

Feb. 5, 1946.

H. J. PAYNTER

2,394,007

MACHINE FOR MAKING FIBER CONTAINERS

Original Filed Dec. 29, 1938

4 Sheets-Sheet 1

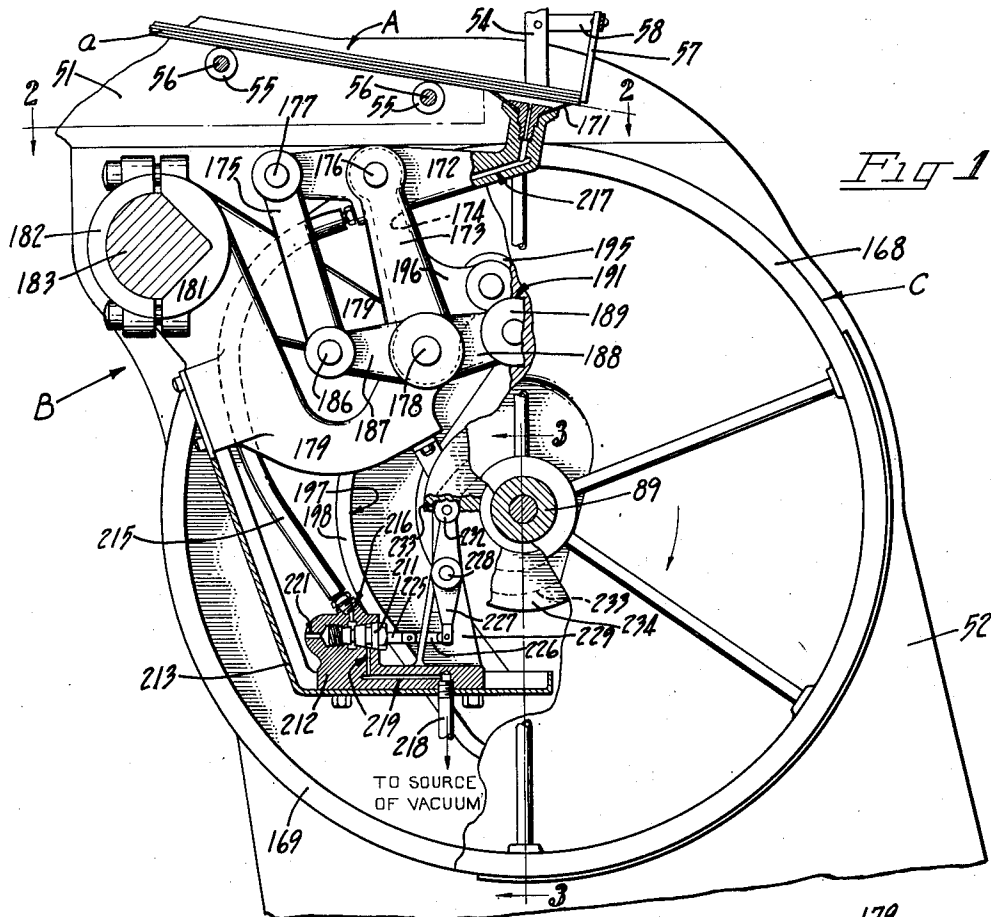


Fig 2

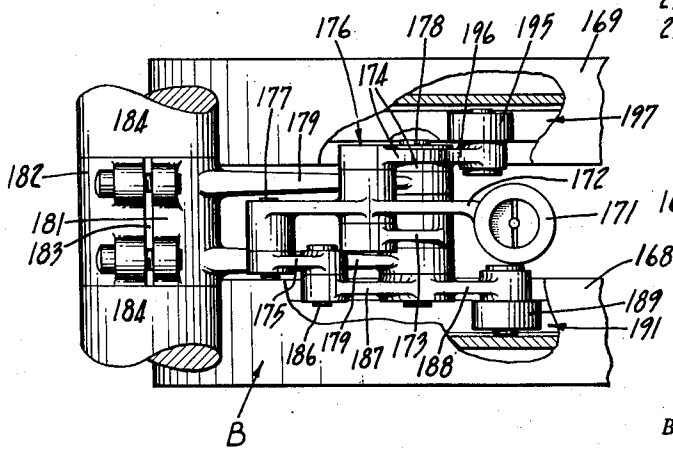
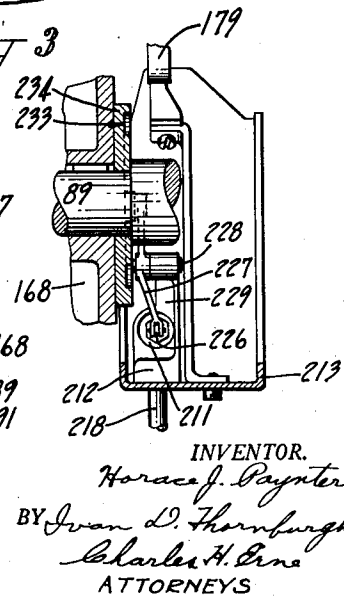


Fig 3



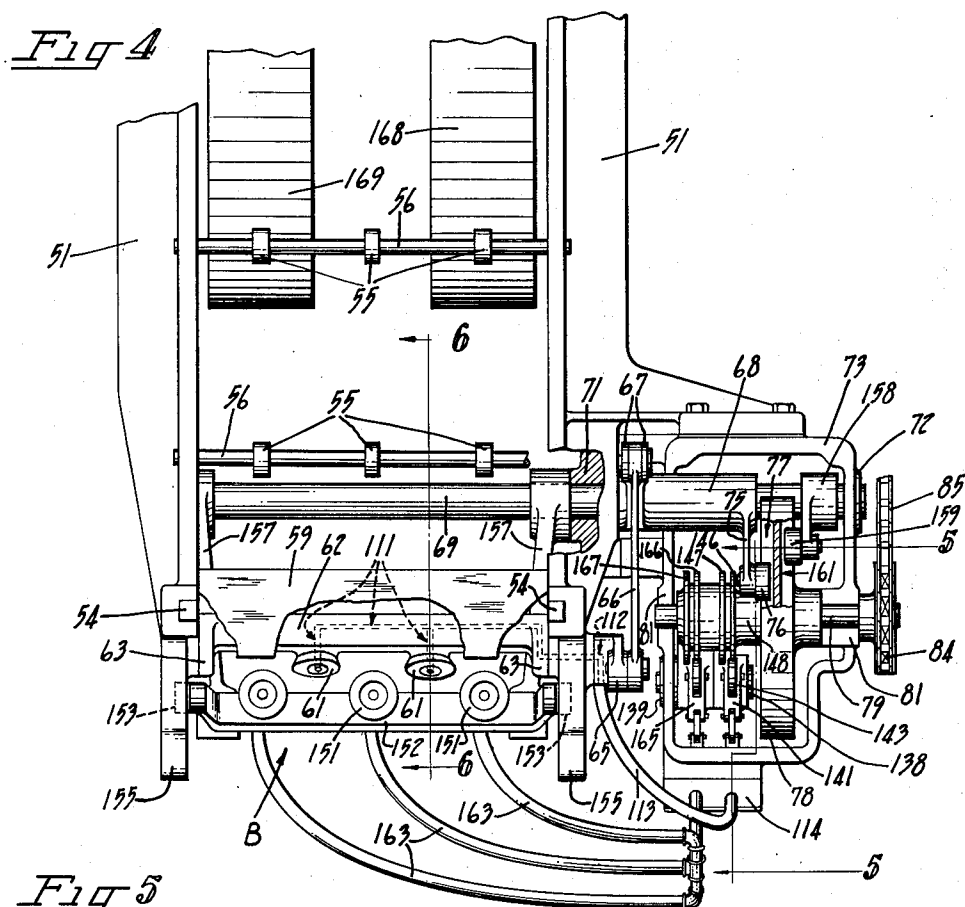
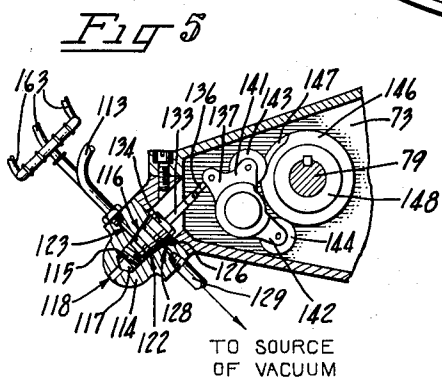
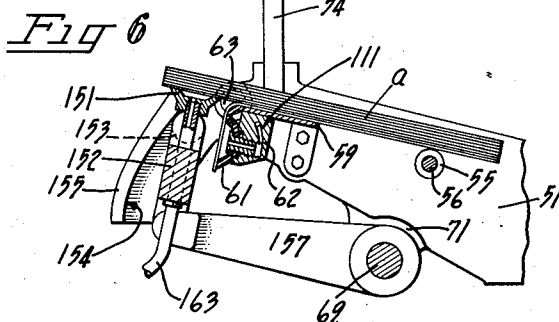
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Original Filed Dec. 29, 1938 4 Sheets-Sheet 2



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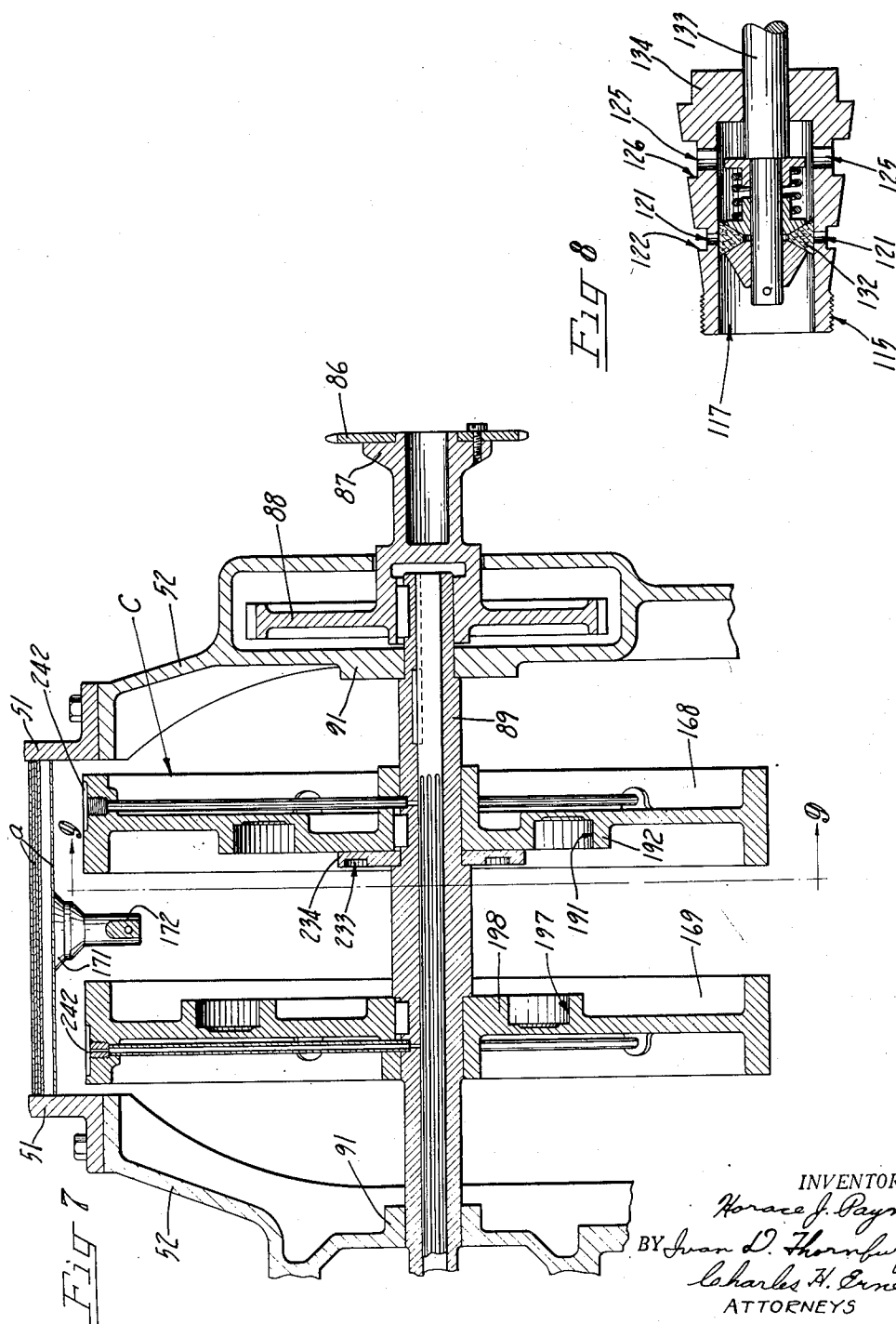
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Fig 9

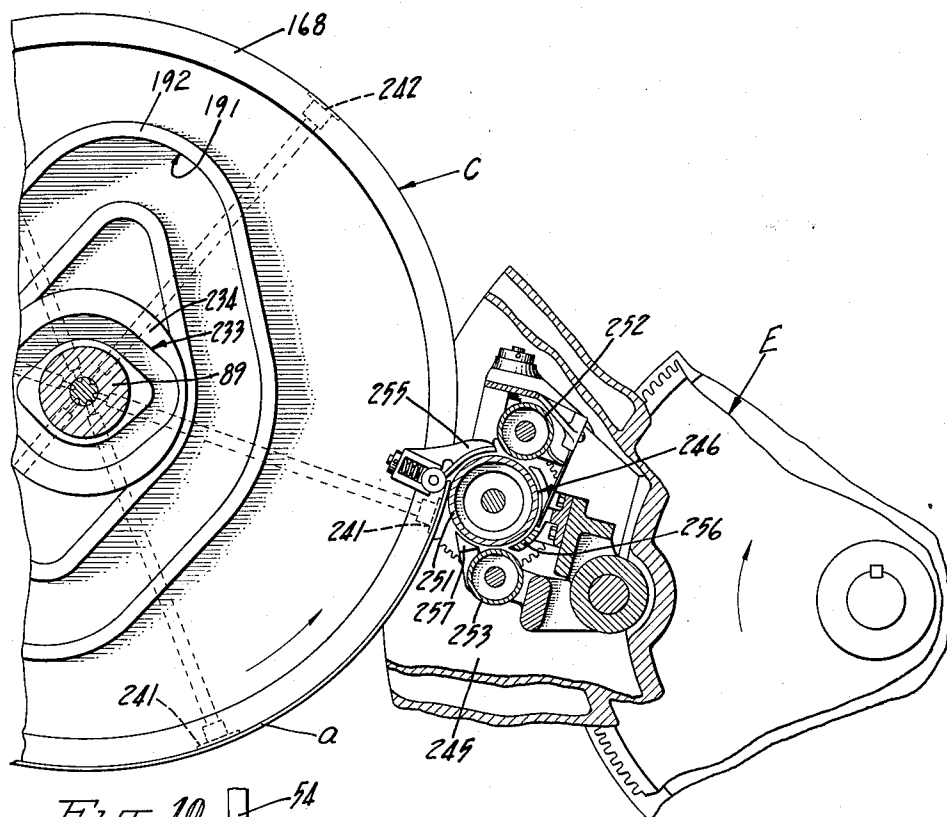
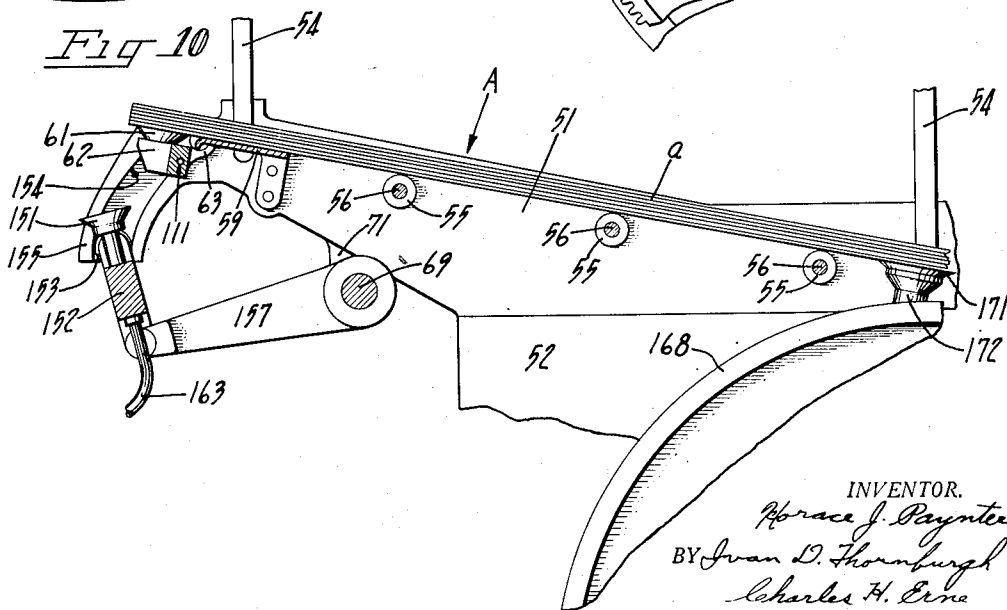


Fig 10



UNITED STATES PATENT OFFICE

2,394,007

MACHINE FOR MAKING FIBER CONTAINERS

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Original application December 29, 1938, Serial No. 248,338. Divided and this application December 20, 1941, Serial No. 423,829

8 Claims. (Cl. 271—32)

The present invention relates to a machine for making fiber container or can bodies and has particular reference to devices for feeding prepared blanks to transfer elements for advancement through the machine. This is a division of my application Serial Number 248,338, filed December 29, 1938, on Machine for making fiber containers, now Patent No. 2,292,402, issued August 12, 1942.

An object of the invention is the provision in a fiber can body making machine of blank feeding devices wherein individual fiber blanks are fed from the bottom of a magazine so that the magazine may be kept filled from the top, the feeding devices operating to hold the blank next above the lowermost blank in place within the magazine while the lowermost blank is being withdrawn so that only one blank will be fed at a time.

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 side view of a portion of a fiber can body making machine embodying the instant invention, with parts broken away and parts shown in section;

Fig. 2 is a plan view taken substantially along planes indicated by the broken line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is a vertical section taken substantially along the line 3—3 in Fig. 1, with parts broken away;

Fig. 4 is a top plan view of the blank feeding device of the machine, with parts broken away;

Figs. 5 and 6 are fragmentary sectional details taken substantially along the lines 5—5 and 6—6 in Fig. 4;

Fig. 7 is a vertical section through the center of the devices shown in Fig. 1 as viewed toward the right, with parts broken away;

Fig. 8 is an enlarged sectional detail of a valve unit used in the machine;

Fig. 9 is a sectional view taken substantially along the line 9—9 in Fig. 7, with parts broken away; and

Fig. 10 is a sectional view similar to Fig. 6 and showing additional parts together with the same movable parts in a different position.

As a preferred embodiment of the instant invention the drawings illustrate the blank feeding devices of the machine disclosed in my original application, in which prepared rectangular, fiber

can body blanks *a* are wound into cylindrical can bodies of laminated character.

In such a machine a stack of the blanks *a* is supported in a magazine A (Fig. 1) from which they are individually withdrawn by a feeding device B, the blanks being fed from the bottom of the stack. A fed blank is immediately brought into engagement with a transfer unit C which carries the blank forward and transfers it to a winding mechanism E (Fig. 9).

In the winding mechanism E one end of the blank is caught by one of a plurality of rotating spindles or mandrels and is wound tightly around the spindle while pressure is exerted on the outside of the blank. Dried adhesive carried on the blank is moistened during its passage through the machine and this adhesive holds the wound body together. The instant invention relates only to the feeding of the blanks from the magazine A onto the transfer unit C.

The blank magazine A is located on top of the machine in an inclined position and includes a pair of spaced magazine side frames 51 (Figs. 1, 4, 7 and 10) which are bolted to a pair of main machine side frames 52. The magazine side frames 51 are provided with vertically disposed guide rods 54 which retain the blanks in a stack one on top of the other. The blanks are mainly supported on a plurality of rollers 55 which are mounted on cross rods 56 carried in the magazine side frames. These rollers are arranged to retain the blanks in an inclined position so that they may be more readily withdrawn from the stack.

Adjacent the forward end of the magazine the blanks overhang the foremost supporting roller 55 and engage endwise against a stop plate 57 which is carried on arms 58 connecting with the forward guide rods 54. This stop plate prevents shifting of the blanks while they are in the magazine. At the rear or elevated end of the magazine the blanks rest on a cross plate 59 (Fig. 10), the ends of the blanks overhanging the plate. This plate is bolted to the magazine side frames 51.

Feeding of the blanks *a* from the magazine A is performed preferably by suction cups which are associated with the feeding device B, the device being located directly under the magazine. In this feeding operation provision is made for holding the remainder of the stack while the lowermost blank is withdrawn, the rear end of the lowermost blank first being drawn down over and below the rear end of the support plate 59, as shown in Fig. 6.

Drawing down of the rear end of the lower-

most blank is effected by a pair of suction cups 61 (Figs. 4, 6 and 10) which are secured to a pivot block 62 having trunnions 63 carried in the magazine side frames 51. One of these trunnions extends beyond the side frame and carries an arm 65. The arm 65 is connected by a link 66 to a second arm 67 which is formed on a sleeve 68 loosely mounted on a cross shaft 69. The cross shaft is carried in bearings 71 formed in the magazine side frame and in a bearing 72 formed in a cam housing 73 secured to a side of one of the magazine side frames.

Sleeve 68 is provided with an arm 75 which carries a cam roller 76. The cam roller operates in a cam groove 77 formed in the inner face of a cam 78 mounted on a short shaft 79 journaled in bearings 81 formed in the cam housing 73. The outer end of the shaft projects beyond the housing and carries a sprocket 84 which is driven by a chain 85.

Chain 85 in turn takes over a driving sprocket 86 (see also Fig. 7) bolted onto a hub extension 87 of a drum gear 88 carried on one end of a hollow drum shaft 89. This shaft is journaled in bearings 91 formed in the main side frames 52. The drum gear 88 is continuously rotated in any suitable manner preferably as disclosed in my original application.

Rotation of the drum shaft 89 and the cam shaft 79 rotates the cam 78 in time with the other moving parts of the machine. The rotation of the cam rocks the sleeve 68 and the suction head block 62 connected therewith. Thus the suction cups 61 are rotated upwardly into engagement with the rear end of the lowermost blank *a* in the magazine as an incident to feeding a blank.

A vacuum is drawn on the suction cups 61 when in this engaged position and the blank so engaged adheres to the cups. The pivoted block 62 is provided with channels 111 (Fig. 4) which connect into each suction cup 61. A manifold end of the channels extends through one of the projecting trunnions 63 where it opens into a similar channel 112 formed in the hub of the block actuating arm 65. The outer end of this channel 112 communicates with a flexible tube 113.

One end of the tube 113 is secured in the hub of the arm 65 while its opposite end is fastened into a valve cage 114 (Fig. 5) which is bolted onto the cam housing 73. The valve cage houses a valve 115 (see also Fig. 8) which is threaded tightly into a tapered bore 116 formed in the cage. The interior of the valve is hollowed out to provide a cylinder 117 which is open at one end, the lower end as viewed in Fig. 5. This end of the cylinder communicates with an atmosphere port 118 which is formed in the valve cage 114 and which leads to the outside atmosphere.

The side wall of the valve 115 is provided with radial intake ports 121 (Fig. 8) which communicate with the valve cylinder 117 and which lead outwardly into an annular groove 122 cut in the outside surface of the valve. Communication between this groove and the valve cage end of the flexible tube 113 is provided by a bore 123 which is formed in the cage.

The valve also is provided with radial outlet ports 125 which extend from the valve cylinder 117 into a second annular groove 126 formed in the outer peripheral surface of the valve. Grooves 122 and 126 are cut off entirely from communication with each other by the metal to metal contact of the outside surface of the valve with the surface of the cage around the tapered

bore 116. However, the groove 126 communicates with an exhaust bore 128 which is formed in the valve cage and which connects with a pipe 129 threaded into the cage. This pipe 129 leads to any suitable source of vacuum.

Control of the vacuum through the valve 115 is governed by a piston 132 (Fig. 8) which slides in the valve cylinder 117. The piston is carried on the inner end of a stem 133 which extends up through a bearing 134 formed in the upper end of the valve, as viewed in Fig. 5. The outer end of the stem is connected by a link 136 to a bell crank lever 137 loosely mounted on a pin 138 secured in a boss 139 formed in the cam housing 73 (see Fig. 4). The bell crank lever is provided with two arms 141, 142 which respectively carry at their outer ends cam rollers 143, 144. Cam roller 143 operates on a narrow edge cam 146 while roller 144 operates on a similar cam 147. These cams are formed on a sleeve 148 mounted on and rotated by the cam shaft 79.

Thus as the cam shaft 79 revolves the cams 146, 147 they in turn rock the bell crank lever 137 in unison with the other moving parts of the machine and hence reciprocate the valve piston 132 within its cylinder 117 in the cycle desired. Rocking of the bell crank lever first moves the piston into a position between the intake ports 121 and the atmosphere port 118. Thus direct communication is established between the source of vacuum and the suction cups 61.

A vacuum is drawn on the suction cups by way of the block channels 111, block actuating arm channel 112, tube 113, valve cage bore 123, valve groove 122, intake ports 121, valve cylinder 117, outlet ports 125, valve groove 126, exhaust bore 128, and pipe 129. It is this vacuum that draws down the rear end of the lowermost blank *a* in the magazine when the cups move from the raised position of Fig. 10 into that of Fig. 6, as when the cup block 62 rocks.

At the proper time, as will be explained in due course, the cups will be released from the blank by breaking of the vacuum. This vacuum release is effected when the valve piston 132 is moved in a reverse direction by the cooperating cams 146, 147 and the bell crank 137. Reverse movement of the piston brings it into a position between the valve intake ports 121 and the outlet ports 125. This cuts off communication between the suction cups 61 and the source of vacuum.

At the same time there is established communication between the cups and the atmosphere port 118. Outside air rushes into the bores, tube and channels and into the suction cups and this breaks the vacuum and releases the blank from the cups at the proper time.

Positive holding of the blank next above the lowermost blank *a* while the latter is held by the suction cups 61 preferably is effected by a series of three vacuum cups 151 (Figs. 4, 6 and 10). These vacuum cups are mounted on a movable cross beam 152 having cam rollers 153 secured to each end thereof. The cam rollers operate within grooves 154 of stationary cams 155 formed as a part of the magazine side frames 51.

The beam 152 is secured to the outer ends of a pair of spaced arms 157 which are carried on the cross shaft 69. The cross shaft also carries a cam arm 158 (Fig. 4) having a cam roller 159 which operates within a groove 161 formed in the outer face of the cam 78 mounted on the cam shaft 79.

Thus as the cross shaft 69 oscillates, the cross beam 152 is raised and lowered and its vacuum

cups 151 move toward and away from the stack of blanks in the magazine. On the upward stroke of the cross beam the stationary cams 155 guide the cups past the turned down rear end of the held lowermost blank and further guide the cups into engagement with the blank next above. It is at this time of engagement that the suction cups 61 release their hold on the turned down end of the lowermost blank and leave it free for withdrawal.

To get the proper vacuum control, the vacuum cups 151 are brought into communication with a source of vacuum. For this purpose each vacuum cup 151 is connected by a tube 163 into the valve cage 114 and these join and communicate with a valve which is identical in construction to the valve 115 just explained. This valve is located adjacent the valve 115 and is operated in a similar manner by a bell crank 165 (Fig. 4) mounted on the same pin 138 adjacent the bell crank lever 137. Bell crank 165 carries cam rollers which operate on a pair of adjacent edge cams 166, 167 also formed on the cam sleeve 148.

Withdrawal of the lowermost blank *a* from the magazine while the blank next above is held stationary is brought about by a single feed cup 171 (Figs. 1, 2, 7 and 10) which is located directly under the forward ends of the blanks in the magazine. In this location the feed cup is disposed between but is slightly above a pair of feed drum wheels 168, 169 carried on the drum shaft 89 and associated with the transfer unit C.

Feed cup 171 carried on the free end of a substantially horizontal moveable arm 172 which is a part of a parallelogram system of links (Figs. 1 and 2) arranged to guide the cup along a curved path of travel when the links are moved. The cup arm is supported on three inclined movable links 173, 174, 175 which are included in the parallelogram system. Links 173, 174 are mounted alongside each other, one on each side of the arm intermediate its length. The upper ends of these links are pivotally connected to the arm by a pivot pin 176. The upper end of the link 175 is pivotally connected by a pivot pin 177 to the outer end of the arm.

To complete the parallelogram system of links, the lower ends of links 173, 174 are mounted on a pivot pin 178 carried in two spaced stationary support arms 179 one of which is straight, the other curved. These arms are formed integrally with a half block 181 which is formed with a V-groove and which is clamped by a half cap 182 around a locking portion 183 of a stationary bar 184. The ends of the bar are secured in the outside frame 52. The lower end of link 175 is fastened by a pivot pin 186 to the outer end of an arm 187 which is carried on the pivot pin 178 adjacent the outer stationary arm 179.

Thus the arms and links are all tied together in a parallel system and are moved along controlled paths of travel in order to shift the suction cup 171 in a controlled path as will now be explained. Link 175 and its arm 187 are rocked independently of the parallel arms 173, 174. For this purpose arm 187 is provided with a leg 188 which carries a cam roller 189. The roller operates in a cam groove 191 (see also Fig. 7) of a face cam 192 formed as a part of the feed drum wheel 168. Rotation of the drum wheel 168 and its cam 192 rocks the arm 187, link 175, and the feed cup arm 172 and moves the feed cup 171 vertically.

The horizontal movement of the feed cup 171 is effected by cam action through the medium of

a cam roller 195 (Figs. 1 and 2) which is carried on a lug extension 196 of the link 174. The cam roller operates in a cam groove 197 (see Figs. 7 and 9) of a face cam 198 formed as a part of the feed drum wheel 169. Rotation of the cam rocks the links 173, 174 and thus shifts the feed cup arm 172 moving the feed cup 171 in its horizontal direction.

The combination sequence of these vertical and horizontal movements first shifts the feed cup 171 vertically into engagement with the forward end of the lowermost blank *a* in the magazine. A vacuum is drawn on the cup at that time. The feed cup then moves downwardly and forwardly in a curved path of travel in time with the rotation of the feed drum wheels and corresponding somewhat to the surface of the drums.

The result of this movement is to partially withdraw the blank *a* from the magazine and to bring the forward end of the blank down into engagement with the periphery of the two spaced and parallel feed drum wheels 168, 169 of the transfer unit C. The feed cup then releases the blank as the vacuum is broken. The feed cup returns to its original raised position ready to transfer the next succeeding blank but not until the partially withdrawn lowermost blank has been entirely removed from the magazine.

The vacuum control on the feed cup 171 is effected through a valve 211 (Fig. 1) which is identical in construction with the other valves 115 (Fig. 8) hereinbefore described. This valve 211 is housed in a valve casing 212 bolted onto a bracket 213 (see also Fig. 3) which is secured to one of the support arms 179.

The vacuum supply connection with the valve 211 is made by a flexible tube 215 having one end connected to the feed cup arm 172, the other end being secured in the valve cage 212 where its interior communicates with a short passageway 216 formed in the cage which leads to the narrow groove of the valve. The feed arm 172 has a passageway 217 which connects the flexible tube to the feed cup 171.

A vacuum supply pipe 218 is threaded into the valve cage, and its interior communicates with a passageway 219 formed in the cage which leads to the wide groove of the valve. An atmosphere port 221 is formed in the valve cage for letting air into the feed cup to break the vacuum.

The movable piston of the valve 211 is actuated by a stem 225 which is connected by a link 226 to the lower end of a vertically disposed lever 227. The lever is mounted on a pivot pin 228 carried in a bracket 229 formed on the valve cage 212. The upper end of the lever carries a cam roller 232 which operates in a cam groove 233 cut in one face of a cam 234 mounted on the drum shaft 89 adjacent the drum wheel 168 (see also Fig. 7). This provides cam actuation for the valve.

When the forward end of a blank *a* partially removed from the magazine is brought into engagement with the outer surface of the feed drum wheels 168, 169 of the transfer unit C it is held there by suction cups 241, 242 (Figs. 7 and 9) which are provided in the drum wheels. Hence the moving wheels withdraw the blank completely from the magazine.

The drum wheels are preferably of sufficient diameter to accommodate on their circumferences two blanks in end to end relation with a working space between them. Greater speed of production is thus possible since one blank is being worked on while another succeeding blank

is being positioned on the drum wheels in readiness for working.

The suction cups 241, 242 hold the received blanks *a* in place on the drum wheels while the latter rotate and carry them forward toward the winding mechanism E (Fig. 9). The winding mechanism is located adjacent the transfer drum wheels and includes a larger drum cylinder 245 which is rotatable on a horizontal axis. The drum cylinder carries a plurality of winding units 246 (only one of which is shown in the drawings). These units each include a rotating winding spindle or mandrel 251 and a pair of yieldably mounted rotating pressure rollers 252, 253 disposed adjacent the spindle. An entrance guide rail 255 is disposed adjacent the spindle and auxiliary guide rails 256, 257 adjacent the pressure rollers guide the blank around the spindle. Actuation of these winding unit parts is identical with those described and explained in my original application.

The drum cylinder 245 is rotated in time with the transfer drum wheels 168, 169 to bring a winding unit 246 into position adjacent the leading edge of a blank *a* on the drum wheels. When the winding unit comes adjacent the drum wheels, the suction cups 241, or 242 as the case may be, successively release their hold on the blank *a* to permit the blank to be transferred to the winding unit spindle 251.

As the first of the cups release the leading edge of the blank, this edge is caught by the entrance guide rail 255 and is directed around the winding spindle 251. The pressure rollers 252, 253 press the blank against the spindle while the guide rails 256, 257 guide the blank around the spindle. As the blank thus is wound on the spindle the remaining suction cups release the blank from the transfer drum wheels and in this manner the blank is wound into a laminated can body. After winding, the finished can body may be discharged from the spindle in any suitable manner, such as that disclosed in my original application. This completes the forming of the can body.

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. A blank feed for a fiber can body making machine, comprising in combination a magazine for a stack of fiber blanks, suction cups for pulling down the rear end of the lowermost blank in the magazine, vacuum cups movable past said pulled down end of the lowermost blank for engaging and holding against displacement the rear end of the blank next above the lowermost blank in the magazine, and a suction feed cup adjacent the front end of the lowermost blank for withdrawing it from the magazine while the blank next above is held therein, and means for drawing vacuum on said cups and for releasing it at the proper time to effect continuous successive feeding of individual blanks from the magazine.

2. A blank feed for a fiber can body making machine, comprising in combination a magazine for a stack of fiber blanks, a block pivotally mounted adjacent the rear end of the lowermost

blank in said magazine, a plurality of suction cups mounted on said block, means for actuating said block to rock said suction cups toward and away from said lowermost blank for pulling its rear end down into a position at an angle to the blank next above, a cross-beam adjacent said block, a plurality of vacuum cups located on said cross-beam, means for moving said cross-beam vertically past the pulled down end of the lowermost blank to bring the vacuum cups into holding engagement with the blank next above, a suction feed cup adjacent the front end of the lowermost blank for withdrawing it from the magazine while the blank next above is held therein, and means for drawing vacuum on said cups and for releasing the blank at the proper time to effect continuous successive feeding of individual blanks from the magazine.

3. A sheet blank feed for a can body making machine, comprising in combination, a magazine for holding a stack of sheet blanks, vacuum controlled means for bending down the rear end of the lowermost blank in the magazine, vacuum controlled means for engaging the blank next above said lowermost blank adjacent the downwardly bent end of the latter and for holding the same against displacement, and feeding means operable against the forward end of the said lowermost blank for withdrawing the same from said magazine while the blank next above is so held by said vacuum controlled means.

4. The method of feeding can body blanks singly and in succession from the bottom of a stack, comprising the steps of first gripping by suction and bending downwardly the rear end of the lowermost sheet in the stack, then gripping by suction the sheet next above said lowermost sheet along its rear end exposed by said bending operation of the lowermost sheet to hold said sheet next above against displacement, releasing the suction grip on the rear end of the lowermost sheet, and thereafter gripping by suction the forward end of said lowermost sheet in the stack to withdraw the same therefrom while retaining said holding suction grip on the rear end of the sheet next above the lowermost sheet being withdrawn from said stack.

5. In a fiber can body making machine, the combination of a magazine for holding a stack of fiber blanks, a transfer mechanism adjacent said magazine and at a lower level than said magazine for advancing fed blanks along a predetermined path of travel, suction feeding means disposed between said magazine and said transfer mechanism and operable against one end of the lowermost blank in the magazine, linkage means for actuating said feeding means in a combined vertical and horizontal movement for withdrawing a blank from said magazine and for carrying its leading edge forward along a curved path of travel into position on said transfer mechanism, the delivery end of said path being substantially tangential to the path of said transfer mechanism, and means movable in timed relation to the movement of said suction feeding means for engaging and holding against displacement the opposite end of the blank next above the lowermost blank engaged and fed by said feeding means.

6. In a fiber can body making machine, the combination of a magazine for holding a stack of fiber blanks, a transfer mechanism adjacent said magazine and at a lower level than said magazine for advancing fed blanks along a prede-

terminated path of travel, suction blank feeding means operable upon one end of the lowermost blank in said magazine and disposed between said magazine and said transfer mechanism, a parallelogram system of links on which said suction feeding means are located, and cam means for shifting said links to effect a combined vertical and horizontal movement of said feeding element for withdrawing a blank from said magazine and for carrying it forward along a predetermined path of travel into position onto said transfer mechanism.

7. In a fiber can body making machine, the combination of a magazine for holding a stack of fiber body blanks, a constantly moving blank transfer mechanism disposed adjacent said magazine, a blank feeding element disposed intermediate said magazine and transfer mechanism and operable against one end of the lowermost sheet in the magazine, said transfer mechanism being adapted to grip the leading margin of a blank, means for actuating said feeding element with

5 accelerating movement along a predetermined arcuate path whereby the leading edge of a blank is delivered by said feeding element to said constantly moving transfer mechanism at substantially the same linear speed and direction of motion of the latter, and means movable in timed relation to the movement of said suction feeding means for engaging and holding against displacement the opposite end of the blank next above the lowermost blank engaged and fed by said feeding means.

8. A blank feed for a can body making machine, comprising in combination a magazine for a stack of blanks, means for applying suction to one end of the blank next above the lowermost blank in said magazine to hold the same against displacement, and suction feeding means operable against the opposite end of the lowermost blank in the magazine for withdrawing the same therefrom while the blank next above is so held by said suction applying means.

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