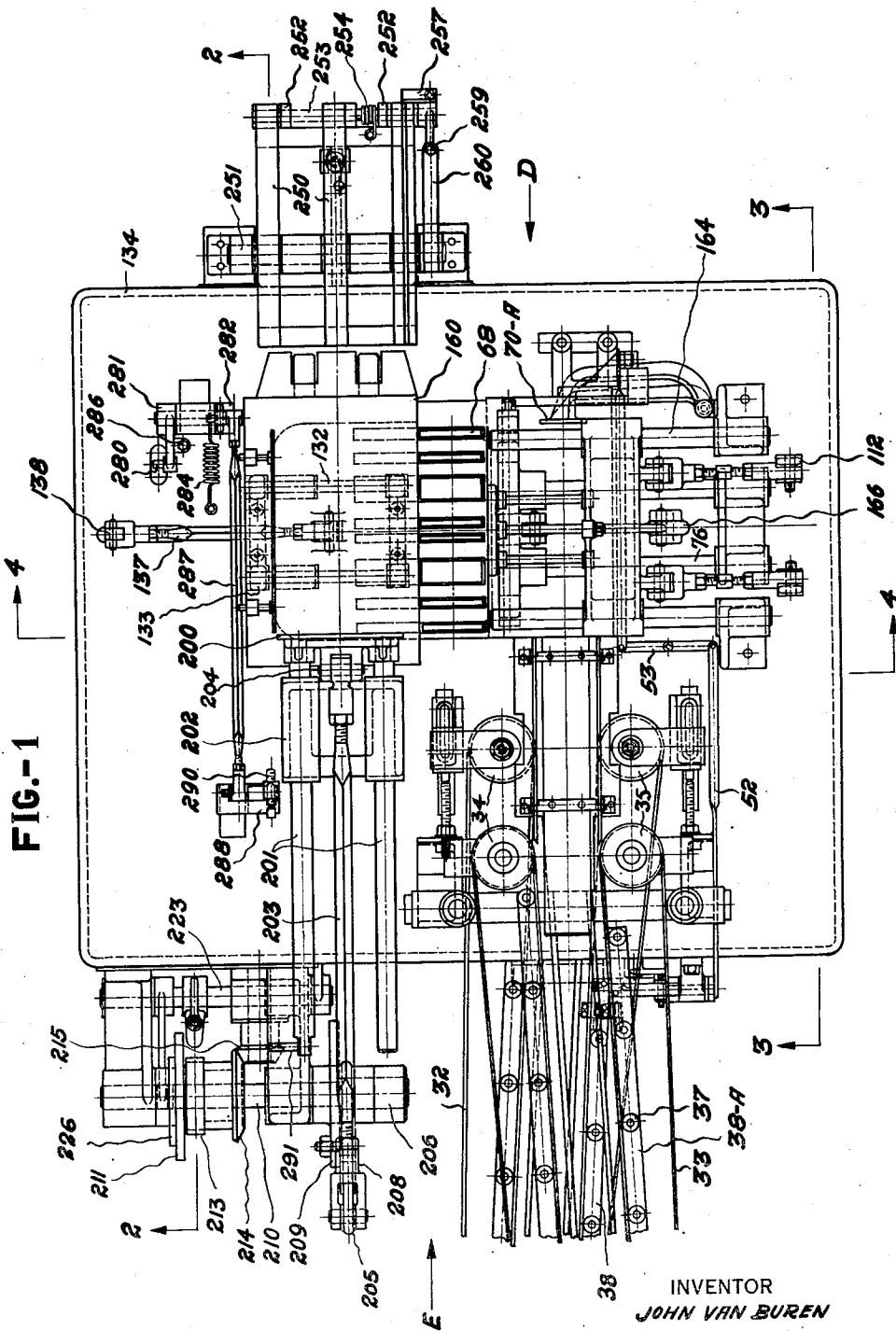
J. VAN BUREN

2,051,190

MACHINE FOR FEEDING, STACKING, AND BOXING ARTICLES

Filed Aug. 28, 1934

11 Sheets-Sheet 1



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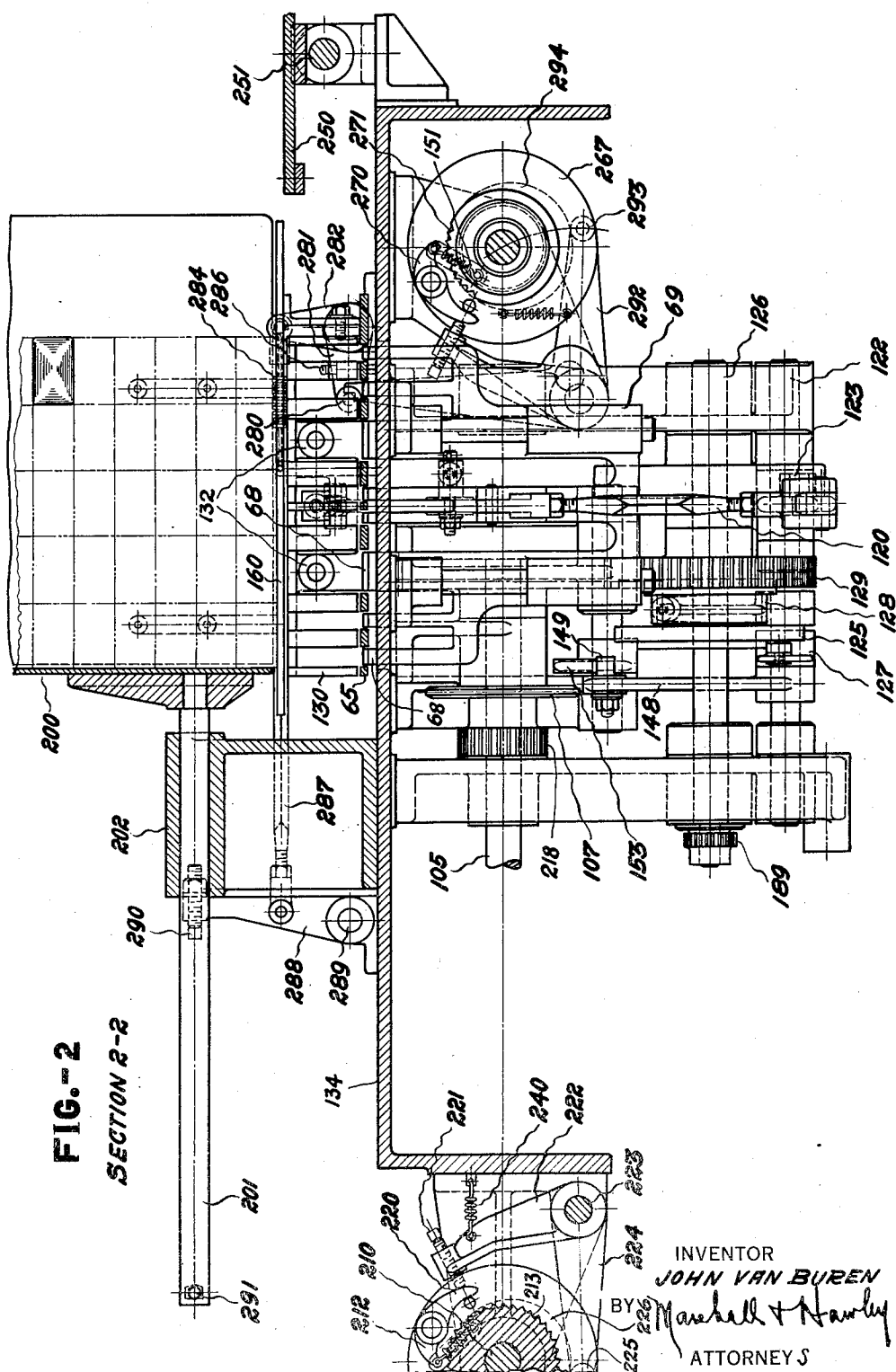
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MACHINE FOR FEEDING, STACKING, AND BOXING ARTICLES

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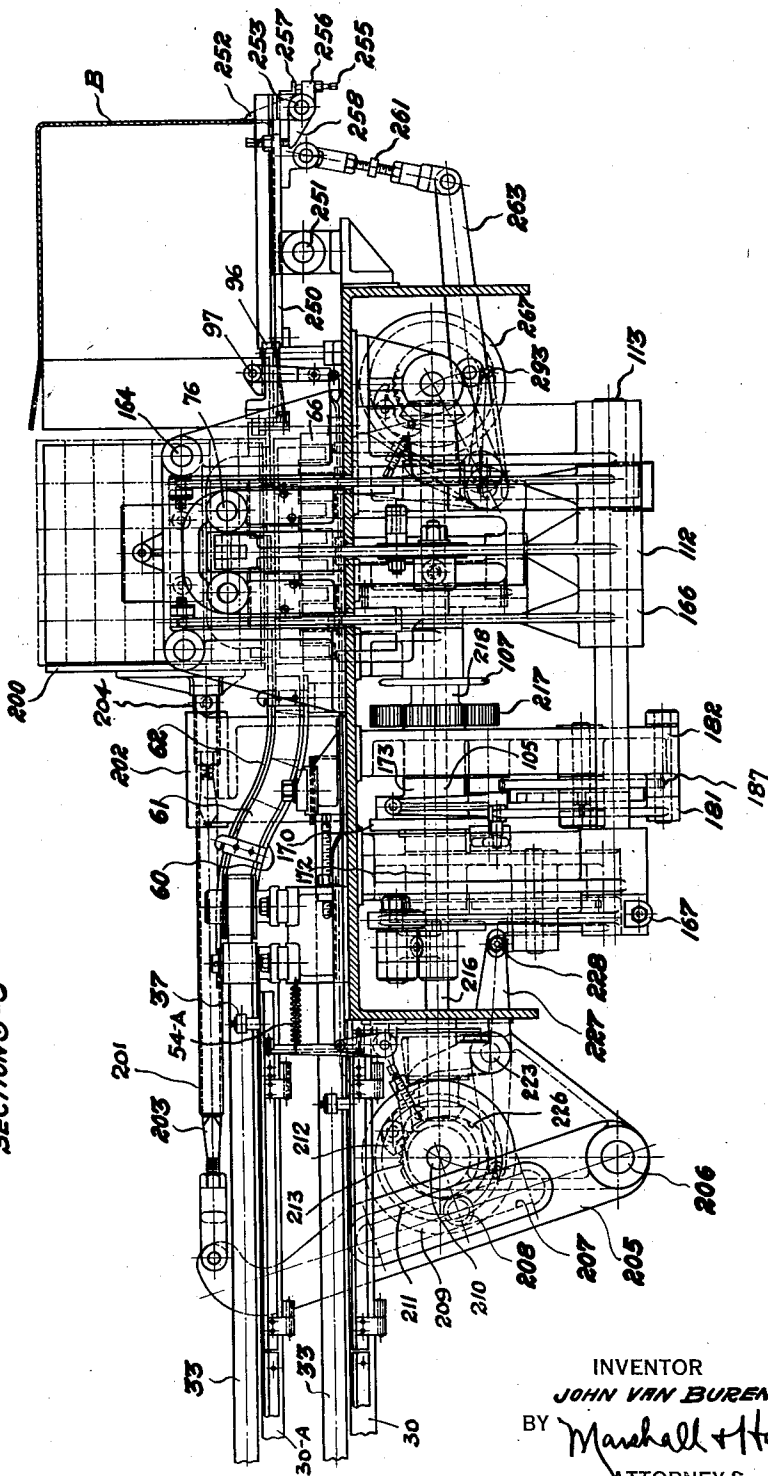
MACHINE FOR FEEDING, STACKING, AND BOXING ARTICLES

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FIG.-3

SECTION 3-3



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11 Sheets-Sheet 4

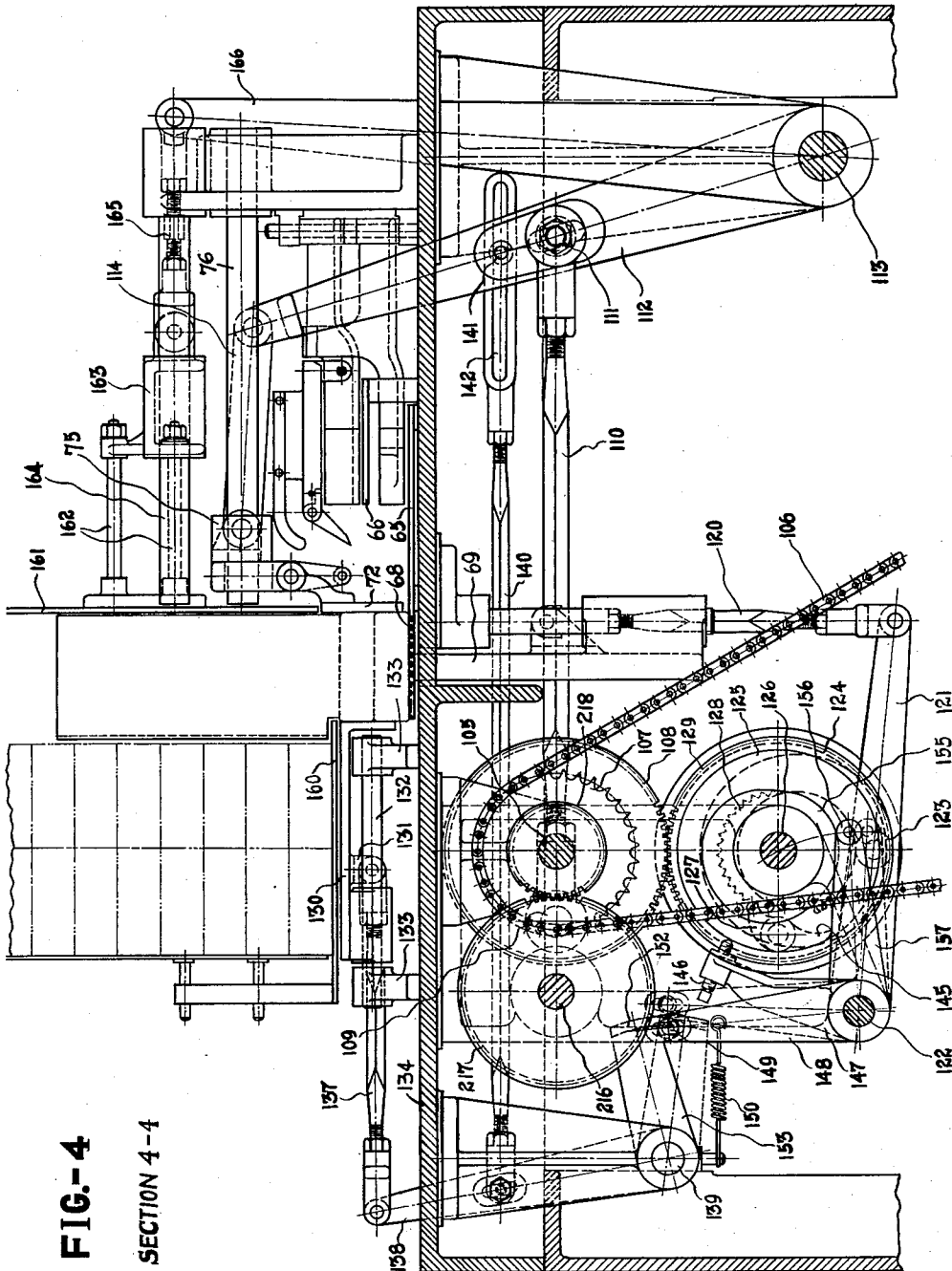


FIG. 4

SECTION 4-4

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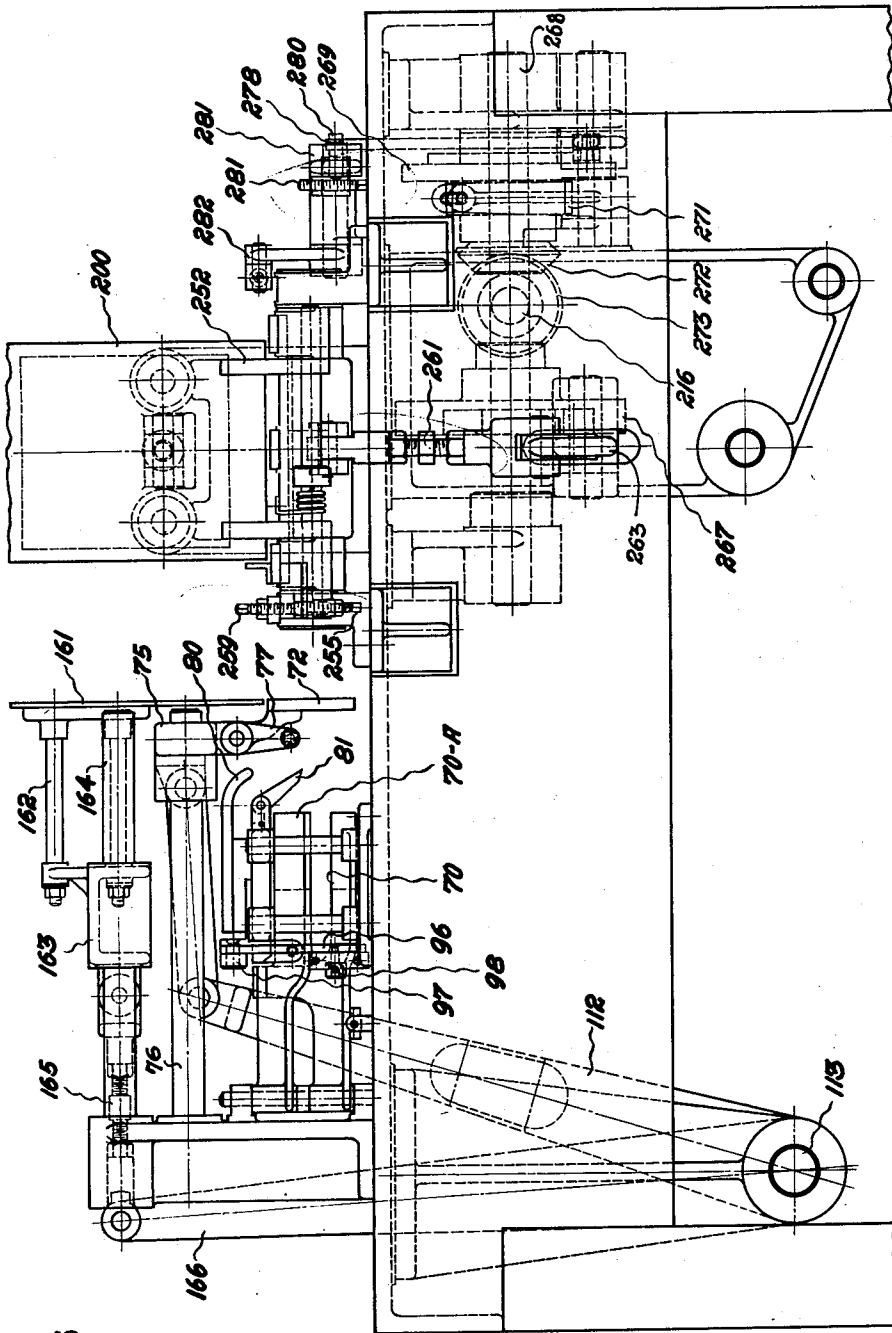


FIG.-5

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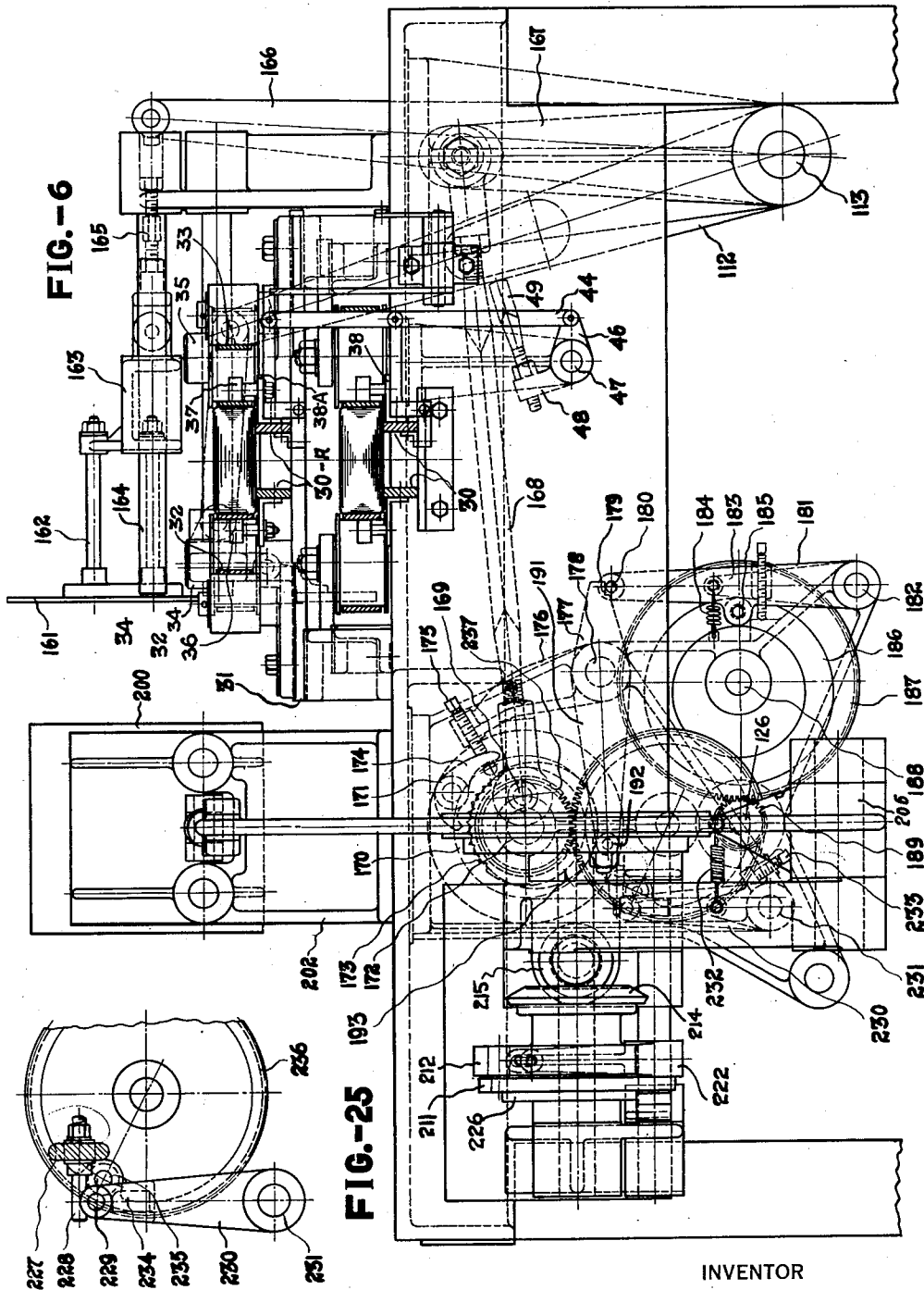
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MACHINE FOR FEEDING, STACKING, AND BOXING ARTICLES

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11 Sheets-Sheet 6



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MACHINE FOR FEEDING, STACKING, AND BOXING ARTICLES

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FIG.-13

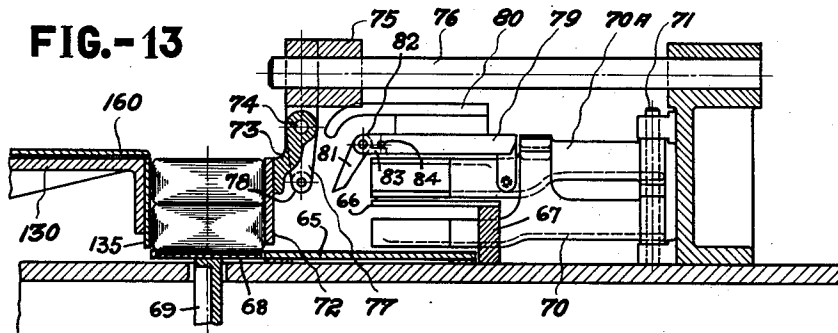


FIG.-17

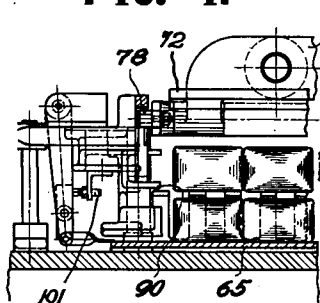


FIG.-14

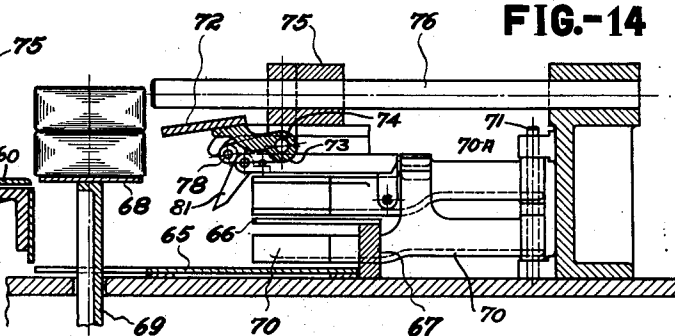


FIG.-18

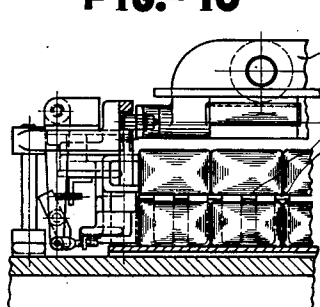


FIG.-15

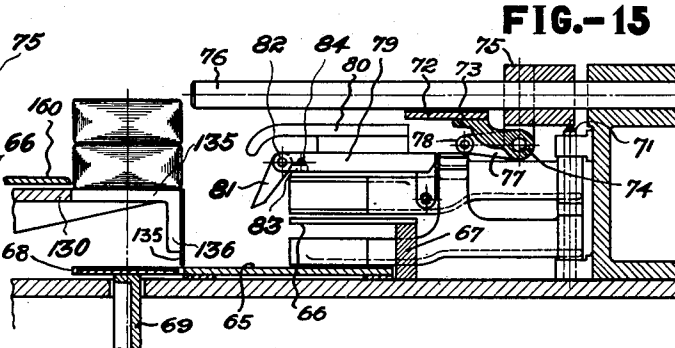
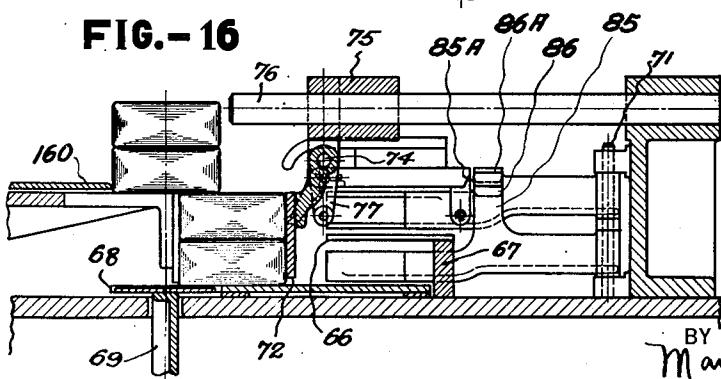


FIG.-16



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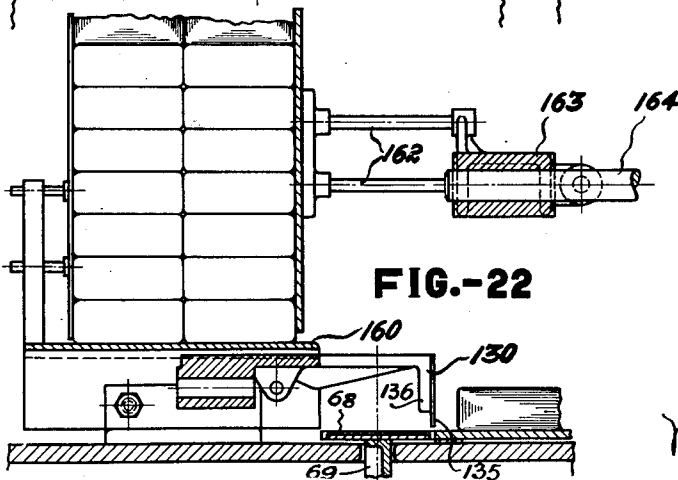
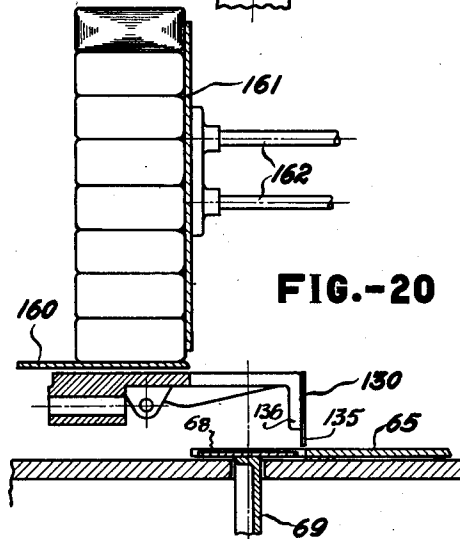
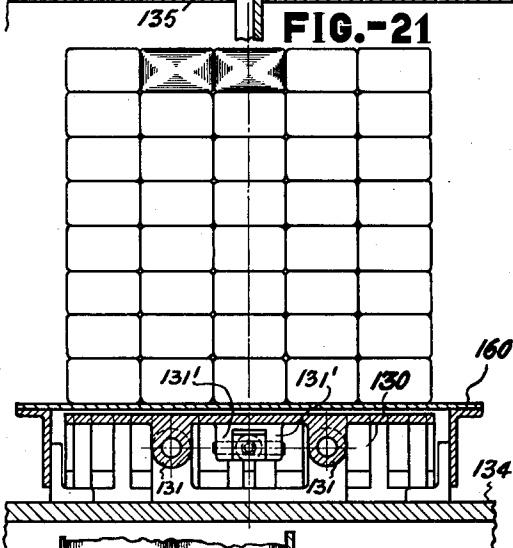
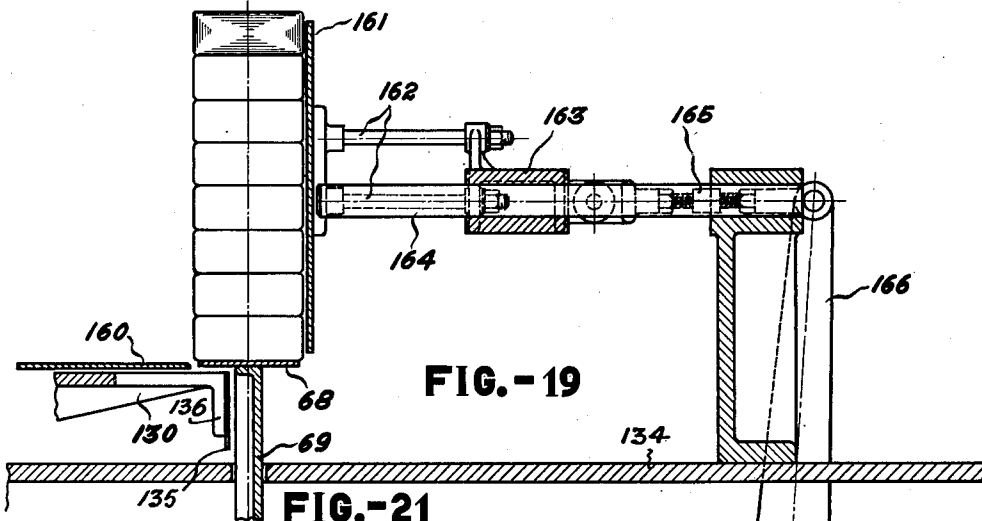
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MACHINE FOR FEEDING, STACKING, AND BOXING ARTICLES

Filed Aug. 28, 1934

11 Sheets-Sheet 10



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UNITED STATES PATENT OFFICE

2,051,190

MACHINE FOR FEEDING, STACKING, AND
BOXING ARTICLES

John Van Buren, Brooklyn, N. Y.

Application August 28, 1934, Serial No. 741,790

13 Claims. (Cl. 226—14)

This invention relates to a machine for feeding, stacking and boxing articles.

Although the machine is capable of use in handling many different kinds of articles it has been particularly worked out for the purpose of handling wrapped articles, such as wrapped cakes of soap.

One of the objects of the invention is to provide a machine so constructed and arranged as to handle a plurality of rows of articles simultaneously.

Another object of the invention is to provide conveyor means for feeding the articles to the feeding and stacking mechanism having control means for automatically rendering the conveyor feed inoperative when the stacking mechanism is operative.

Another object of the invention is to provide stacking mechanism so constructed and arranged as to stack a plurality of rows of articles and automatically operable boxing mechanism arranged to feed the stacked articles into a container after predetermined load or number of articles has been deposited on the support from which they are fed to the container.

Another object of the invention is to provide in a machine of the character specified, means for automatically stacking a plurality of rows of articles one above the other.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which

Fig. 1 is a top plan view of the machine constructed in accordance with the invention;

Fig. 2 is a sectional elevation of the machine taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a sectional elevation taken substantially on line 3—3 of Fig. 1;

Fig. 4 is a sectional elevation taken substantially on line 4—4 of Fig. 1;

Fig. 5 is an end elevation of the right hand end of the machine viewing Fig. 1;

Fig. 6 is an elevation of the other end of the machine shown in Fig. 1;

Fig. 7 is an enlarged plan view, partly broken away, showing the delivery end of the feed conveyors and the control means therefor;

Fig. 8 is a fragmentary view similar to Fig. 7 but showing the control means for the feed conveyor in the position taken when the load has been delivered to the supporting platforms by the conveying mechanisms;

Fig. 9 is a sectional elevation taken at right angles to Fig. 7;

Fig. 10 is a view similar to Fig. 9 but showing the control mechanism in the position shown in Fig. 8;

Fig. 11 is a transverse sectional elevation through the feed conveyors showing the parts in operative position;

Fig. 12 is a view similar to Fig. 11 but showing the presser members which act on the conveyor belts to press the belts against the articles being fed, in inoperative position;

Fig. 13 is a detail sectional elevation showing a pusher plate for feeding the articles to the stacking mechanism at the end of its feeding stroke;

Fig. 14 is a view similar to Fig. 13 but showing the pusher plate at the beginning of its retractive movement and the vertically movable platform in elevated position;

Fig. 15 is a view similar to Fig. 14 but shows the pusher plate substantially at the end of its retractive position and also shows the vertically movable platform lowered to its lowermost position and a laterally movable platform positioned beneath the articles which have been raised on the vertically movable platform;

Fig. 16 is a view similar to Figs. 13 to 15 inclusive, but shows the pusher plate feeding a second load of articles to the vertically movable platform;

Fig. 17 is a transverse sectional elevation showing the supporting platforms for the articles delivered by the conveying means and also showing the control means for the pusher plate;

Fig. 18 is a view similar to Fig. 17 but shows the control mechanism in the position taken when a full load has been delivered to the supporting platforms by the conveyor mechanisms;

Fig. 19 is a detail sectional elevation showing the vertically movable platform in elevated position with a full load of articles thereon and also the feed plate and the discharge plunger in position to discharge this load from the vertically movable platform;

Fig. 20 is a view similar to Fig. 19 but illustrates the load discharged from the vertically movable platform;

Fig. 21 is a sectional elevation taken at right angles to Fig. 20;

Fig. 22 is a view similar to Fig. 20 but shows two vertically arranged rows of articles positioned on the platform prior to being fed into a container or box;

Fig. 23 is a detail sectional elevation showing the box supporting means and feeding mechanism for feeding the load into the box, the parts

being shown just prior to the operation of the feeding mechanism;

Fig. 24 is a view similar to Fig. 23 showing the load of articles fed into the box and the box tilted to discharge position; and

Fig. 25 is a detail sectional elevation showing the driving, gearing and connections for the pusher plate which discharges the load of articles into the container or box.

The invention briefly described consists of a machine comprising a plurality of feeding and stacking mechanisms so relatively constructed and arranged that a plurality of rows of articles can be handled simultaneously and can be stacked, assembled and discharged into boxes or containers.

The articles are fed into the machine by a plurality or pair of superposed conveyor mechanisms, such as conveyor belts arranged to press against the ends of the articles. Releasable presser means are provided in conjunction with each conveyor mechanism, control means for these presser means being arranged to release the presser means to permit them to move to inoperative position when a load of articles or a predetermined number of articles have been delivered by the conveyor mechanisms.

The articles are delivered in two rows by the conveyor mechanism to supporting platforms and are fed from these platforms to a vertically movable platform when a predetermined load or number of articles has been delivered to each platform. The articles delivered on the platforms control the operation of the feed means or pusher plate which feeds the articles from the supporting platforms to the vertically movable platform.

A laterally movable platform is provided for receiving and supporting the rows of articles delivered to the vertically movable platform after the last named platform has been raised or elevated. As the articles are fed to the vertically movable platform the laterally or horizontally movable platform is retracted and this platform is moved back to operative position beneath the elevated platform and the articles supported thereby.

After a predetermined load of articles has been moved to the vertically movable platform these articles are discharged therefrom to a stationary platform and this operation is repeated in the particular embodiment of the machine illustrated until a predetermined number of vertical stacks of articles have been deposited on the stationary platform from the vertically movable platform.

When this has been accomplished the stacks of articles on the stationary platform are discharged therefrom into a container or box mounted on a tiltable support, the support automatically tilting to discharge position when a load has been deposited in the box.

Further details of the invention will appear from the following description.

In order to facilitate the understanding of the invention the operation of the various feeding, stacking and discharge mechanisms will be described under separate headings.

Conveyor mechanism

This mechanism is illustrated particularly in Figs. 1, 3, and 6 to 12 inclusive. The machine particularly shown and described in this application was designed to receive wrapped articles, such as cakes of soap, from a wrapping machine so arranged as to deliver the cakes in two rows

or into two conveying mechanisms. The conveying mechanisms are superimposed or are arranged one above the other and deliver the articles in two rows to a pair of supporting platforms hereinafter described.

The articles are fed along supporting rails 30 and 30A mounted on a suitable machine frame 31. Each conveyor mechanism comprises a pair of endless belts 32 and 33 mounted on pulleys 34 and 35 at their delivery ends. In the particular embodiment of the invention shown the two conveyor mechanisms are arranged at an angle to each other although, as shown in Figs. 1 and 7, the delivery ends of the conveyor mechanisms are disposed in substantially the same vertical planes.

The conveyor belts 32 and 33 of each set of conveyor mechanisms are engaged adjacent their delivery ends by a plurality of relatively stationary presser rollers 36 which press against the belts 32 and by releasable presser members or rollers 37 arranged to press against the belts 33. The rollers 37 are mounted on angle iron members 38 and 38A having depending arms 39 and 39A mounted on pivots 40 and 40A. An arm 41A is fixed to and extends laterally from the angle iron member 38A, as shown particularly in Figs. 11 and 12.

When the conveyor mechanisms are operating the angle iron members 38 and 38A and the presser rollers 37 carried thereby are held in operative position by an arm 42 having a notched upper end 43 arranged to engage beneath the arm 41A. The angle iron member 38 also has secured thereto a laterally extending arm 41 and a link 44 is pivoted at 45A to the arm 41A and at 45 to the arm 38A. The link 44 extends downwardly and is pivoted at its lower end to an arm 46 of a bell crank lever mounted on a spindle 47 and having a second arm 48 to which is secured a stud 49. The stud 49 is engaged in a manner hereinafter described by a lever arm to reset the angle iron members 38 and 38A and the presser rollers carried thereby after the operation of the feed mechanism which discharges the two rows of articles from the supporting platforms on which they are delivered by the conveyor mechanisms.

The arm 42 is mounted on a spindle 50 to which is also secured an arm 51. The upper end of the arm 51 is pivoted to a link 52 and this link is pivoted at its opposite end to a lever 53 mounted on a fixed pivot 54 and having the opposite end thereof pivotally connected to a link 55. The link 55 is controlled by control means operated by the rows of articles delivered by the conveyor mechanisms in a manner hereinafter described. After two complete rows or charges of articles have been delivered by the two sets of conveyor mechanisms the link 55 will be moved to the right viewing Fig. 8 causing the lever 53 to move in a clockwise direction, thus moving the link 52 to the left and through the arm 51 and spindle 50 causing the arm 42 to be withdrawn from the position shown in Fig. 11 to the position shown in Fig. 12. When this support for the angle iron members has been withdrawn these members will tilt downwardly, as shown in Fig. 12, under the action of gravity, thus moving the presser rollers 37 to inoperative position and releasing the pressure against the ends of the articles being fed. The feeding of the articles by the conveyor mechanisms will thus be interrupted and will not be resumed until the stud 49 is engaged in a manner hereinafter described to swing the bell crank

lever 48, 46 in an anticlockwise direction, thus moving the arms 41 and 41A and angle iron members upwardly to the position shown in Fig. 11. As soon as these members have been so actuated

5 a spring 54A which is connected to the arm 42 will cause the arm 42 to swing inwardly beneath the arm 38A, thus retaining the presser members in operative position.

10 At the discharge end of the upper conveying mechanism a downwardly inclined discharge chute is provided to guide the articles discharged therefrom to the supporting platform provided for receiving the articles. This chute comprises a downwardly inclined bottom member 60, side

15 walls 61 and a removable top plate 62.

Article receiving platforms and feeding and discharge mechanism therefor

20 This mechanism is illustrated particularly in Figs. 1, 4, 5 and 13 to 18 inclusive. The articles discharged from the lower conveyor mechanism are received on a supporting plate or platform 65 and the articles discharged from the upper conveyor mechanism are received on a platform

25 comprising a plurality of parallel arms or strips 66 carried by a bar 67.

In the particular embodiment of the invention illustrated in the drawings each of the platforms is arranged to receive a row of wrapped articles comprising five articles. After a complete row of five articles has been fed to each of the supporting platforms 65 and 66 control mechanism is actuated to move the link 55 shown in Figs. 7 and 8 to the right releasing the presser rollers 37

30 from engagement with the belts 33 of both conveyor mechanisms. These control members which are actuated by the two rows of articles fed to the supporting platforms also control the operation of the feeding member or pusher plate which discharges the two rows simultaneously from the platforms 65 and 66 to a vertically movable platform 68 carried by a plunger 69.

35 At the inner end of each of the platforms 65 and 66 there is mounted an arm, the arms being designated as 70 and 70A, both arms being

40 mounted on a vertical pivot pin 71.

The articles are discharged from the platforms 65 and 66 by a pusher plate 72 which is carried by an arm 73 mounted on a pivot pin 74. The pin 74 is carried by a block 75 slidably mounted on guide rods 76. The pivot pin 74 also has secured thereto an arm 77 having a roller 78 on the free end thereof. The roller 78 is adapted to reciprocate in a track formed by guide members 79 and 80, an arm 81 being pivoted at 82 to the front end of the guide member 79. The arm 81 has secured thereto a rearwardly extending projection 83 arranged to engage a stop pin 84 which limits the movement of the arm in an anticlockwise direction, the arm being free to swing on its pivot in the opposite direction.

During the feeding of a load of articles to the platforms 65 and 66 the pusher plate is held in an elevated position shown in Fig. 15 in which position the roller 78 reciprocates in the path provided by the guide members 79 and 80. Means is provided, however, for permitting the roller 78 and the pusher plate to swing downwardly to the position shown in Figs. 13 and 16 when a predetermined load of articles has been deposited on the supporting platforms 65 and 66.

70 The arms 70 and 70A have formed thereon upwardly extending projections 85 and 85A having laterally extending flanges 86 and 86A at their

upper ends, the flange 86 being disposed beneath the flange 86A.

At its rearmost extreme position of movement shown in Fig. 15, the roller 78 rests on the flange 86A carried by the upwardly extending arm or extension 85A which in turn is carried by the arm 70A. However, when a complete load of articles, such as five articles, have been delivered to the platform 66 the arm 70A will swing on its pivot, thus withdrawing the supporting flange 86A from beneath the roller 78. Since articles are also being fed to the lower platform 65 at the same time as they are being fed to the upper platform, in the normal operation of the machine a complete load of articles will have been deposited on the platform 65. If this be the case the arm 70 will also swing on its pivot 71, thus withdrawing the flange 86 and the roller 78 will be permitted to swing downwardly to a position between flanges 90 formed on the arm 70A. The pusher plate 72 will also swing downwardly to a position in the rear of the two rows of articles disposed on the platforms 65 and 66 and on its forward movement will feed the articles, as shown in Fig. 13, to a position on the vertically movable platform 68. After the pusher plate has fed the two rows of articles to the vertically movable platform 68, on its return movement the roller 78 will ride up on the outer edge of the arm 81 and will again reciprocate between the guide members 79 and 80 until a complete load of articles has again been deposited on each of the platforms 65 and 66.

The pivoted arms 70 and 70A not only control the feeding operation of the pusher plate 72, but also control the release of the presser rollers 37 by the actuation of the link 55. This is accomplished in the following manner: The link 55 is pivoted at 95 to the lower end of an arm 96 mounted on a fixed pivot 97. The arm 96 also has pivoted thereon at 98 an equalizer 99. As shown in Figs. 9 and 10, the arm 70A has adjustably connected to a depending lug 100 carried thereby a stud 101. A stud 102 is similarly connected to the arm 70. These studs are arranged to engage opposite ends of the equalizer 99. If both of the arms 70 and 70A are swung backwardly on their pivots by complete loads on the two platforms the studs 101 and 102 by engagement with the ends of the equalizer 99 will swing the arm 96 in an anticlockwise direction viewing Fig. 10, thus moving the link 55 shown in Fig. 8 to the right and in the manner hereinabove described causing the arm 42 to be withdrawn from supporting position with relation to the arm 41A permitting the presser members 37 to swing to inoperative position, as shown in Fig. 12. In order to cause the release of the presser members it is necessary that both platforms be completely loaded since otherwise the equalizer 99 will be merely swung on its pivot 98 and will not swing the arm 96 to actuate the link 55 and release the presser rollers 37.

Driving connections for pusher plate

65 The main driving shaft of the machine is shown at 105 in Fig. 4. This shaft rotates continuously during the operation of the machine and is driven from any suitable source of power by any suitable driving mechanism such as the sprocket chain 106 and sprocket 107 which is mounted on the shaft. A gear 108 is fixed on the shaft 105 and carries a crank pin 109 to which is connected a pitman 110. The other end of the pitman 110 is adjustably connected at 111 to

an arm 112 pivotally mounted on a shaft or spindle 113. The upper end of the arm 112 is connected by a link 114 to the block 75. By these driving connections the arm 112 is continuously oscillated back and forth and the pusher plate will be similarly oscillated, but will drop to operative position, as shown in Fig. 13, only when two complete rows or loads of articles have been deposited on the platforms 65 and 66.

The arm 112 in addition to operating the pusher plate also engages the stud 49 on its forward movement, as shown in Fig. 6, to reset the presser rollers 37 or to return them to operative position.

Vertical elevator and horizontally movable platform and transfer mechanism

This mechanism is particularly illustrated in Figs. 4, 13 to 16 and 19 to 22 inclusive. As above described, the vertically movable platform or elevator 68 is mounted on the upper end of a plunger 69. This plunger is periodically actuated in the following manner:

A link 120 which is connected at its lower end to an arm 121 mounted on a pivot 122, a roller 123 being carried by the arm 121. The roller 123 is positioned in a cam groove 124 fixed to or formed on a disk 125 rotatably mounted on a shaft 126. The disk 125 has pivotally mounted thereon a pawl 127 which in certain periods of the cycle of operation of the machine, as hereinafter described, is adapted to engage a ratchet wheel 128 loosely mounted on the shaft 126. The ratchet wheel 128 is fixed to and movable with a gear 129 which is also loosely mounted on the shaft 126 and meshes with the gear 108 mounted on the shaft 105. The shaft 105 and gear 108 are continuously driven, thus continuously rotating the gear 129 and ratchet wheel 128. However, the pawl 127 engages the ratchet wheel only at certain periods in the cycle of operation so that the elevator platform 68 is raised only after a load or two complete rows of articles have been deposited thereon by the pusher plate 72, as shown in Figs. 13 and 14.

The engagement of the pawl 127 with the ratchet wheel 128 is controlled by means actuated by the retraction of a horizontally or laterally movable transfer platform 130 having depending lugs 131 slidably mounted on guide rods 132 carried by supports 133 secured to the top of the machine table or frame 134. The platform 130 comprises a series of parallel spaced connected bars 135 having depending angular flanges 136 on the ends thereof. The horizontally movable platform 130 is reciprocated by means of a link 137 connected to the depending lugs 131 at one end and at its opposite end connected to an arm 138 mounted on a pivot 139. The arm 138 is connected by a link 140 and by a pin and slot connection 141, 142 to the arm 112. This pin and slot connection permits the table 130 to be pushed toward the left viewing Fig. 4 and Figs. 13 to 16 by the two rows of articles as they are fed on the vertically movable platform 68 by the pusher plate 72. The pusher plate in turn is actuated by the arm 112 and when this arm is moved to its maximum retracted position the pin 141 will engage the right hand end of the slot 142 and pull the link 140 to the right viewing Fig. 4, thus moving the horizontally movable table 130 to the position shown in Fig. 15. During this movement or during this cycle of operation the vertically movable platform 68 is suc-

cessively raised and lowered in the following manner:

The pawl 127 carried by the disk 125 is normally held in retracted position or out of engagement with the ratchet wheel 128 by means of the engagement with the tail 145 of the pawl of an adjustable stud 146 carried by an arm 147 mounted on the spindle or shaft 122. The arm 147 forms part of a bell crank lever, the other part being formed by an arm 148 having a laterally projecting adjustably mounted stud 149 at the upper end thereof. The arm 148 is normally urged in an anticlockwise direction by a spring 150. A spring 151 normally urges the pawl 127 toward the ratchet wheel 128.

The movement of the arm 148 under the action of spring 150 is controlled by a stop lug 152 which is carried by an arm 153 which is fixed to the shaft 139 on which is also fixed the arm 138. The mechanism just described operates as follows: When the horizontally movable table 130 is pushed backwardly to the position shown in Figs. 4 and 13 by the two rows of articles fed to the vertically movable platform 68 the arm 138 will cause the shaft 139, the arm 153 and stop lug 152 carried thereby to swing in an anticlockwise direction and release the stud 149 carried by the arm 148. The arm 149 will thereupon be moved by the spring 150 in an anticlockwise direction viewing Fig. 4, thus raising the stud 146 from engagement with the tail 145 of the pawl 127. Upon the release of the pawl the spring 151 will force the pawl into engagement with the ratchet wheel 128 and the rotation of the ratchet wheel will cause through the pawl a rotation of the disk 125 and cam 124, thus through the roller 123 causing the oscillation of the arm 121 and the raising and lowering of the vertically movable platform 68.

The pawl mechanism just described is reset by a cam 155 which is fixed to the disk 125 and engages a lug or roller 156 mounted on an arm 157 which is fixed to the arm 148. As this arm is moved in a clockwise direction by the cam action the stud 149 will be positioned in back of the stop lug 152 carried by the arm 153 which has again moved downwardly due to the action of the arm 138 in the manner above described.

The feeding of the articles from the platforms 65 and 66 to the vertically movable platform 68 and the stacking of the articles on this platform will be clear from the showing in Figs. 13 to 22 inclusive. In Fig. 13 the pusher plate 72 has fed two rows of articles arranged one above the other to the vertically movable platform 68. During this movement the horizontally movable platform 130 has been moved to the left by the engagement of the depending portion or flanges 136 with the articles fed on the platform 68.

After the articles have reached the position shown in Fig. 13 the platform 68 is raised to the position shown in Fig. 14 and thereupon the fingers or bars 135 which form the outer end of the platform 130 are moved to the position shown in Fig. 15 and the vertically movable platform 68 is lowered.

As the next succeeding rows of articles are fed to the platform 68 in the manner shown in Fig. 16 they will be positioned beneath the two rows already fed and by the withdrawal of the platform 130 the two upper rows will rest on the two lower rows which are in turn supported on the vertically movable platform 68. The two up-

per rows are held against retraction with the platform 130 by the front edge of a stationary support or platform 160.

In the foregoing manner the stack of articles is built up until eight horizontal rows have been deposited on the vertically movable platform 68, as shown in Fig. 19.

This mechanism is particularly illustrated in Figs. 4, 6 and 19. A pusher plate 161 is carried by horizontally movable rods 162, these rods being connected to a reciprocable block 163 slidably mounted on guide rods 164. A link 165 is connected to the block 163 and is also connected to one end of a lever arm 166 fixed to the shaft 113. An arm 167 is fixed to the shaft 113 and is connected at its upper end to a link 168. The link 168 is connected to a crank pin 169 carried by a disk 170 on which is also mounted a pawl 171. The disk 170 is fixed on a shaft 172 which is disposed in alinement with the shaft 105, but is not connected thereto. This will be clear from the showing in Fig. 3. The disk and pawl are driven periodically from a ratchet wheel 173 which is fixed on and driven by the shaft 105. The engagement of the pawl 170 with the ratchet wheel 173 is controlled in the following manner: The pawl 171 has a tail 174 which is normally engaged by an adjustable stud 175 carried by a bell crank lever 176, 177 mounted on a fixed pivot 178. The arm 177 of the bell crank lever is provided with a notch 179 arranged to receive a pin 180 carried by an arm 181 pivotally mounted on a spindle or shaft 182. An arm 183 is also mounted on the spindle 182 and is connected to the arm 181 and a spring 184 is connected to the arm 183 and normally urges the arms 181 and 183 in an anticlockwise direction.

The arm 181 carries a roller 185 which engages a cam 186 which is fixed to and driven by a gear 187 rotatably mounted on a spindle 188. The gear 187 meshes with a gear 189, these two gears being proportioned in a one to eight ratio. The gear 189 is fixed on the shaft 126 which controls the operation of the vertically movable platform 68.

The mechanism for operating the pusher plate 161 is operated as follows: The gear 189 will rotate the gear 187 and the cam 186 fixed thereto and will thereby swing the arm 181 in a clockwise direction about its pivot 182, thus moving the stop pin 180 out of the path of the arm 177 of the bell crank lever 176, 177. This will release the lug 175 from engagement with the tail 174 of the pawl 171 permitting the pawl actuating spring 190 to move the pawl into engagement with the ratchet wheel 173. The pawl and disk 170 will thus be rotated and the crank pin 169 will cause the link 168 to be reciprocated, thus actuating the link 165 and the block 163 and causing the feed plate or pusher plate 161 to move from the position shown in Fig. 19 to the position shown in Fig. 20. This feeding operation is interrupted by the resetting of the pawl control lever 176 in the following manner: An arm 191 is connected to the shaft 178 and thus to the arm 176, the arm 191 having secured to its free end a roller 192 which is disposed in engagement with a reset cam 193 fixed to the disk 170. Thus, as the disk 170 rotates the cam 193 will cause the arm 191 to move in an anticlockwise direction and will cause the corresponding movement of the arms 176 and 177. Thus, the stop pin 180 will snap under the arm 177 and the stud 175 will engage the tail 174 of the pawl 171 and lift the pawl out of engagement with the ratchet wheel 173.

The transfer operation of the vertical stack of rows of articles will be repeated for a second vertical stack and when this stack is transferred to the platform 160 the first stack of articles will be pushed along the platform thereby. When two stacks have been transferred to the platform 160, as shown in Fig. 22, the complete load of articles is discharged from the platform 160 into a box or container in the following manner:

Load feeding and boxing mechanism

This mechanism is particularly illustrated in Figs. 1, 2, 3, 5, 6, 23 and 24. After a complete load of articles has been deposited on the platform 160 the articles are discharged from the platform into a box or container B in the following manner: A pusher plate 200 is carried by a pair of rods 201 slidably mounted in bearings 202. The pusher plate is actuated by a link 203 which is pivoted at 204 to the plate and is connected at its rear end to a lever or rocker 205 mounted on a fixed pivot 206. The lever or rocker 205 is provided with a longitudinal slot 207 in which is positioned a roller 208 carried by a disk 209 fixed to a shaft 210. A second disk 211 is also fixed to the shaft 210 and carries a pawl 212 which is adapted to periodically engage a ratchet wheel 213 loosely mounted on the shaft 210. The ratchet wheel 213 is fixed to a bevel gear 214 which meshes with a gear 215 carried by a shaft 216. The shaft 216 has mounted thereon a gear 217 which meshes with a gear 218 carried by the shaft 105.

The engagement of the pawl 212 by the ratchet wheel 213 is controlled in the following manner: The pawl 212 has a tail 220 which is normally engaged by an adjustable stud 221 carried by an arm 222 mounted on a spindle 223. An arm 224 is also mounted on the spindle 223 and is connected to the arm 222. A roller 225 is carried by the free end of the arm 224 and is disposed in engagement with a reset cam 226. The cam 226 is fixed or connected to the disk 211 which carries the pawl 212.

A second arm 227 is also mounted on the spindle 223 and is connected to the arm 222. A stud 228 is secured to the end of the arm 227 and is positioned in the path of movement of and adapted to engage a stud 229 which is mounted on an arm 230 pivoted at 231. This arm 230 is normally urged in a clockwise direction viewing Fig. 6 by a spring 232, this movement being limited by an adjustable set screw 233 which is disposed in the path of a lug 234 carried by the arm 230. The stud 229 which is carried by the arm 230 is engageable by a roller 235 carried by a gear 236 which meshes with a gear 237 mounted on and driven by the shaft 172. The gears 237 and 236 are proportioned in a ratio of from two to one.

The feed plate 200 operates as follows: At the correct point in the cycle of operation of the machine the roller 235 will move the stud 229 laterally out of the path of the stud 228 carried by the arm 227. This will permit a spring 240 to swing the arm 222 and stud 221 carried thereby away from engagement with the tail 220 of the pawl 212 thereby permitting the pawl actuating spring 241 to move the pawl into engagement with the ratchet wheel 213. This will cause the disk 209 which is connected to the shaft 210 on which the pawl disk is mounted to rotate carrying with it the roller 208 and thus oscillating the arm 205 and causing the load to be discharged from the platform 160.

Box supporting platform and tilting mechanism therefor

This mechanism is illustrated particularly in Figs. 1, 2, 5, 23 and 24. The box or container is supported on a frame 250 mounted on a pivot shaft 251. At the rear end of the frame 250 are disposed a pair of arms 252 which form a rear stop and engage the rear wall of the box B. The fingers or arms 252 are carried by a spindle 253 and are actuated by a spring 254 to operative position. A stud 255 is adjustably carried by a lug 256 fixed on the spindle 253. The stud 255 is arranged to engage a stop 257 carried by the frame 250. This limits the movement of the fingers 252 in a clockwise direction and is so adjusted that the fingers 252 will be disposed in vertical position, as shown in Fig. 23.

The spindle 253 also has connected thereto a lug 258 which is arranged to engage an adjustable stud 259 carried by a bar 260 fixed to the frame of the machine.

The frame 250 is normally held in the position shown in Fig. 23, but when a charge or a complete load of articles has been deposited in the box B the frame is tilted to the position shown in Fig. 24. This is accomplished in the following manner:

A link 261 is pivotally connected at 262 to the frame 250 and is connected at its opposite end to a lever arm 263 which is mounted on a fixed pivot 264. The arm 263 has mounted thereon a roller 265 which is mounted in a cam groove 266 formed on a cam 267 fixed on a shaft 268. The shaft 268 also has mounted thereon a disk 269 which carries a pawl 270 arranged under predetermined conditions to engage and be driven by a ratchet wheel 271 loosely mounted on the shaft 268. The ratchet wheel has connected thereto a bevel gear 272 which meshes with a bevel gear 273 carried by the shaft 216.

The pawl 270 is controlled by the following mechanism: This pawl has a tail 275 normally engaged by an adjustable stud 276 carried by a lever arm 277 mounted on the pivot shaft 264. An arm 278 is also mounted on the shaft 264 and is connected to the arm 277. The arm 278 is provided at its upper end with a notch 279 arranged to receive a pin 280 carried by a bell crank lever 281, 282 mounted on a pivot shaft 283. The bell crank lever is normally urged in a clockwise direction viewing Fig. 23 by a spring 284, this movement being limited by a stop 285 and an adjustable stop stud 286. The arm 282 of the bell crank lever has pivotally connected thereto a link 287, the other end of the link being connected to an arm 288 mounted on a fixed pivot 289. An adjustable set screw or stud 290 is carried by the upper end of the arm 288 and is disposed in a path of movement of a stud or pin 291 carried by one of the rods 201. When the presser plate 200 is moved to its inner extreme of movement or to its full discharge position the stud or pin 291 will engage the adjustable stud or set screw 290 and will thus swing the arm 288 in an anticlockwise direction causing the link 287 to swing the bell crank lever 281, 282 in an anticlockwise direction moving the pin 280 out of the notch 279 formed in the upper end of the arm 278. This will release the stud 276 from engagement with the tail 275 of the pawl 270 permitting the pawl actuating spring to swing the pawl into engagement with the ratchet 271. This in turn will cause the pawl disk and shaft 268 to rotate, at the same time causing the rotation of the

cam 267 and the cam will through the roller 265 actuate the arm 263 and swing the container supporting frame 250 downwardly about its pivot 251 to the position shown in Fig. 24.

After the container supporting frame has been tilted downwardly in the manner described it will be returned to the position shown in Fig. 23 and the pawl 270 will be automatically released from engagement with the ratchet wheel 271 in the following manner: An arm 292 is mounted on the spindle 264 and is fixed with relation to the arm 277. Arm 292 has secured to its free end a roller 293 which is disposed in engagement with a reset cam 294 which is mounted on the shaft 268 and is connected to rotate with the pawl disk 269. Thus, as the cam 294 actuates the arm 292 the arm 277 will be moved in an anticlockwise direction causing the stud 276 to engage the tail 275 of the pawl 270, thus releasing the pawl from engagement with the ratchet wheel 271.

In the manner described in the preceeding paragraph the box supporting frame 250 is tilted to the position shown in Fig. 24 and the fingers 252 which, in the position shown in Fig. 23, engage the rear wall of the box are permitted to swing on the pivot 253, thus releasing the filled container which is free to drop on a conveyor which will conduct the box away from the machine.

Résumé of operation of the machine

The operations of the various mechanisms in the machine have been outlined in connection with the descriptions of said mechanisms and therefore a detailed summary of operations is not deemed necessary. Briefly, stated, however, the machine operates as follows:

The two sets of conveying mechanisms including the two superposed sets of conveying belts feed two rows of articles to the two platforms 65 and 66. In the particular machine illustrated a complete load for each platform comprises five articles and when each of the platforms has received a complete load the control arms 70 and 70A will through the equalizer 99 swing the arm 96 on its pivot, thus, through the linkage means hereinbefore described causing the arm 42 to swing from the position shown in Fig. 9 to the position shown in Fig. 10. This will permit the presser rollers 37 to move to the inoperative position shown in Fig. 12, thus releasing the pressure of the belts against the ends of the articles and interrupting the feeding of the articles to the platforms by the conveyor mechanisms.

The actuation of the arms 70 and 70A will also permit the roller 78 on the arm 77 to swing downwardly thus allowing the pusher plate 72 to engage behind the two rows of articles on the platforms 65 and 66, whereupon the pusher plate will feed the two rows of articles to the vertically movable platform 68.

After the platform 68 has received a load the platform will be raised to the position shown in Fig. 14 whereupon the horizontally or laterally movable platform 130 will be moved to the position shown in Fig. 15 to support the articles which have been deposited on the platform 68. The latter platform is then lowered, as shown in Fig. 15.

This operation is repeated and the two rows of articles fed by the pusher plate will be successively positioned beneath the rows already positioned on the platform 130 in the manner shown in Fig. 16 until a complete charge of articles has

been deposited on the platform 68, the charge in the machine illustrated comprising eight horizontal rows of articles, as shown in Fig. 19.

When eight rows of articles have been placed on the platform 68 the pusher plate 161 will be actuated and will deposit the charge on the stationary platform 160, as shown in Fig. 20.

This operation will be repeated until a second charge or stack of eight rows has been placed on the platform 160, as shown in Fig. 22. Thereupon the pusher plate 200 will be actuated to feed the load on the platform 160 into the container or box B which is supported on the tiltable platform 250. When the load has been deposited in the box B the platform 250 will be tilted to the position shown in Fig. 24 and the box will be released and will fall by gravity to a delivery conveyor or other suitable delivery means not shown.

From the foregoing description it will be evident that a simple, practical and efficient machine has been designed for feeding, stacking and boxing articles, and that the machine will operate automatically to feed a plurality of rows of articles simultaneously to the stacking mechanism, will stack the articles until a complete load has been assembled and will deposit the load in a box and discharge the loaded box from the machine.

Although one specific embodiment of the invention has been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. In a machine of the character described, article supporting means, means engageable with a plurality of articles on said support for feeding the articles as a unit, means including continuously operating feed belts and means for pressing the belts toward each other for feeding the articles to the support, and means operative when a predetermined number of articles have been fed to the support for rendering said pressing means inoperative and thereby rendering said feeding belts inoperative to feed the articles to the support.

2. In a machine of the character described, article supporting means, means engageable with the articles on said supporting means to feed the articles simultaneously as a unit, a plurality of article conveying means for feeding articles to said supporting means, presser means coacting with each conveying means for rendering said conveying means inoperative to feed the articles, and means controlled by the articles on the supporting means and operative on the presser means for rendering the article conveying means inoperative when the supporting means have received predetermined charges of articles from said conveying means.

3. In a machine of the character described, article supporting means, a vertically movable platform, means for feeding articles from the supporting means to said platform, means for raising the platform, a laterally movable platform, and means for moving said last named platform beneath the articles on said elevated platform to support the articles after said vertically movable platform is lowered, said laterally movable platform being movable out of operative position as each charge is fed to the vertically movable platform.

4. In a machine of the character described, a vertically movable platform, a laterally movable platform disposed in a plane above the plane of the lowermost position of the vertically movable platform and substantially in the plane of the uppermost position thereof, means for feeding articles to the vertically movable platform, means on the laterally movable platform engageable by articles during their movement onto the vertically movable platform whereby the movement of the articles will move the laterally movable platform away from a position over the other platform, means for raising the vertically movable platform, and means for moving the laterally movable platform beneath the articles after they have been raised on the other platform.

5. In a machine of the character described, a vertically movable platform, a laterally movable platform disposed in a plane above the plane of the lowermost position of the vertically movable platform and substantially in the plane of the uppermost position thereof, means for feeding articles to the vertically movable platform, means on the laterally movable platform engageable by articles during their movement onto the vertically movable platform whereby the movement of the articles will move the laterally movable platform away from a position over the other platform, means engageable with articles supported on the laterally movable platform for holding the articles against movement with the laterally movable platform as the platform is moved laterally by the fed articles, means for raising the vertically movable platform, and means for moving the laterally movable platform beneath the articles after they have been raised on the other platform.

6. In a machine of the character described, a vertically movable platform, a laterally movable platform disposed in a plane above the plane of the lowermost position of the vertically movable platform and substantially in the plane of the uppermost position thereof, means for feeding articles to the vertically movable platform, means on the laterally movable platform engageable by articles during their movement onto the vertically movable platform whereby the movement of the articles will move the laterally movable platform away from a position over the other platform, means engageable with articles supported on the laterally movable platform for holding the articles against movement with the laterally movable platform as the platform is moved laterally by the fed articles, means for raising the vertically movable platform, means for moving the laterally movable platform beneath the articles after they have been raised on the other platform, and means for discharging the articles from the vertically movable platform when a predetermined load has been placed thereon.

7. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, and means to move said laterally movable platform beneath the raised articles, said laterally movable platform being movable out of operative position as each charge is fed to the vertically movable platform.

8. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, and means to move said laterally movable platform beneath the raised articles, said laterally movable platform being movable by the articles fed on the vertically movable platform from beneath the articles supported thereon to permit the fed articles to move beneath the articles previously fed and transferred to the laterally movable platform.

9. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, positively actuated means to move said laterally movable platform beneath the raised articles, and means to discharge the articles from the vertically movable platform when a predetermined load has been placed thereon, said laterally movable platform being movable out of operative position as each charge is fed to the vertically movable platform.

10. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, and means to move said laterally movable platform beneath the raised articles, said laterally movable platform being movable from beneath the supported articles as the next succeeding load of articles is fed to the vertically movable platform.

11. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, means

to move said laterally movable platform beneath the raised articles, said laterally movable platform being movable from beneath the supported articles as the next succeeding load of articles is fed to the vertically movable platform, and means to discharge the articles from the vertically movable platform when a predetermined load has been placed thereon.

12. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, means to move said laterally movable platform beneath the raised articles, said laterally movable platform being movable from beneath the supported articles as the next succeeding load of articles is fed to the vertically movable platform, means to discharge the articles from the vertically movable platform when a predetermined load has been placed thereon, a third platform for receiving the discharged articles, and means operative when a predetermined load has been placed on the third platform for discharging the articles therefrom.

13. In a machine of the character described, a vertically movable platform, means for feeding articles to said platform, a laterally movable platform disposed in a plane above the receiving plane of the vertically movable platform and arranged to move beneath and support articles raised by said vertically movable platform, means to move said laterally movable platform beneath the raised articles, said laterally movable platform being movable from beneath the supported articles as the next succeeding load of articles is fed to the vertically movable platform, means to discharge the articles from the vertically movable platform when a predetermined load has been placed thereon, a third platform for receiving the discharged articles, means operative when a predetermined load has been placed on the third platform for discharging the articles therefrom, and a container support arranged to support a container in position to receive the articles discharged from the third platform.

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