Feb. 26, 1946. R. E. J. NORDQUIST 2,395,497

FEEDING DEVICE

Filed Nov. 26, 1943 8 Sheets-Sheet 1

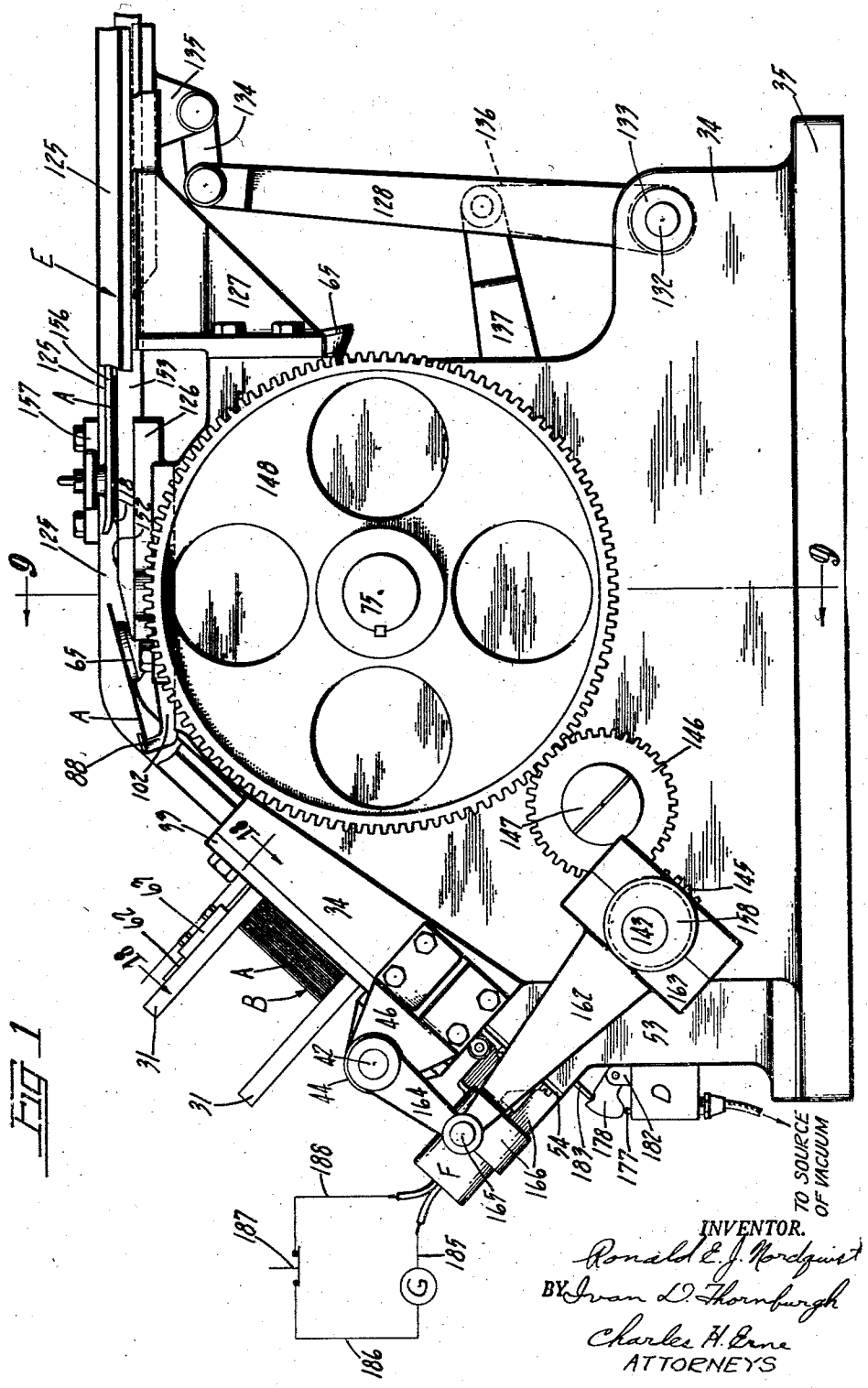


Fig. 1

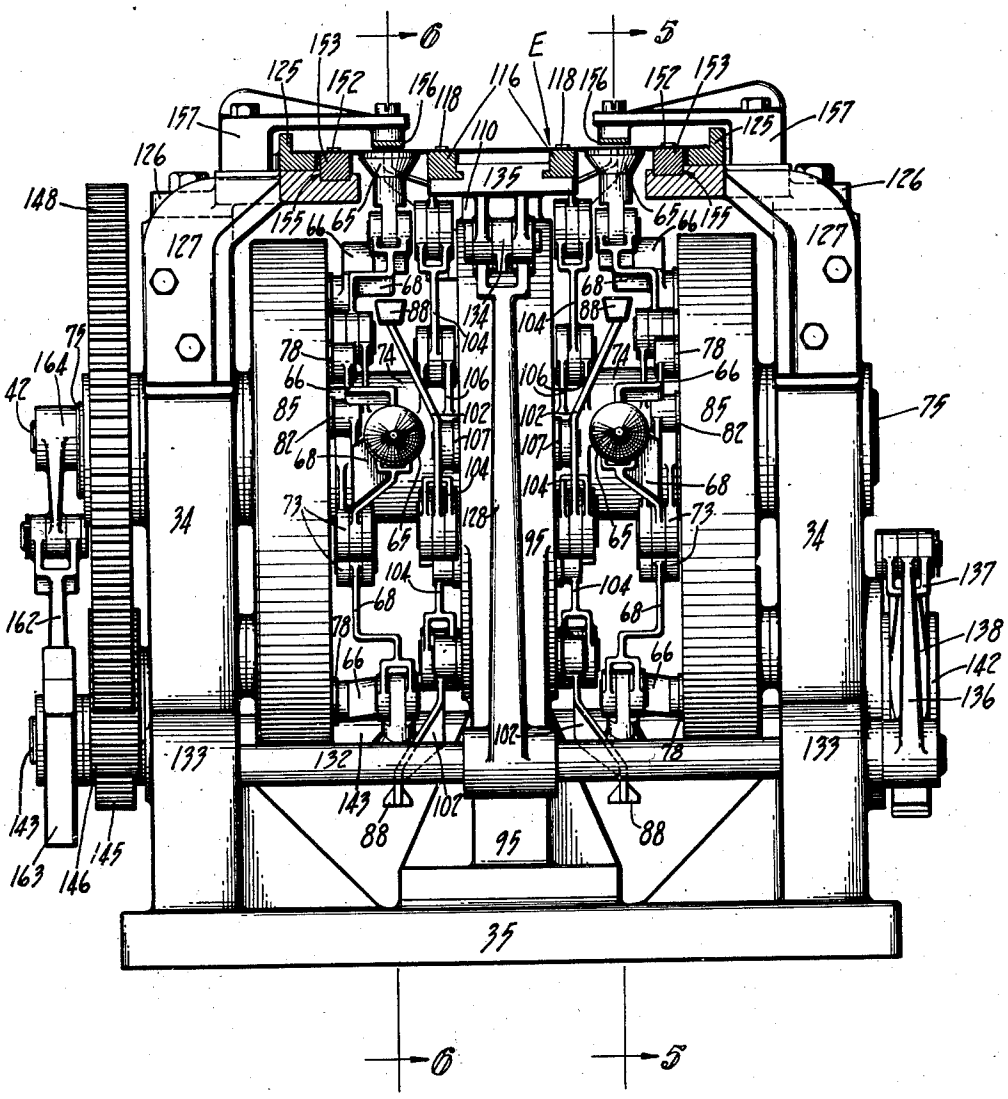
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FEEDING DEVICE

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FIG 2



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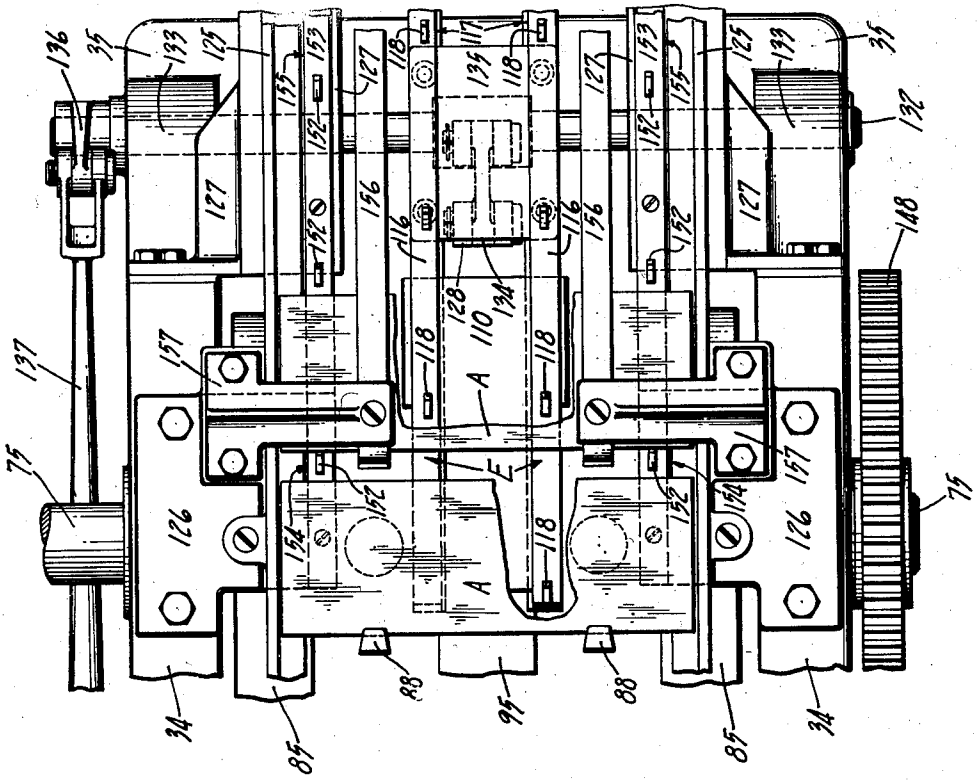


Fig 3

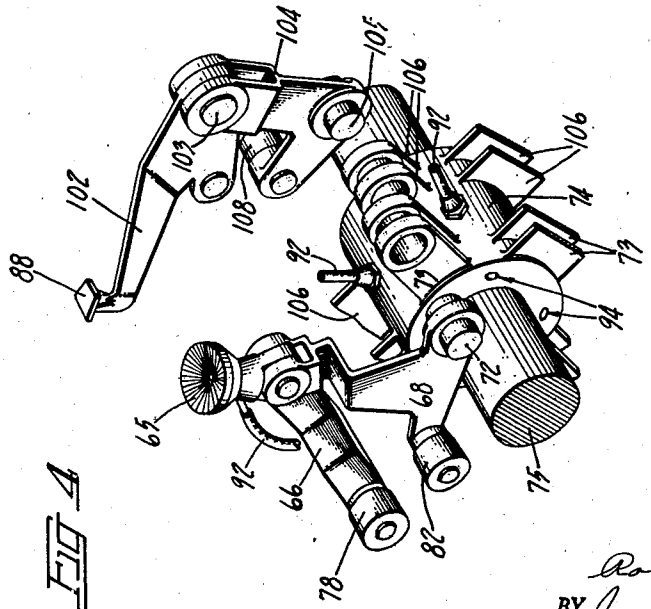


Fig 4

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FEEDING DEVICE

Filed Nov. 26, 1943 8 Sheets-Sheet 4

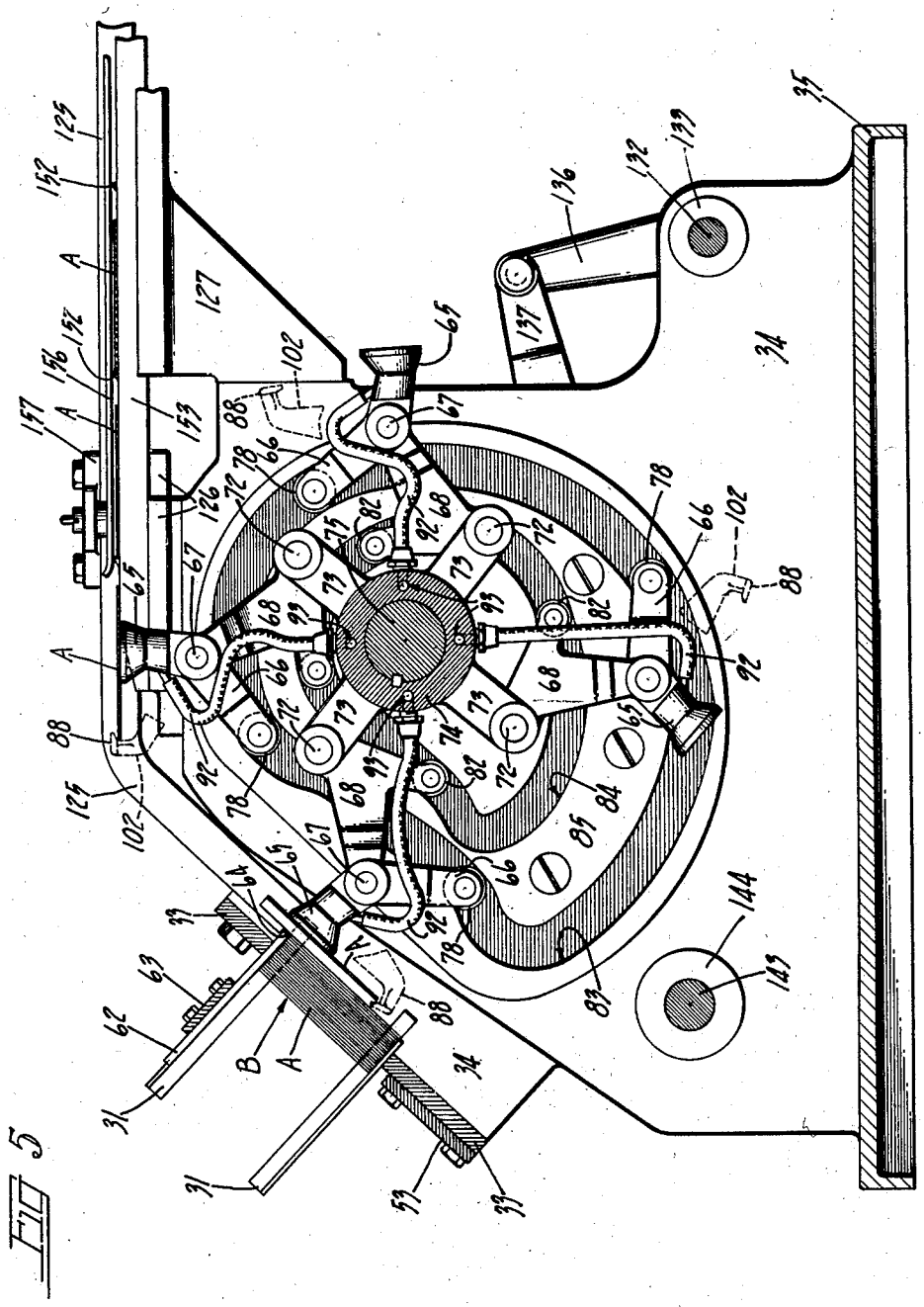


FIG 5

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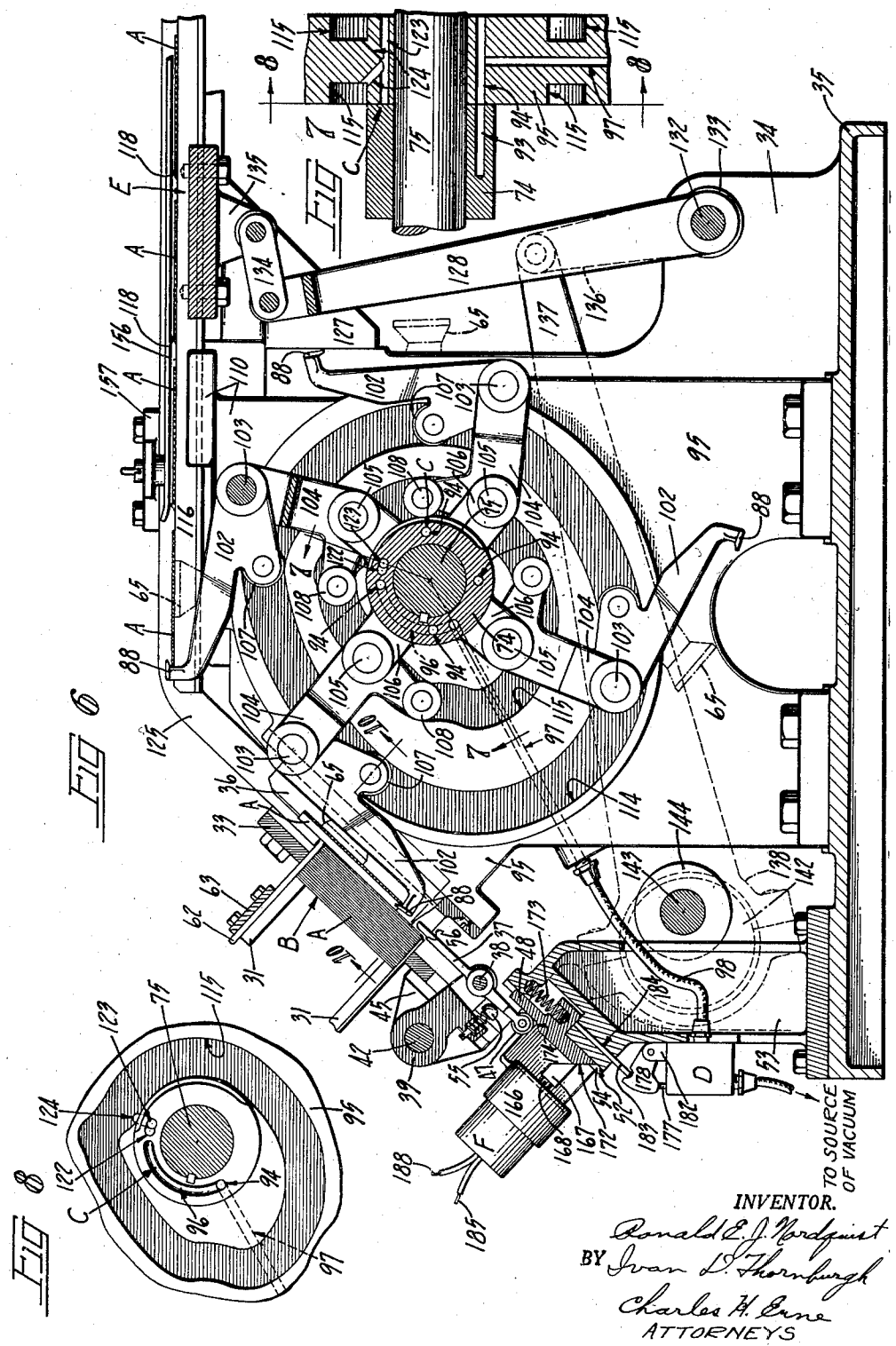


FIG 6

FIG 8

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FIG 9

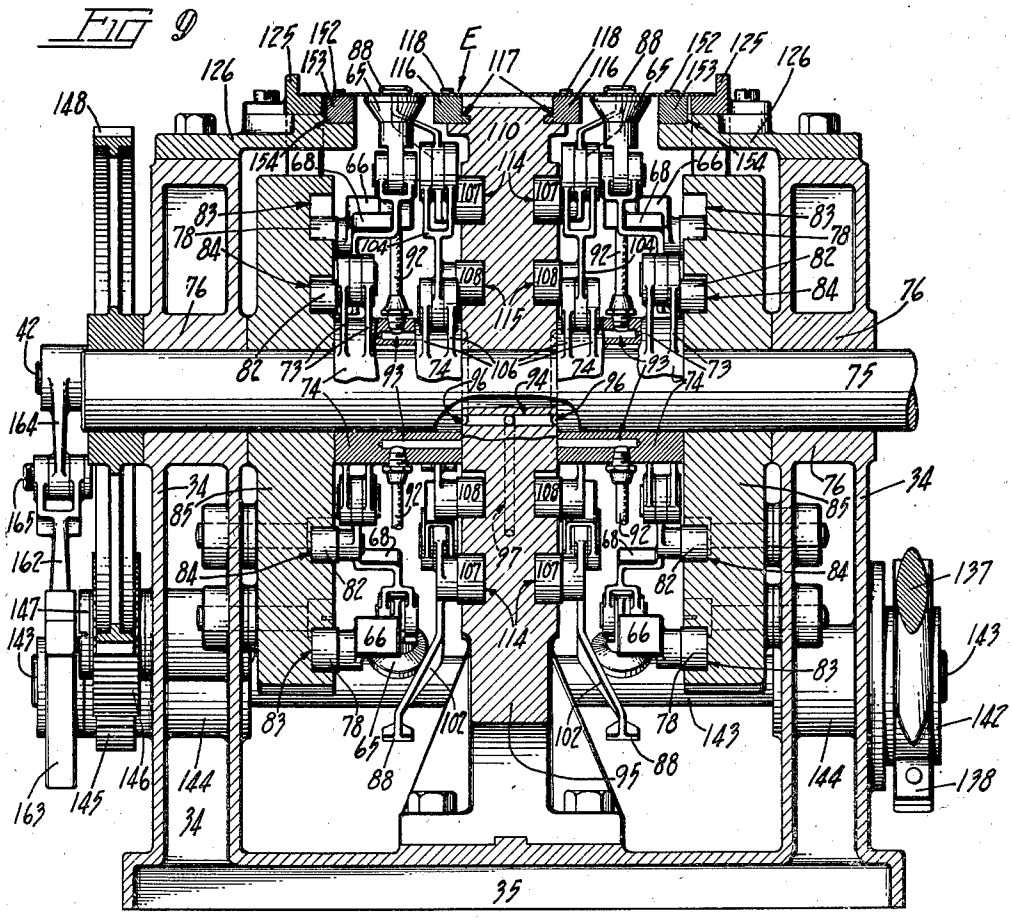
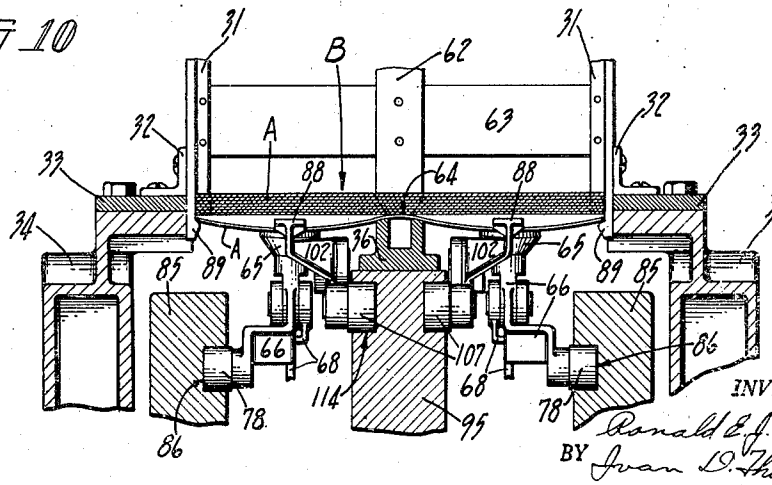


FIG 10



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FIG 11

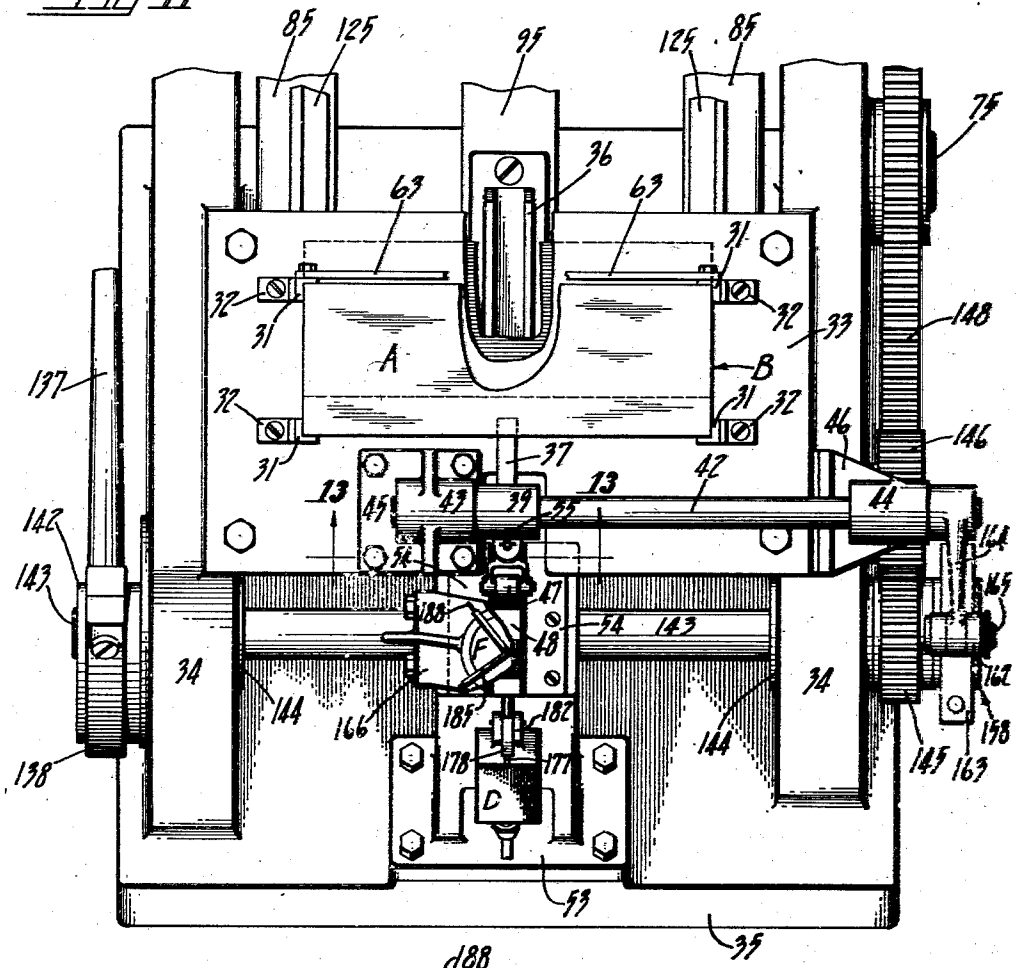


FIG 12

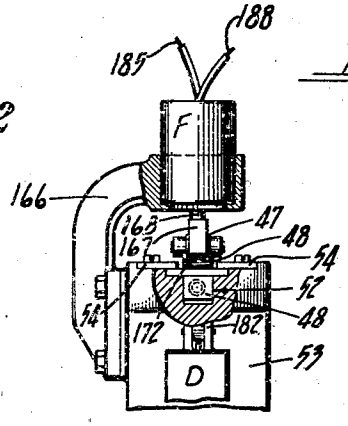
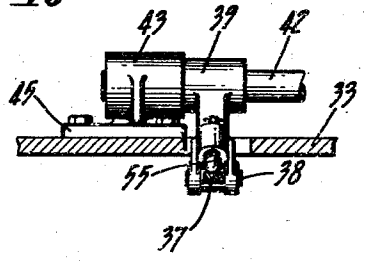


FIG 13



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Fig 14

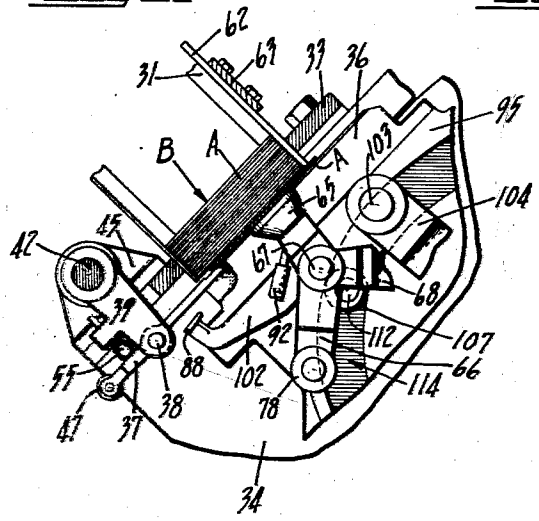


Fig 15

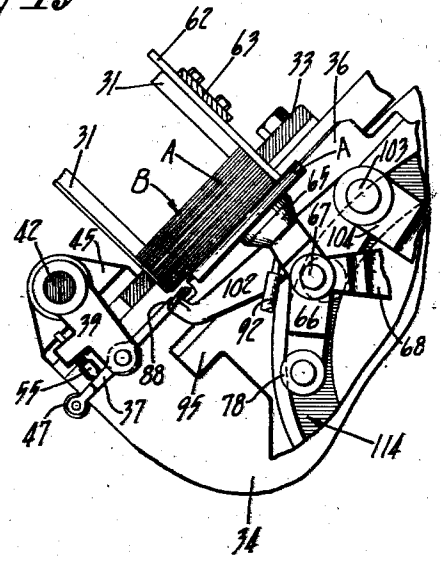


Fig 16

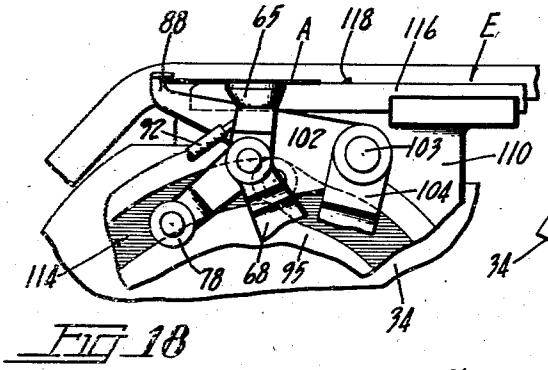


Fig 17

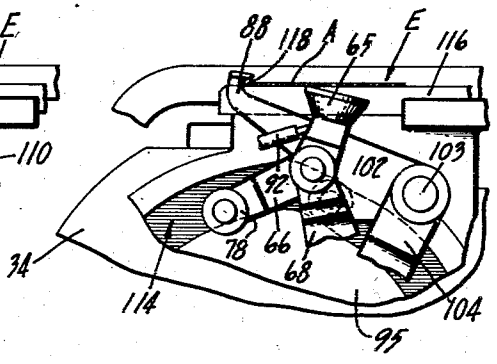
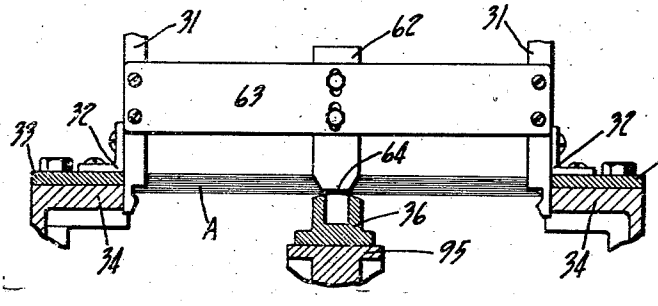


Fig 18



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Patented Feb. 26, 1946 2,395,497

UNITED STATES PATENT OFFICE

2,395,497

FEEDING DEVICE

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Application November 26, 1943, Serial No. 511,810

16 Claims. (Cl. 271—29)

This invention relates to feeding devices for flat sheets or blanks from which container parts are made and has particular reference to a feeding device which may be operated at exceedingly high speeds limited only by the handling capacity of the machine to which the feeding device is attached.

In the feeding of sheets or blanks and the like through can or container making machines, the blanks usually are separated individually from a supply magazine and then are engaged by feed fingers or dogs disposed in reciprocating feed elements or other feeding or advancing devices. When these feed dogs strike against stationary blanks to set them in motion for advancement, the inertia of the blank first must be overcome, which action at high speeds usually nicks the feeding edge of the blank, frequently causing trouble when the blank is undergoing operations in a subsequent can making machine.

The instant invention contemplates overcoming these difficulties by providing a high speed feeding device which separates one blank at a time from a stack of such blanks while setting each separated blank in motion without nicking it and which shifts the separated blank to a position where it may be picked up while it is moving at high speed for further advancement along a path of travel.

An object of the invention is the provision of blank or sheet feeding devices wherein the lowermost blanks in a stack of blanks in a supply magazine are separated individually and set in motion along a predetermined path of travel without nicking the edges of the blanks so that they may be picked up while moving at high speed to control their movement and to continue their advancement.

Another object is the provision of a feeding device of this character wherein the weight of a stack of such blanks in a supply magazine is concentrated at the middle of the lowermost blank so that the lowermost blank can be separated readily without undue scratching of the blanks while moving one blank relative to the other.

A further object is the provision of such a blank feeding device having a suction cup movable along a curved path of travel and mounted in such a manner that it also has movement relative to the curved path of travel and at variable speeds resulting, at the moment of removal of the separated blank from a magazine, in a composite movement in a straight line path of travel, the better to facilitate the blank removal.

Another object is the provision of a feeding device having a plurality of suction cups and a plurality of squaring-up fingers which are coordinated in operation for engaging individual moving blanks to shift them from the magazine and to advance the blanks along a predetermined path of travel for placing them in a desired position.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a longitudinal side elevation of a feeding device embodying the present invention with parts broken away, the view also showing a wiring diagram of the electric apparatus used with the device;

Fig. 2 is an end elevation of the feeding device illustrated in Fig. 1, showing the device as being viewed from the right of that figure, with parts in section;

Fig. 3 is a top plan view of that portion of the device shown at the right in Fig. 1, with parts broken away;

Fig. 4 is a perspective view of a portion of the machine and illustrating a suction cup and a squaring-up finger together with link parts for operating the same, with parts broken away and parts omitted;

Figs. 5 and 6 are longitudinal sections taken substantially along the vertical lines 5—5 and 6—6 in Fig. 2, with parts broken away;

Fig. 7 is a fragmentary sectional view taken substantially along the broken line 7—7 in Fig. 6;

Fig. 8 is a fragmentary detail as viewed substantially along the line 8—8 in Fig. 7;

Fig. 9 is a transverse sectional view taken substantially along the line 9—9 in Fig. 1, with parts broken away;

Fig. 10 is a transverse sectional view taken along the broken lines 10—10 in Fig. 6, with parts broken away;

Fig. 11 is a plan view of a blank magazine in the device as viewed at the left of Fig. 1, with parts broken away, the view being rotated through an angle of ninety degrees;

Fig. 12 is a detail showing a blank separator finger and control solenoid, illustrated at the left in Fig. 1, with parts broken away and parts in section;

Fig. 13 is a fragmentary sectional view taken substantially along the line 13—13 in Fig. 11;

Figs. 14 and 15 are fragmentary sectional views of the blank magazine showing the separation of the lowermost blank and the start of such a blank on its initial straight line movement;

Figs. 16 and 17 are fragmentary sectional views showing the delivery of a blank by a suction cup and a squaring-up finger and showing the release of such a blank after being transferred; and

Fig. 18 is a fragmentary sectional view taken substantially along the line 18—18 in Fig. 1.

As a preferred embodiment of the present in-

vention the drawings illustrate a high speed feeding device wherein rectangular sheets or blanks A (Figs. 1 and 11), having substantially uniform thickness are fed from a stack of such blanks located in supply magazine B. Such a magazine preferably is disposed in an angular position at the feed-in end of the device (see also Figs. 5 and 6).

The magazine B comprises a plurality of corner guide posts **31**, located one at each of the four corners of the blanks A (Fig. 11). These guide posts are secured by angle irons **32** (see also Fig. 18) to a support plate **33** so that they extend up vertically with respect to the plate for holding the stack of blanks in the magazine at an angle. The plate **33** is mounted on side frames **34** which are formed integral with a base **35**.

The blanks while in the magazine rest on a longitudinal support bar **36** located at the middle of the blanks and on a reciprocating separator finger **37** disposed within a clearance groove formed in the bar. The blanks at both ends are unsupported (Fig. 18). The weight of the stack of blanks thus is concentrated on a small central area of the lowermost blank in the magazine. This reduces the tendency of the blanks to scratch each other when moving one blank across another as during their separation.

The lowermost blank A in the stack is separated from the supply magazine by moving it edgewise a predetermined distance along a straight line path of travel relative to the remaining blanks. This is effected by the reciprocating separator finger **37** which is operated at high speed adjacent the supply magazine B. The separator finger moves in a plane substantially parallel to the bottom of the magazine.

The separator finger **37** is carried on a pivot pin **38** secured in the lower end of a depending rocker arm **39** (Figs. 5 and 6). The arm is mounted on a rocker shaft **42** carried in bearings **43**, **44** (see also Fig. 11) of brackets **45**, **46** mounted on the plate **33** and the frame **34**. One end of the finger **37** is forked to accommodate a roller **47** which operates along the surface of a feed control slide **48**, the operation of which will be more fully described hereinafter. Such a slide is movable in a slideway **52** of a pedestal **53** and is retained therein by gibs **54**. The pedestal is mounted on the base **35**.

The roller **47** is held against the slide **48** by a spring operated plunger **55** carried in the rocker arm **39**. This keeps the forward end of the separator finger **37** in a normal operating position. The finger preferably is cut away at its forward edge to form a step **56** equal to or slightly less than the thickness of a blank. This step slides beneath and engages against the rear edge of the lowermost blank on a forward or feeding stroke of the finger and initially starts the blank moving.

In order to prevent more than a single blank from being separated by the rapid action of the separator finger **37**, the magazine is provided with a gauging instrumentality or member **62** which is located at the forward upper end of the magazine (Figs. 5, 10 and 18). Such a gauging instrumentality is adjustable on a cross bar **63** secured to the two forward guide posts **31**. The lower end of the gauging instrumentality is formed with a gauge edge **64** which is positioned relative to the support bar **36** a distance slightly greater than the thickness of one blank. This permits the passage of only the separated blank, when it is advanced by the separator finger.

This initial forward movement of each blank A being advanced by the separator finger **37** carries the blank to the position illustrated in Fig. 14. The blank while still moving is engaged at this location by a pair of transversely spaced suction cups **65** disposed one on each side of the blank support bar **36** (see also Figs. 5 and 10). Thus the two cups engage a blank at two places near its ends. There are four sets of the suction cups, arranged at spaced intervals around a central axis and therefore these cups travel in two spaced and parallel circular paths of travel. The suction cups of each pair operate in unison to grip a blank simultaneously and are controlled in a radial path to cause deviation from their circular path while still moving therearound. This is done to engage successive moving blanks and to draw each one down into a double bowed condition prior to advancing them along a straight line path of travel as an incident to removing them from the magazine.

The suction cups **65** are of the conventional type, being made of rubber or other similar material. Each suction cup is secured to a bell crank lever **66** which is carried on a pivot pin **67** in a link **68**, the lever and the link constituting a pair of jointed connectors. This link is connected by a pivot pin **72** to spaced lugs or arms **73** of a rotatable spider member **74** (Figs. 5 and 9). There are two such spider members located side by side in spaced relation. Each spider member carries four suction cups and they are aligned so that each cup on one member is in transverse registry with its mating cup on the other member to constitute the pairs or sets of cups. The spider members are mounted on a main drive shaft **75** journaled in bearings **76** in the frames **34**. The shaft **75** may be driven in any suitable manner.

The spider members **74** and the rotating main shaft **75** controls the angular velocity of the links **68** and also the suction cups **65**. The radial movement of the suction cups is controlled by cam action. For this purpose the bell crank lever **66** and the link **68** of each suction cup carries cam rollers **78**, **82** which operate in respective cam grooves **83**, **84** (see also Fig. 5) formed in a stationary face cam **85**. There are two cams **85** located one on each side of the machine and each cam is secured to the side frames **34**. The motion resulting from the shaft rotation and cam control is one which carries each pair of suction cups positively along a straight line path of travel at various angular velocities and positions through part of their cycle and through a circular path of travel for the remainder of the cycle.

As a pair of suction cups **65** engages the lowermost blank A in the magazine B (Fig. 14), a vacuum is drawn in each of the suction cups through a valve mechanism C (Figs. 6, 7, 8 and 9). The suction cups then drop back slightly from their circular path to draw down the blank into the bowed condition hereinbefore mentioned and best illustrated in Figs. 10 and 15. This is done to insert a pair of squaring-up fingers **88** between the lowermost separated blank and the stack of blanks in the magazine. The inserted fingers cooperate with the suction cups in advancing the blank. The separated lowermost blank A now is supported at the middle on the support bar **36** and at its opposite ends on ledges **89** formed at the lower ends of the front guide posts **31**.

The valve mechanism C functions continually during the operation of the feeding device and insures the proper vacuum at each pair of suction cups as needed. Thus vacuum is effective at the

cups when they engage, hold and move the blank during part of their cycle. The vacuum is controlled by way of a valve which is operated by the rotation of the rotatable spider members **74**.

Flexible hose or pipes **92** (Fig. 5) connect the suction cups **65** with ports **93** in the hubs of the spider members (Figs. 5, 6, 7 and 9). There is one port **93** for each suction cup. As the two spider members rotate the two ports associated with the two suction cups moving up and engaging the blank register with a passageway **94** which extends through a stationary cam **95**. This is a double cam located between the inner faces of the two spider members at the center of the machine. The cam rests upon and is bolted to the base **35**. The drive shaft **75** extends through the cam.

An arcuate channel **96** is cut in each face of the cam **95** (Fig. 8) these two channels being of the same length and relative position. They determine the period of time that the vacuum supply is effective on the pair of suction cups for as long as the two ports **93** are in communication with the channels the vacuum is in effect.

The passage **94** communicates with a bore **97** (Figs. 6, 7, 8 and 9) which extends back through the cam **95** to the feed-in end of the device (as viewed to the left in Fig. 6). A flexible hose or pipe **98** is connected into the outer end of the bore **97**, the other end of the pipe leading to a vacuum supply shut-off valve D. The operation of this valve D will be described hereinafter.

During the blank engaging action of the suction cups **65** and the drawing down of the blank (Figs. 10 and 15), a pair of the squaring-up fingers **88** previously briefly mentioned move rapidly into position in coordination with each pair of suction cups to engage against an edge of the lowermost blank. These fingers square up each blank and hold the blank in proper position against lateral displacement while they are moving with the suction cups as shown in Fig. 6.

The squaring-up fingers **88**, like the suction cups **65**, also are carried on the spider members **74**. Each feed finger **88** is formed at the end of a lever **102** (Figs. 4 and 6) which is carried on a pivot pin **103** in a bell crank lever **104** (see also Figs. 6 and 9) each of these pairs of levers constituting jointed connectors. Each of the levers **104** is mounted on a pivot pin **105** carried in spaced lugs on arms **106** of the spider members.

The levers **102** and the bell crank levers **104** carry respectively cam rollers **107** and **108** which operate in cam grooves **114**, **115** formed in the opposite faces of the stationary cam **95**. The levers **102** and the levers **104**, like the levers **66** and the links **68** for the suction cups, effect radial movement and angular velocity and position of the squaring-up feed fingers. In fact, synchronized movements are obtained on both the squaring-up fingers and the suction cups through this blank separating part of their circular path of travel.

The synchronized or coordinate action of the suction cups and squaring-up fingers begins just after the suction cups drop back, at the time the lowermost blank in the magazine is engaged by both the suction cups and the squaring-up fingers (Fig. 6). At this time the moving blank A, advancing along a substantially straight line path of travel and on an inclined plane, is continued along such a path by the combined actions of the links and levers previously described. This is at the time these parts are being propelled by the spider members and being actuated by the cams. This effects the removal of the blank from the magazine B along a straight line path of travel in a speedy and smooth manner.

The blank continues moving upwardly along the straight line path in the inclined plane until it approaches the upper level or horizontal plane of the device (Figs. 1, 5 and 6). At this position they are diverted into a curved or arcuate path of travel for delivery onto the horizontal plane. It is this delivery that places the blank into proper position for transfer onto other conveying means which brings it into the work station of a machine.

In the present embodiment it is desirable to transfer the moving blanks onto a reciprocating feed mechanism E (Figs. 1, 3 and 9) without stopping the blanks. Such a feed includes a pair of spaced and parallel reciprocable feed bars **116** which slide in longitudinal grooves **117** formed in a flat top table section **110** (Figs. 5 and 9) of the stationary cam **95**. These feed bars carry a plurality of spaced depressible feed dogs **118** which engage behind the blanks following their delivery onto the feed E.

To effect the delivery of blank A onto the reciprocating feed mechanism E, the blank must be released by the suction cups only after they are in proper position on the feed. Fig. 16 illustrates such a position with a blank A in place on the feed bars **116** and with the suction cups **65** and squaring up fingers **88** still holding the blanks. As this position is reached the vacuum supply to the suction cups is shut off, the channels **96** in the cam **95** (Figs. 8 and 9) having just passed beyond the ports **93** in the spider members **74**. However, the suction line has not yet been opened to atmosphere so the suction cup continues to hold the blank.

The operation of feeding continues and the parts just described next move to a position illustrated in Fig. 17. Here the blank remains fully seated on the feed bars **116**, the suction cups **65** having released their hold on the blank as the vacuum line now is broken. In fact, in this position the suction cups are slightly removed from the blank. This was accomplished by suitable radial action of the levers **66**, the links **68**, and the cams **85**.

This breaking of the vacuum in the suction cup line is brought about when the two ports **93** in the spider members **74**, which connect with the two suction cups now being considered, move into registration with atmosphere channels **122** (Fig. 8) formed in the opposite faces of the stationary cam **95**. One end of each channel **122** is open to an end of a connecting passage **123** (Fig. 7) which extends through the stationary cam. Two angularly disposed openings **124** connect the middle of the passage to atmosphere, the ends of the openings terminating in the two cam grooves **115**.

Simultaneously with the movement of the suction cups **65** from the position shown in Fig. 16 to that of Fig. 17, the squaring up fingers **88** also move out of the way of the blank in an upward direction. This frees the rear edge of the blank from the fingers. Movement of the links **102** and levers **104** under actuation of the cam **95** produce this result. The moving blank, as it is being transferred onto the reciprocating feed bars **116** of the feed E and following such a time, does not pause but continues advancing while the feed bars then on their forward stroke move at the same speed as the blank.

The feed bar movement is to the right, as viewed in Figs. 1, 5, 6, 16 and 17, the feed dogs **118** on the bars engaging the rear edge of the blank and smoothly picking it up without nicking the edge to continue feeding it forward. Since the blank

now is in a horizontal position on top of the feed bars 116 its outer ends pass over and are supported by end guide rails 125. Each guide rail is secured to a table plate 126 which extends longitudinally of the device, there being two rails and two plates, one each on each side. The table plates 126 are secured to the side frames 34 at the rear and to brackets 127 bolted to these frames (Figs. 1 and 2) at the front.

The feed bars 116 are reciprocated in unison through a forward or feeding stroke and thence through a return stroke by an upright actuating lever 128. This lever is mounted at its lower end on a cross shaft 132 journaled in bearings 133 formed in the side frames 34 (Figs. 1, 2, 3 and 6). The upper end of the lever 128 is connected by a link 134 to a cross-head 135 to which is secured the feed bars 116. The cross-head ties the feed bars together and extends down between the feed bars.

The actuating lever 128 is rocked in time with other moving parts of the device by a lever 136 secured to an end of the cross shaft 132. Lever 136 is connected to one end of an eccentric arm 137. The other end of the eccentric arm is formed with an eccentric strap 138 which surrounds an eccentric member 142 mounted on a transverse shaft 143 journaled in bearings 144 formed in the side frames 34 adjacent the feed-in end of the device.

The end of the shaft 143 opposite the eccentric 142 extends beyond the other side of the frame and carries a pinion 145 which meshes with and is driven by an idler gear 146 (Figs. 1 and 11). This idler gear is carried on a stud 147 which is secured to the outer side of a side frame 34. The idler gear 146 meshes with and is driven by a drive gear 148 which is keyed to the main drive shaft 75 of the device.

On the return stroke of the feed bars 116, following each feeding stroke, the blanks are held against return movement by depressible hold-back fingers 152 which are located in a pair of stationary hold-back bars 153 (Figs. 2, 3 and 9) disposed adjacent to and parallel with the feed bars. The hold-back bars are secured in longitudinal grooves 154, 155 formed respectively in the table plates 126 and in the brackets 127.

Hold-down bars 156 extend along and over the feed E (Figs. 1, 3, 6 and 9) and are provided for keeping the moving blanks A on the feed bars 116 as they advance. These bars, of which there are two, are secured at one end to brackets 157 bolted to each of the table plates 126. The opposite ends of the bars 156 may be supported as desired on an adjacent machine or in any suitable manner.

It will be recalled in connection with the preceding description of separating a blank from the magazine that mention was made of the separator finger 37, the rocker arm 39 and the rocker shaft 42 on which the latter was mounted. The rocker shaft 42 (Figs. 1, 5, 6 and 11) is operated by eccentric connection with the transverse shaft 143. For this purpose an eccentric 158 is secured on the end of the shaft 143 just outside of the pinion 145. An eccentric arm 162 having an enlarged end 163 surrounds the eccentric 158. The opposite end of the eccentric arm is connected to a lever 164 by a pin 165 carried in the lever. The lever 164 is secured to the end of the rock shaft 42.

Provision is made in the instant device to stop the feeding of blanks A from the magazine and to render the suction cups 65 inoperative without stopping the rest of the device. For this purpose an electric solenoid F is provided which may be actuated when adverse conditions develop at some remote point as in an adjacent machine when it becomes advantageous to stop further feeding of the blanks. Exemplary of such conditions the solenoid is shown herein as being connected into a normally closed electric circuit, the solenoid being located near the feed-in end of the present feeding device (Figs. 1, 5, 6 and 11). Solenoid F, accordingly is carried in a bracket 166 bolted to the pedestal 53.

The solenoid carries an angular or wedge-shaped element 167 at the lower end of a solenoid core 168. This core is held magnetically in an upward or raised position (Fig. 6) when the solenoid is energized as during normal operations of the feeding device. When the solenoid is deenergized as when adverse conditions require feeding alteration, the core 168 with the element 167 drops down and the wedge element engages against a rear angular surface 172 of the feed control slide 48. This action moves the slide forward and upward on the inclined plane and in the slideway 52 against the resistance of a spring 173, housed in a recess of the pedestal 53. The spring is interposed between a wall of the pedestal and a depending stop lug of the slide.

Movement of the slide 48 when the solenoid is deenergized, cams the roller 47 carried on the separator finger 37 up onto an inclined cam surface 174 of the slide. This action rocks the separator finger 37 against the spring pressed plunger 55 and thus lowers the stepped feed end 56 of the separator finger to a position below the plane of the lower-most blank A in the magazine. Therefore separation of a blank from the stack does not take place.

Movement of the feed control slide 48 when the solenoid is deenergized also cuts off the source of vacuum from the suction cups 65 and thereby prevents the removal of the blanks from the magazine. This is brought about by closing the valve D. Under normal operating conditions the valve is held open by a spring held stem 177 (Fig. 6) which is held depressed by a rocker shoe 178 mounted on a pivot pin secured in lugs 182 on the top of the valve casing. The shoe is normally held in operative position by a slide rod 183 which operates in a bore 184 in the pedestal 53.

One end of the rod engages against the shoe while its opposite end abuts against the stop lug of the feed control slide. Hence when the slide shifts to rock the separator finger 37 out of the plane of the blanks in the magazine, it also moves away from the slide rod and thereby permits the spring held stem 177 to rise under the action of its spring. It is this action that closes the valve D.

Normal operations of the device are resumed again following the reenergizing of the solenoid F. This draws the solenoid core 168 and the wedge element 167 upwardly, permitting the feed control slide 48 to move back to its original operative position by action of the spring 173. This also permits rocking of the separator finger 37 back into its normal separating position in the plane of the lowermost blank in the stack under the action of spring pressed plunger 55 (Fig. 6). The movement of the slide 48 also pushes the slide pin 183 against the rocker shoe 178 and thus depresses the valve stem 177. This opens the vacuum supply valve D and restores the vacuum to the suction cups 65.

The solenoid F is here shown as being a part of an electric circuit (Fig. 1) which includes a

source of electric energy such as a generator G. In this circuit the solenoid is connected by a wire 185 to the generator which in turn is connected by a wire 186 to one side of a normally closed push button or stop switch 187. The stop switch 187 in its turn is connected by a wire 188 to the other side of the solenoid F and this completes the electric circuit and holds the solenoid energized when all switches are closed.

This switch is exemplary of one or more control switches which may be manually opened or may be automatically opened by a movable part at the desired work station as in an adjacent machine. Thus when abnormal conditions arise as where a jam occurs or where further feeding of blanks is not desired for any reason, the solenoid circuit is opened at the switch 187.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a feeding device for container blanks, the combination of a rotatable member, a suction cup carried on said member for engaging a surface of a blank and for advancing the blank along a path of travel, a finger carried on said rotatable member in the rear of said suction cup for thereafter engaging the rear edge of said blank for holding the latter in position on said suction cup, and means for coordinating the operation of said suction cup and said finger to respectively and successively engage longitudinally spaced portions of the blank to advance the latter along said path of travel.

2. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger disposed adjacent said magazine and reciprocable in the direction of travel of the blanks for initially engaging the rear edge of a blank to set in motion the lowermost blank in the magazine and separate the blank from the remaining blanks in said magazine, a rotating member disposed adjacent said magazine, and a suction cup carried on said member for engaging said moving blank to remove the same from the remaining blanks while said moving blank is continued in advancement by said separator finger.

3. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger disposed adjacent said magazine and reciprocable in the direction of travel of the blanks for separating the lowermost blank from the remaining blanks in the magazine and for initially setting in motion said lowermost blank, actuating means for operating said separator finger, means for holding the remaining blanks in said magazine against separation, a rotating member disposed adjacent said magazine, and a suction cup carried on said member for engaging said moving blank and for withdrawing the same laterally from the magazine while the moving blank is being advanced by said separator finger without interrupting movement of the blank along a predetermined path of travel.

4. In a feeding device for container blanks, the combination of a pair of spaced and parallel rotatable members, a plurality of suction cups carried on each of said members and peripherally spaced thereon, a said suction cup of one member being aligned transversely with a corresponding cup on the other member to provide cooperation in pairs for picking up a blank adjacent its forward end and for engaging and advancing it continuously along a path of travel, a finger also carried on each of said members to provide cooperating pairs of fingers for simultaneously engaging the rear edge of a picked-up blank to hold it in position on the associated pair of suction cups while the cups advance the blank along its path of travel, and means for coordinating the operations of said suction cups and said fingers.

5. In a feeding device for container blanks, the combination of a rotatable member, a suction cup carried on said member for picking up a blank adjacent its leading edge while moving in a plane adjacent said member, a squaring up finger carried on said rotatable member and engageable with the rear edge of said picked-up blank for aligning and holding it in position on said suction cup, and means for coordinating the operations of said suction cup and said finger for continuing the movement of said container blank.

6. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger movable adjacent said magazine for initially setting in motion the lowermost blank in said magazine, a rotating member located adjacent said magazine, a suction cup carried on said member for engaging said moving blank while the latter is being advanced by said separator finger and for removing it from said supply of blanks in the magazine, and a finger carried on the rotating member and engaging the rear edge of the blank when it is moving with said suction cup to hold the moving blank in the engaged position on said suction cup while the blank continues its travel.

7. In a feeding device for container blanks, the combination of a magazine for holding a supply of container blanks, a support bar located in said magazine for supporting the said supply of blanks along a narrow area at the middle of the lowermost blank to prevent scratching of the blanks during removal from the magazine, a separator finger movable within the support bar for initially setting in motion the said lowermost blank to slide it along said support bar, a rotating member located adjacent the said magazine, and a pair of suction cups carried on said member and located one on each side of said support bar for engaging the moving blank and for removing it from said magazine.

8. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger movable adjacent said magazine for initially engaging the rear edge of and setting in motion the lowermost blank in the magazine, actuating means for operating said separator finger a plurality of rotating members located adjacent said magazine and operated in unison, a suction cup carried on each of said members, said cups being arranged to operate in unison for engaging and picking up the moving blank adjacent its forward end and for removing it from said supply of blanks in said magazine, and a squaring-up finger also carried on each of said rotating members, said fingers being operated in unison and coordinating with said suction cups to engage the rear edge of the picked-up moving blank for holding it in a squared position on said suction cups while the cups advance it along a predetermined path of travel.

9. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger movable adjacent said magazine for engaging the rear edge of and initially setting in motion the lowermost blank in the magazine, actuating means for operating said separator finger, a plurality of rotating members located adjacent said magazine and operated in unison, a plurality of suction cups carried on each of said members, the cups of each member being spaced and arranged in a circle, corresponding cups of said members being aligned transversely in cooperating sets for picking up successively separated blanks from the magazine while the blanks are in motion and for removing them from the magazine, and a plurality of squaring-up fingers also carried on each of said members with one finger adjacent each suction cup, each set of fingers successively engaging the rear edges of the picked-up blanks to hold them in squared positions on each set of suction cups while the cups advance the blanks along a predetermined path of travel.

10. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a rotating member located adjacent said magazine, a jointed connector element secured to said member, a plurality of suction cups mounted in circumferentially spaced relation on said connector element and movable through a circular path of travel with the rotation of said member, and cam means disposed adjacent said rotating member for effecting radial movement of said connector element at varying angular velocities to bring said cup into engagement with the lowermost blank in the magazine and for removing said blank from the magazine along a straight line path of travel.

11. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a rotating member located adjacent said magazine, a plurality of connectors pivotally secured to said member, a suction cup and a finger carried respectively on adjacent connectors in spaced relation with each other and movable through a circular path of travel, and means disposed adjacent the rotating member for effecting radial movement of said cup and finger at varying angular velocities to bring said suction cup and said finger respectively into engagement with opposite ends of the lowermost blank in the magazine to remove the blank from the magazine and advance the blank along a straight line path of travel.

12. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a rotating member located adjacent said magazine, a pair of links pivotally connected to said rotating member, a pair of levers respectively pivotally connected to each of said links, a suction cup carried on one of said levers, a squaring-up finger carried on the other of said levers, said cup and finger being movable through circular paths of travel with the rotation of said member, and stationary cams adjacent the rotating member for effecting coordinated radial movement of said suction cup and said finger for bringing them into substantially simultaneous engagement with opposite ends of the lowermost blank in the magazine and for removing the blank along a straight line path of travel.

13. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks with the lowermost blank in a predetermined plane, a conveyor located adjacent the magazine for receiving blanks from the magazine and for advancing them along a different plane, a separator finger movable beneath said magazine for initially setting in motion the lowermost blank in said magazine to separate it from the others, a rotating member located adjacent said magazine and said conveyor, a plurality of connectors pivotally secured to said member, a suction cup carried on one of said connectors, a squaring up finger carried on another of said connectors, said suction cup and squaring up finger being movable through a circular path of travel with the rotation of said member, and means disposed adjacent the rotating member for effecting coordinated radial movements of said suction cup and said finger for bringing them into engagement with the lowermost blank in the magazine and for removing the blank along the plane of the blank and for subsequently shifting the removed blank into the plane of the conveyor for deposit thereon.

14. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger operable adjacent said magazine and movable in a plane with the lowermost blank in the said magazine for initially setting the blank in motion, a slide located adjacent to and operable against said finger, means for removing the moving blank from the magazine, and means for actuating said slide relative to said finger for shifting the finger out of the plane of the lowermost blank to stop the feeding of blanks.

15. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a pivoted separator finger operable adjacent said magazine and movable in a plane with the lowermost blank in the magazine for initially setting the blank into motion, a slide located adjacent to and operable against said finger, means for removing the moving blank from the magazine, and an electric circuit including a solenoid for moving the slide relative to said finger for rocking the said finger out of the plane of the lowermost blank to stop the feeding of blanks.

16. In a feeding device for container blanks, the combination of a magazine for holding a supply of blanks, a separator finger operable adjacent said magazine and movable in a plane with the lowermost blank in the magazine for initially setting the blank in motion, a slide located adjacent to and operable against said finger, a rotating member located adjacent said magazine, a vacuum suction cup carried on said member for picking up the moving blank and for removing it from the magazine, a vacuum supply valve having communication with said suction cup for controlling the supply of vacuum to the suction cup, and an electric circuit including a solenoid for moving the slide relative to said finger to shift the finger out of the plane of the lowermost blank in the magazine and for simultaneously closing said valve to shut off the supply of vacuum to said suction cup to stop the feeding of the blanks.

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