Sept. 15, 1942. A. J. ERSTED 2,295,940

BAG TURNING MACHINE

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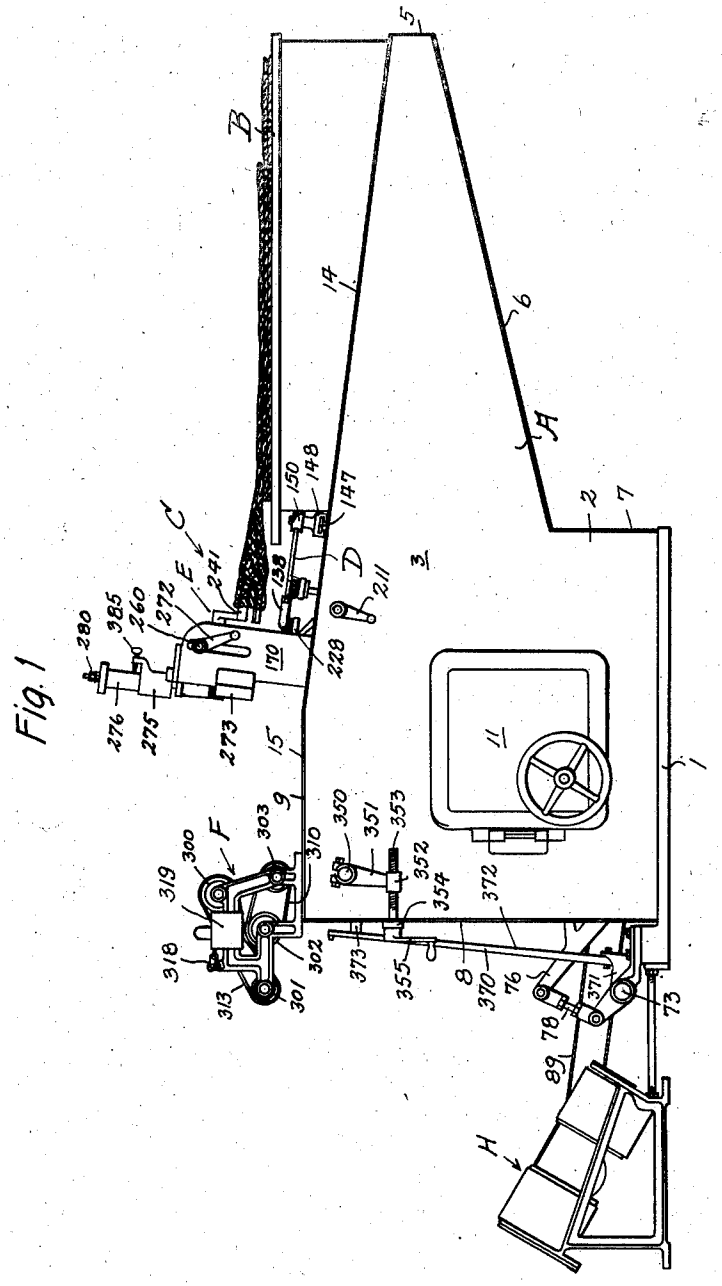



Fig. 1

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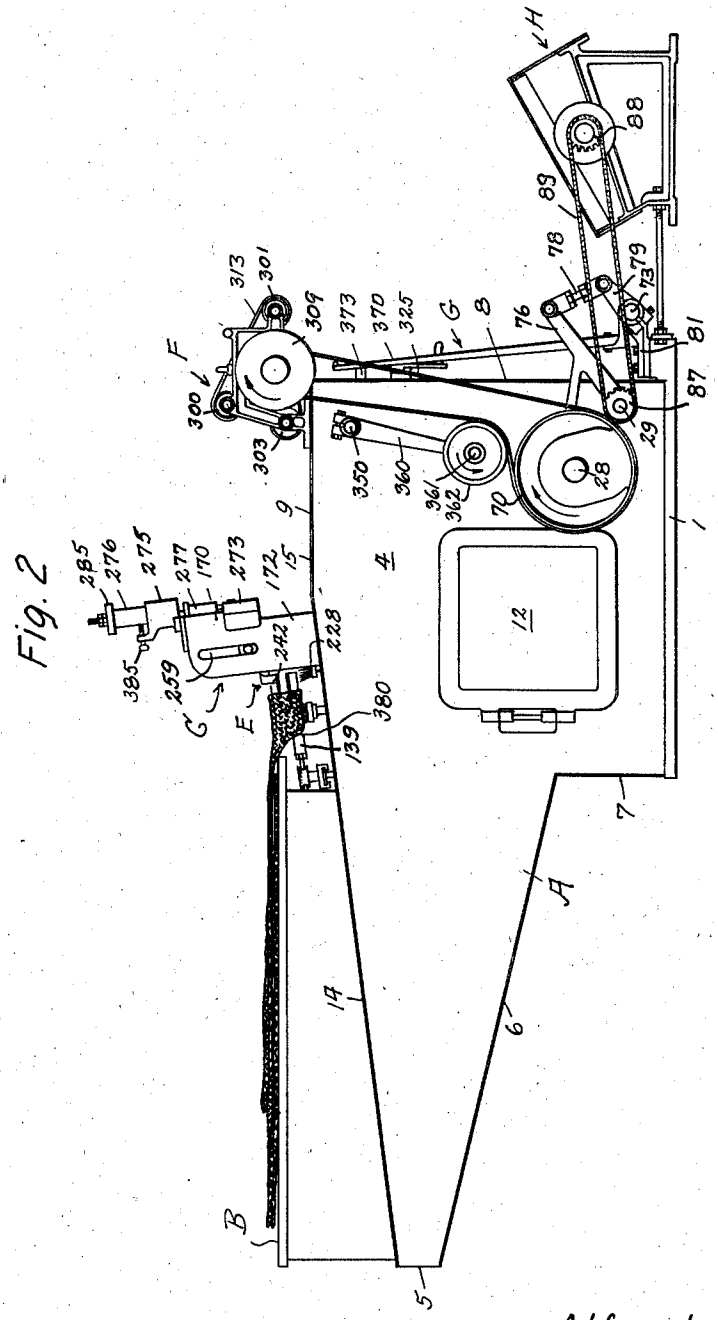
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BAG TURNING MACHINE

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Fig. 2




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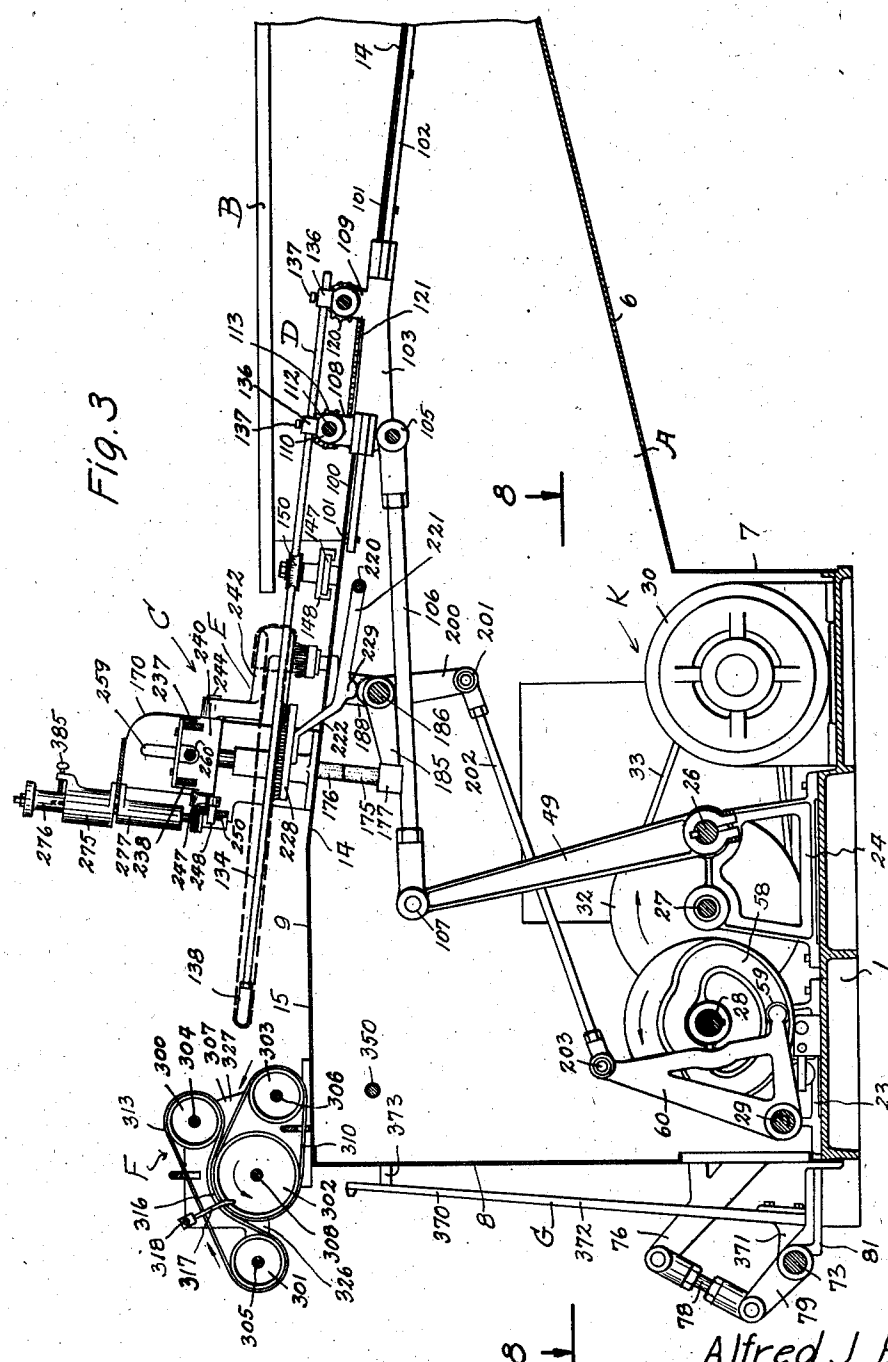
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BAG TURNING MACHINE

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Fig. 3



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BAG TURNING MACHINE

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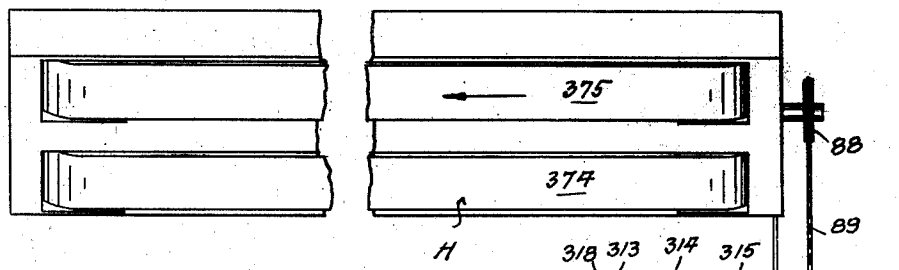



Fig. 4

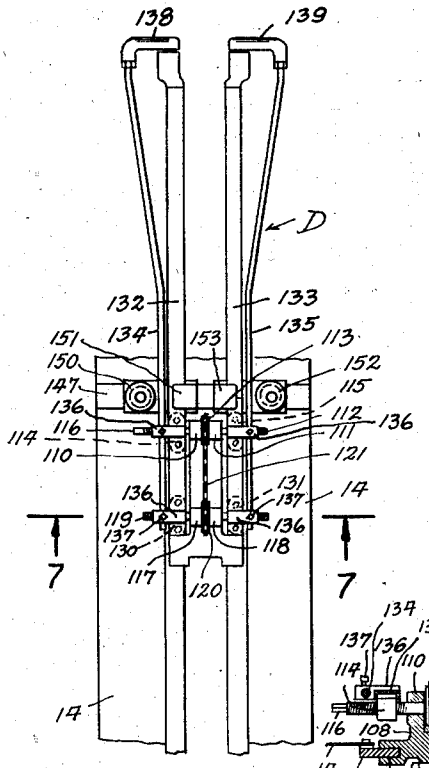



Fig. 5

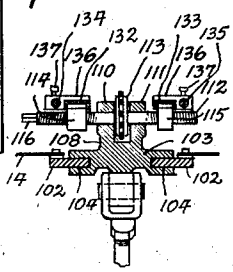



Fig. 7

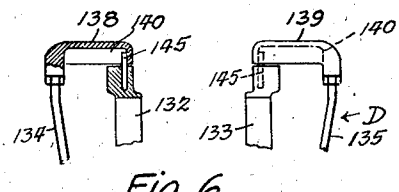
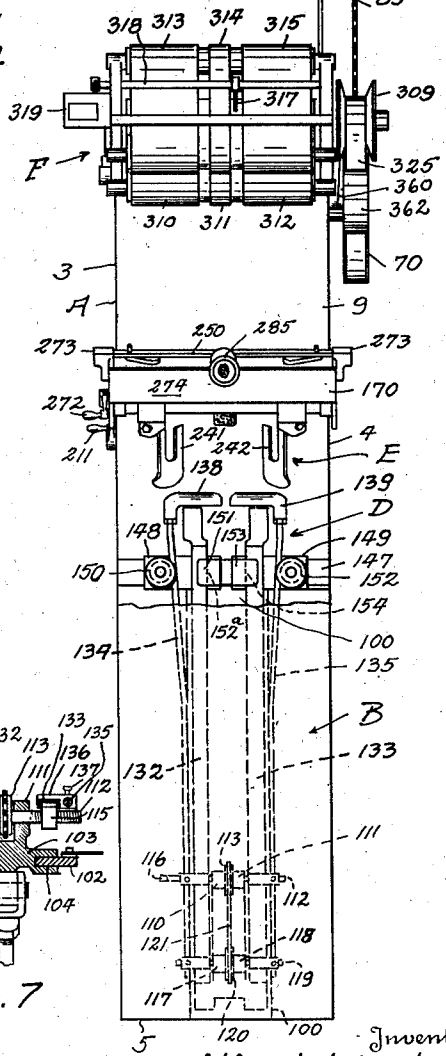



Fig. 6




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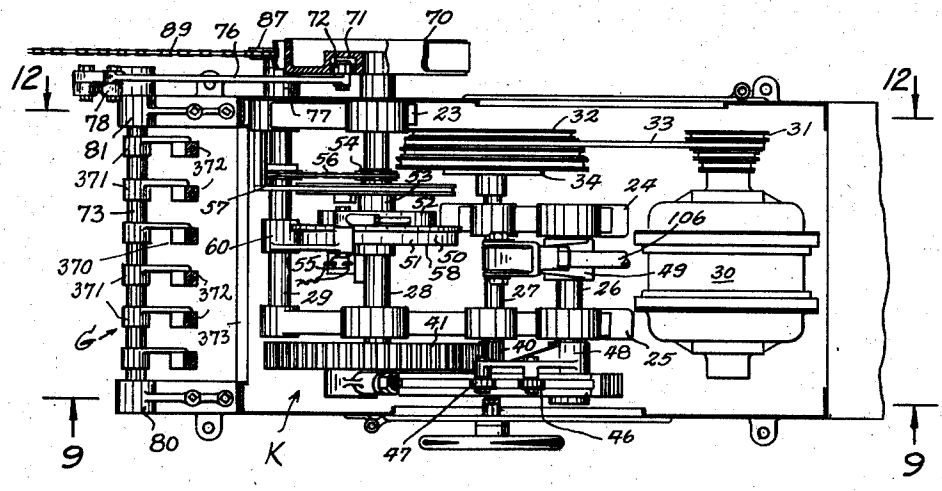
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Fig. 8



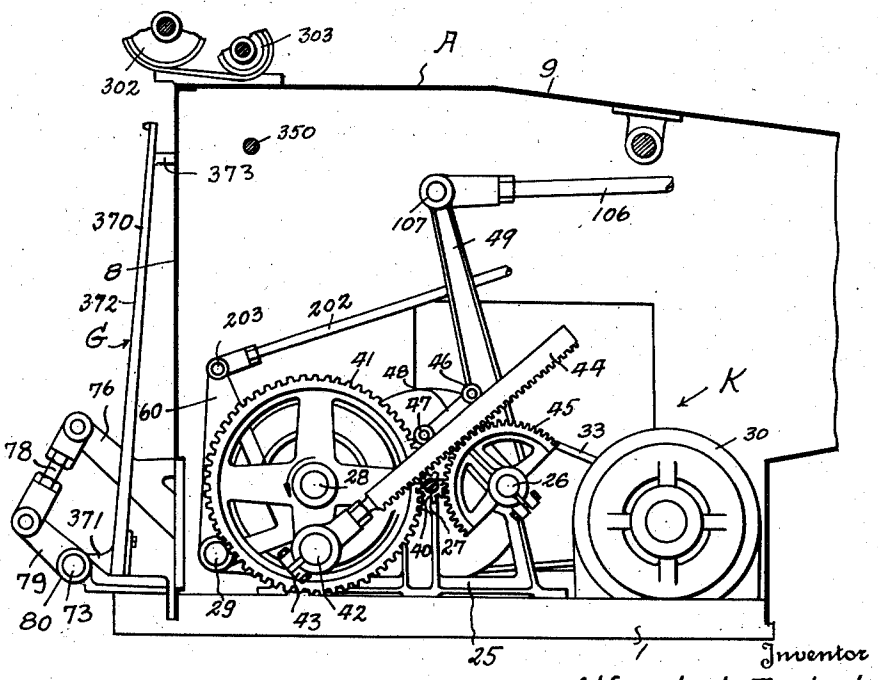




Fig. 9

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Fig. 10

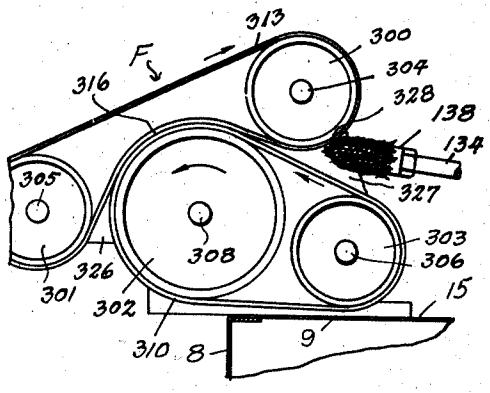
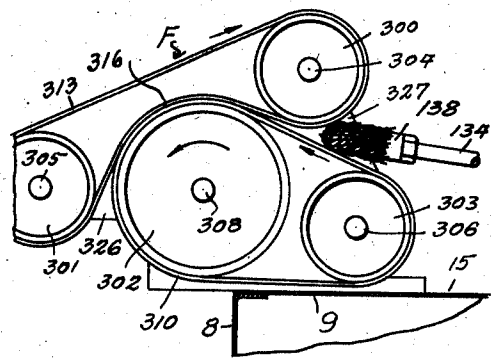



Fig. 11



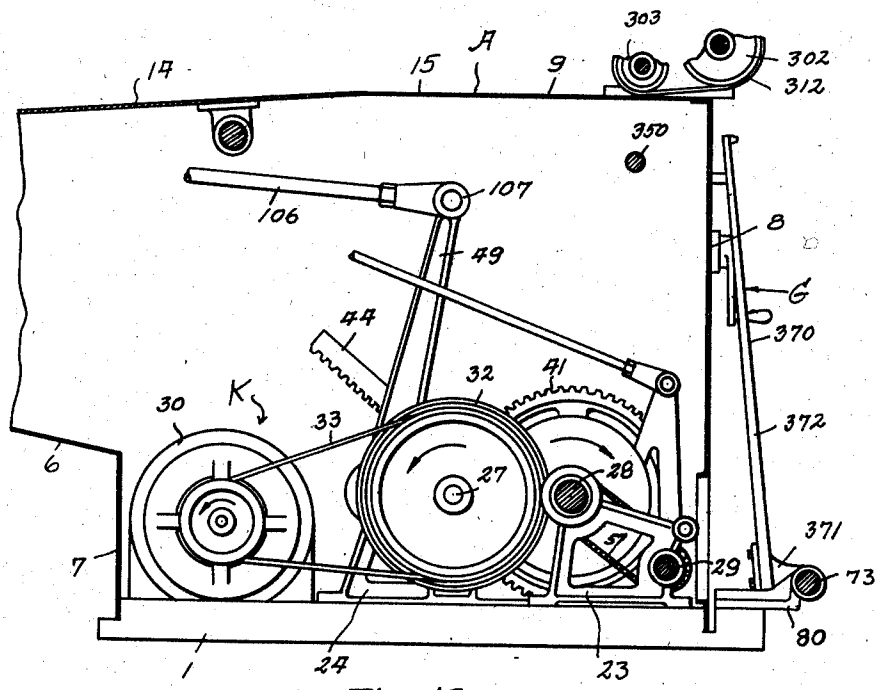




Fig. 12

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Fig. 13

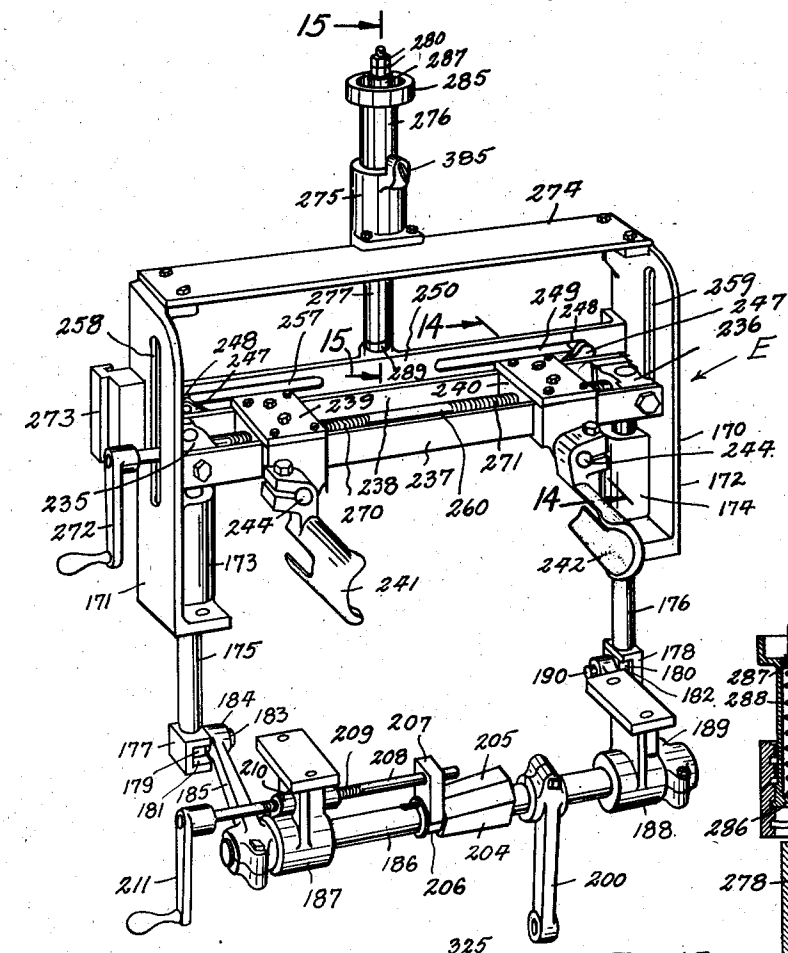



Fig. 14

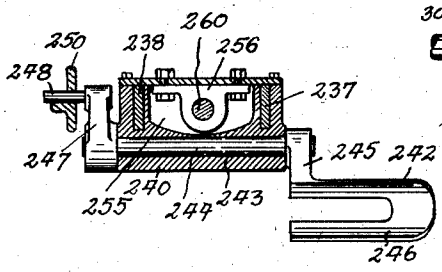



Fig. 15

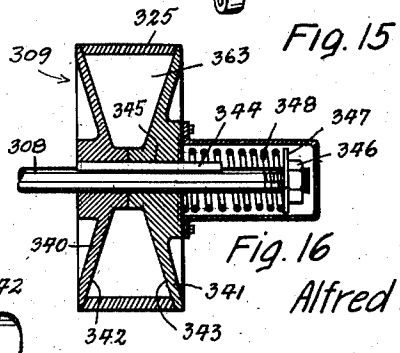



Fig. 16

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Patented Sept. 15, 1942

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# UNITED STATES PATENT OFFICE

2,295,940

## BAG TURNING MACHINE

Alfred J. Ersted, Menlo Park, Calif.

Application May 28, 1940, Serial No. 337,637

27 Claims. (Cl. 223—40)

The present invention relates to a machine for turning or reversing bags.

One object of the present invention is to provide an improved machine for turning or reversing bags in a very efficient and speedy manner.

Another object is to provide a bag turning machine which is quickly and accurately adjustable for turning bags of various widths.

Another object is to provide a bag turning machine which is readily adjustable for handling bags of various lengths.

Another object is to provide a bag turning machine which is adjustable for handling bags of various lengths without varying the speed of operation of the bag turning mechanism.

Another object is to provide a bag turning machine having a variable speed bag delivery mechanism for varying the speed of removal of the turned bags from the ram to the fly of the machine.

Another object is to provide a bag turning machine which comprises a bag delivery mechanism for removing the turned bags in a horizontal direction from the ram of the machine and for discharging the bags in a vertical direction upon the fly of the machine.

Another object is to provide a bag turning machine which comprises an adjustable ram structure wherein the vibration and whip of the ram has been reduced to a minimum.

Another object is to provide a bag turning machine which comprises a bag delivery mechanism for positioning the ram into proper delivery position relative thereto and for positively engaging the turned bags at a predetermined position of the ram.

Another object is to provide a bag turning machine which comprises adjustable bag holding means and means for maintaining the bag holding means in proper gripping contact with the bags during the turning thereof.

Other and further objects and advantages of the present invention will become apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of the complete machine of the present invention.

Fig. 2 is a side view of the machine taken in an opposite direction from that as shown in Fig. 1.

Fig. 3 is a longitudinal section of a portion of the machine, certain parts being shown in elevation.

Fig. 4 is a plan view of the machine showing the ram in retracted position, a portion of the table being broken away.

Fig. 5 illustrates a portion of the machine showing the ram in its forward position.

Fig. 6 shows a detail view of a portion of the ram structure, certain parts being shown in section.

Fig. 7 is a cross section of Fig. 5 taken along lines 7—7 thereof.

Fig. 8 is a horizontal section through the housing of the machine, taken along lines 8—8 of Fig. 3.

Fig. 9 is a section of Fig. 8 taken along lines 9—9 thereof.

Figs. 10 and 11 are somewhat diagrammatic views of the bag delivery mechanism, a portion of the ram and a portion of a turned bag thereon illustrating the mode of transfer of the bag to the delivery mechanism.

Fig. 12 shows a section of Fig. 8 taken along lines 12—12 thereof.

Fig. 13 is a perspective view of the bag holding mechanism and its associated parts with the housing of the machine removed.

Fig. 14 is a section of Fig. 13 along lines 14—14 thereof.

Fig. 15 illustrates a section of Fig. 13 along lines 15—15 thereof.

Fig. 16 is a detail view of the variable speed drive pulley structure of the delivery mechanism.

The machine of the present invention consists primarily of a housing structure A, a serving table B, a bag turning mechanism C, consisting of a ram D and a bag holding mechanism E, a bag delivery mechanism F, a discharge mechanism G, a conveyor H, and a drive mechanism K.

The bags to be turned by the machine are placed upon the serving table B from which each bag is manually presented to the bag holding mechanism E of the turning mechanism C. The ram D cooperates with the holding mechanism E for turning the bags and presents the turned bags to the delivery mechanism F. The delivery mechanism F removes the turned bags from the ram D and delivers the same to the discharge mechanism G, which discharges the bags from the machine upon the conveyor H.

With the foregoing general description in mind, the construction and operation of the machine will now be specifically described.

The housing structure A of the machine (see Figs. 1, 2 and 3) comprises a base 1 to which a housing 2 is secured which consists of side walls 3 and 4, front walls 5, 6 and 7, a rear wall 8 and a top wall 9.

The side walls 3 and 4 of the housing 2 are provided with doors 11 and 12 to permit access to the drive mechanism K of the machine positioned within the housing 2. The front portion of the top wall 9 is inclined as shown at 14, while the rear portion 15 extends in a horizontal direction, as will be best seen from Fig. 3.

Mounted within the housing 2 and secured to the base 1 of the machine are bearing frames 23, 24 and 25 within which shafts 26, 27, 28 and 29 are rotatably mounted (see Fig. 8). The shaft 27 is driven from any convenient source of power such as an electric motor 30, mounted upon the base 1, by means of pulleys 31, 32 and a drive belt 33 trained around the same. Interposed between the pulley 32 and the shaft 27 is a friction clutch 34 to prevent overloading of the motor 30.

Keyed to the shaft 27 is a pinion gear 40 which intermeshes with a large gear 41 fixed upon the shaft 28. Pivotally mounted on a bearing pin 42, eccentrically secured to the gear 41 by means of a bearing 43, is a rack 44 which intermeshes with a semi-circular pinion 45 fixed to the shaft 26. Rollers 46 and 47 rotatably mounted on a bracket 48, which is pivotally secured to shaft 26, maintain the rack 44 in operative engagement with the pinion 45. Keyed to the shaft 26 intermediate the bearing frames 24 and 25 is an actuating arm 49 which extends in an upward direction within the housing 2.

Mounted upon the shaft 28 is a clutch 50 of any suitable construction, comprising a clutch member 51 fixed to shaft 28 and a clutch member 52 freely rotatable thereon, and provided with a sleeve 53 and sprocket wheel 54. A solenoid 55 is adapted to operate the clutch 50 so as to establish driving relation between the parts 51 and 52 thereof and to effect rotation of the sprocket wheel 54 which is operatively connected by means of a sprocket chain 56 with a sprocket wheel 57 keyed on the shaft 29.

The clutch member 51 (see Fig. 3) is provided with a cam track 58 within which a cam roller 59, rotatably secured to an actuating arm 60, is received. The actuating arm 60 is freely pivoted upon shaft 29 but held against any movement in the direction of the axis of shaft 29 so that roller 59 is maintained in proper engagement with the cam track 58.

Shaft 28 extends from the housing 2 through the side wall 4 (see Figs. 2 and 8) and carries at its free end a pulley 70 fixed thereto. The inner side of the pulley 70 is provided with a cam track 71 for the reception of a cam roller 72 operatively connected to a fly shaft 73 by means of an actuating arm 76 freely pivoted upon shaft 29 at 77, a link 78 and crank arm 79. The fly shaft 73 is rotatably mounted within bearings 80 and 81 secured to the base 1 at the rear end of the machine. The free end of shaft 29 which extends from the housing 2 is further provided with a sprocket wheel 87 operatively connected with a sprocket wheel 88 of the conveyor H by means of a drive chain 89.

From the above it will therefore be seen that upon operation of the motor 30 shaft 27 will be rotated in a direction as indicated in Fig. 3, and shaft 28 will be rotated in an opposite direction, as shown by an arrow in this figure. The rotation of shaft 28 and gear 41 secured thereto causes reciprocation of rack 44 and oscillation of the semi-circular pinion 45 and shaft 26. The oscillatory movement of shaft 26 causes reciprocation of the actuating arm 49. It will further be noted that upon rotation of shaft 28 clutch member 51 keyed thereto is rotated therewith. Due to the fact that the camway 58 forms a part of the clutch member 51, this camway is also rotated, causing actuation of the roller 59 due to the configuration of the camway, as shown in Fig. 3, so that the actuating arm 60 is reciprocated around the shaft 28.

Normally the clutch members 51 and 52 of the clutch 50 on the shaft 28 are disengaged; however, when the solenoid 55 is energized these clutch members are connected, causing rotation of the sprocket wheel 54 and sprocket wheel 57 keyed to shaft 29, so that the latter will be rotated in a direction as shown in Fig. 3. Rotation of the shaft 29 causes operation of the conveyor H with which it is operatively connected by means of the sprocket wheels 87, 88 and sprocket chain 89.

During rotation of the shaft 28 as above stated, pulley 70 keyed thereto is also rotated therewith. This pulley 70 is provided with the cam track 71 above referred to, which is of a configuration so as to cause oscillation of the actuating arm 76 which in turn produces oscillatory movement of the fly shaft 73 operatively connected therewith.

The inclined portion 14 of the top wall 9 is provided with a longitudinally extending slot 100 (see Figs. 3 and 4) and secured to the lower surface of the inclined top wall adjacent each side of the slot 100 by means of studs 101 are guide rails 102. Slidably mounted on the guide rails 102 is a cross head 103 (see Fig. 7) provided with guide channels 104 within which the guide rails 102 are received. The lower part of the cross head structure, as will be best seen from Fig. 3, is pivotally secured at 105 to an actuating rod 106 which in turn is pivoted at 107 to the actuating arm 49, so that upon back and forth movement of the actuating arm 49 the cross head 103 is reciprocated along the guide rails 102. The cross head structure 103 is further provided with lugs 108 and 109 which extend in an upward direction through the slot 100 above the upper surface of the inclined top wall 14. The lug 108 is provided with spaced bearings 110 and 111 within which a screw shaft 112 is rotatably mounted. Fixed to the screw shaft 112 intermediate the bearing portions 110 and 111 is a sprocket wheel 113 which retains the screw shaft 112 in proper position and prevents lateral movement thereof. The free ends of the screw shaft 112 exterior of the bearing portions 110 and 111 are provided with oppositely convoluted threads which are received within correspondingly threaded portions of ram supporting bearings 114 and 115. The outer end of the screw shaft 112 adjacent the supporting bearing 114 is of square configuration, as shown at 116 so that the screw shaft 112 may be rotated by means of a wrench or the like. In a smiliar manner, lugs 109 are provided with spaced bearing portions 117 and 118 within which a screw shaft 119 is rotatably mounted. Keyed to the screw shaft 119 intermediate the bearing portions 117 and 118 is a sprocket wheel 120 which prevents lateral movement of the screw shaft 119 within the bearing portions 117 and 118. The sprocket wheels 113 and 120 are operatively interconnected by means of a sprocket chain 121. The free ends of the screw shaft 119 are provided with oppositely convoluted threads in the same manner as screw shaft 112. The threaded portions of screw shaft 119 are received within interiorly threaded ram supporting bearings 130

and 131 which are of the same construction as the ram supporting bearings 114 and 115.

The ram supporting bearings 114, 115, 130 and 131 are adapted to carry the ram D of the machine, which consists of inner rigid bars 132 and 133 and outer flexible rods 134 and 135. The inner bars 132 and 133 are connected to the ram supporting bearings 114, 115, 130 and 131 in any convenient manner and are held in a position parallel to the inclined top wall 14 of the machine, as will be best seen from Fig. 3. The outer flexible rods 134 and 135 of the ram structure D are fixed to the rigid bars 132 and 133 by means of brackets 136 and clamp screws 137. The outer rods 134 and 135 extend parallel to the rigid bars 132 and 133 at the rear section of the same, and diverge in outward directions toward the front ends of the rigid bars, as will be best seen from Fig. 5. The forward ends of the outer rods 134 and 135 are provided with curved head members 138 and 139, each provided with a groove 140 which extends transversely to the longitudinal axis of the ram. Fixed within the front ends of the rigid bars 132 and 133 are pins 145 which extend into the grooves 140 of the head members (see Fig. 6). The ends of the grooves 140 are closed so that the head members 138 and 139 may slide in transverse directions with respect to the front ends of the rigid bars 132 and 133 without disengaging from the same. Normally, the tension of the rods 134 and 135 forces the ram heads 138 and 139 to their outermost positions in which they are held against the tension of the rods by means of the pins 145 (see Fig. 6).

Positioned above the rear end 146 of the longitudinal slot 100 is a guide rail 147 secured to the inclined portion 14 of the top wall 9 of the housing of the machine, upon which ram guides 148 and 149 are slidably mounted. The ram guide 148 carries a grooved roller 150 which is adapted to engage the rod 134 when the ram is in retracted position (see Fig. 4). The ram guide 148 is further provided with a guide block 151 provided with a guide slot 152*a* within which the rigid bar 132 is slidably received. In a similar manner, the ram guide 149 is provided with a grooved roller 152 adapted to engage the rod 135 when the ram is in retracted position, while a guide block 153 provided with a guide slot 154 is adapted to slidably receive the rigid bar 133.

From the above it will therefore be seen that upon reciprocation of the cross head 103 the ram D is reciprocated therewith. When the ram D moves to its retracted position as shown in Fig. 4, the grooved rollers 150 and 152 engage the outwardly diverging portions of the rods 134 and 135 and flex the same in an inward direction toward the rigid bars 132 and 133 respectively, so that the head members 138 and 139 are moved toward each other. When the ram D is moved in a forward direction toward the bag holding mechanism E and delivery mechanism F, the grooved rollers 150 and 152 disengage from the rods 134 and 135 so that the same spread in an outward direction due to their inherent resiliency. This causes spreading of the ram head structure to a position as clearly shown in Figs. 5 and 6. The width of the ram structure has to be properly adjusted for bags of various widths, and this is effected by rotation of the screw shaft 112 which in turn effects rotation of the screw shaft 119 due to the operative connection therebetween by means of the sprocket wheels 113, 120 and sprocket chain 121. Upon rotation of the screw shafts 112 and 119 in one direction, the ram supporting bearings 114, 115, 130 and 131 are moved toward each other so that the width of the ram D is thereby reduced. By rotating screw shafts 112 and 119 in an opposite direction the ram supporting members 114, 115, 130 and 131 are moved away from each other so that the width of the ram D is increased. Due to the slidable mounting of the ram guides 148 and 149, these guides as well as the guide blocks 151, 153 and the grooved rollers 150 and 152 will automatically adjust themselves into proper position with respect to the ram during the above adjustment.

It will be apparent from the above that by constructing the ram D of a plurality of rigid and flexible bars and arranging them in the manner above described, a very rigid ram structure is obtained in which any undesirable vibration and whip is eliminated. The adjustability of the rigid bars and the flexible rods, as above described, permits an accurate adjustment of the width of the ram, which is necessary to obtain maximum results with the machine. By adjusting the ram to a width slightly less than the width of the bags to be handled, a fast removal of the bags from the ram by the delivery mechanism F is obtained without any possibility of tearing the bags thereby.

The bag holding mechanism E, generally referred to in the above, consists of a U-shaped frame 170 (see Fig. 13) which is secured to the inclined portion 14 of the top wall 9 adjacent the horizontal portion thereof. The side members 171 and 172 of the U-shaped frame 170 are provided with vertical bearings 173 and 174 within which vertical shafts 175 and 176 are slidably mounted. The lower ends of the vertical shafts 175 and 176 carry blocks 177 and 178 which are provided with slide blocks 179 and 180 slidably mounted within guide slots 181 and 182, respectively. The slide block 179 is provided with a stud pin 183 rotatably received within a bearing 184 of an arm 185 fixed to a shaft 186 rotatably mounted within bearings 187 and 188. The bearings 187 and 188 are secured to the lower surface of the inclined section 14 of the top wall 9, as will be best seen from Fig. 3.

The shaft 186 extends transversely within the housing 2 of the machine and carries further an arm 189 pivotally secured to the slide block 180 by means of a stud pin 190. Fixed upon the transverse shaft 186 is further a downwardly depending arm 200 which is pivotally connected at 201 to an actuating rod 202 pivotally connected to the actuating arm 60 at 203 (see Fig. 3).

From the above it will therefore be seen that upon oscillation of the actuating arm 60 shaft 186 will be correspondingly oscillated, causing upward and downward movement of the arms 185 and 189 and vertical shafts 175 and 176.

Slidably mounted upon the transverse shaft 186 and keyed thereto for rotation therewith is a brush actuating cam 204 provided with an inclined cam surface 205. One end of the brush actuating cam is provided with a circular groove 206 into which a cam actuating member 207 extends. The upper portion of the cam actuating member 207 is fixed to a rod 208 provided with a threaded portion 209 whch is received within an interiorly threaded sleeve 210 of the bearing 187. The outer end of the rod 208 extends through the side wall 3 of the housing 2 and carries a crank handle 211.

Pivotally mounted upon a transverse rod 220 secured to the side walls 3 and 4 of the machine is a brush supporting lever 221 which extends from the housing 2 through a slot 222 above the inclined portion 14 of the top wall 9 and carries a brush 228 secured to the same. This brush is positioned above the inclined top wall portion 14 directly in the center between the side members 171 and 172 of the U-shaped frame 170 (see Fig. 3). The lever 221 is provided with a downwardly extending portion 229 which engages one of the inclined cam surface 205 of the brush actuating cam 204. When the cam surface 205 is in engagement with the downwardly extending portion 229 of the lever 221 the brush is held in its uppermost position. If the cam surface 205 is disengaged from the lever 229 upon rotation of the shaft 186 the brush 228 is lowered. From the above it will therefore be seen that upon oscillation of the transverse shaft 186 the brush 228 is moved up and down and the amount of this upward movement may be adjusted by turning the crank handle 211 so as to shift the brush actuating cam 204 in one or the other direction, so that the point of contact of the lever portion 229 with respect to the inclined cam surfaces 205 will be varied.

Secured to the upper ends of the vertical shafts 175 and 176 are blocks 235 and 236 to which transverse bars 237 and 238 are secured. Slidably mounted upon the transverse bars 237 and 238 are guide blocks 239 and 240 provided with bag gripping fingers 241 and 242, respectively, which are pivotally supported thereby. The guide blocks 239 and 240 and the bag gripping fingers 241 and 242 and their associated parts are of the same construction so that the description of one of these units will be sufficient for the purposes herein. In Fig. 14 a longitudinal section through the guide block 240 has been illustrated. This guide block comprises a bearing portion 243 within which a shaft 244 is rotatably mounted. Fixed to one end of the shaft 244 is the bag gripping finger 242 which consists of an arm 245 and a curved gripping member 246. The other end of the shaft 244 is provided with an actuating arm 247 secured thereto for rotation therewith and provided with a pin 248 which extends into a slot 249 of a transverse bar 250. The guide block 240 is further provided with a recess 255 within which a nut 256 is positioned which may be an integral part of the guide block 240 or may be removably secured thereto.

As previously stated, the guide block 239 and its associated parts are of the same construction as the guide block 240 above described. The pin 248 of the arm 247 which is secured to the shaft 244 of the guide block 239 extends into a slot 257 of the transverse bar 250. Rotably mounted within the blocks 235 and 236 and extending through vertical slots 258 and 259 within the side members 171 and 172 of the U-shaped frame 170 is a shaft 260 which extends through the guide blocks 239 and 240 and is provided with oppositely threaded portions 270 and 271 which are received within the correspondingly threaded nuts 258 of the guide blocks 239 and 240 respectively. Secured to one end of the shaft 260 is a crank handle 272, as will be best seen from Fig. 13. Upon rotation of the crank handle 272 and shaft 260 in one direction, the guide blocks 239 and 240 will be moved toward each other. Upon rotation of shaft 260 in another direction, the guide blocks will be moved away from each other, so that the position of the gripping fingers 241 and 242 with respect to each other may be varied. This is necessary to permit adjustment of the gripping fingers 241 and 242 for various widths of bags to be handled thereby. The transverse bar 250 is slidably mounted within guides 273 secured to the side members 171 and 172 of the U-shaped frame 170, only one of the guides 273 being shown in Fig. 13. It is therefore obvious that the transverse bar 250 is free to move in an upward or downward direction.

Supported upon the upper portion 274 of the U-shaped frame 170 (see Figs. 13 and 15) is an interiorly threaded sleeve 275 within which a sleeve 276 is screwed. Positioned within the sleeve 276 and a vertical bearing 277 carried by the upper member 274 of the frame 170 is a shaft 278, the lower end of which is fixed to the transverse bar 250 in any convenient manner. The upper end of the shaft 278 is threaded as shown at 279, and screwed thereon are nuts 280. The upper end of the sleeve 276 is provided with a collar 285, while the lower end of said sleeve is provided with a collar 286. Positioned adjacent the nuts 280 on the shaft 278 is a washer 287 and interposed between said washer and the shoulder 286 of the sleeve 276 is a coil spring 288. Interposed between the lower end of the vertical bearing 277 and the upper side of the transverse bar 250 is a rubber washer 289. The spring 288 normally holds the transverse bar 250 in its uppermost position, as shown in Figs. 13 and 15. By turning the sleeve 276 in one or the other direction the tension of the spring 288 acting upon the shaft 278 may be varied.

From the above it will be seen that upon oscillation of the actuating arm 60 and transverse shaft 186, the vertical shafts 175 and 176 will be raised and lowered. Upon upward movement of the shafts 175 and 176 the fingers 241 and 242 are moved toward each other. This is effected by the cranking action of the arms 247 and pins 248 which slide within the slots 249 and 257 of the transverse bar 250. Upon downward movement of the vertical shafts 175 and 176 the gripping fingers 241 and 242 will be moved away from each other, i. e., they will be spread apart.

Positioned upon the horizontal portion 15 of the upper wall 9 adjacent the rear end of the housing 2 are a plurality of delivery rolls designated 300, 301, 302, 303, which extend transversely substantially over the entire width of the machine. The delivery rolls 300, 301, and 303 are freely rotatable upon shafts 304, 305, and 306, respectively, which are mounted within a frame structure 307. The delivery roll 302 is keyed to a shaft 308 which is also supported within the frame structure 307 and carries at one end a drive pulley 309, as will be best seen from Figs. 2 and 16. Trained around the delivery rolls 302 and 303 are rubber belts 310, 311, and 312, which are spaced from each other. Trained around the delivery rolls 300 and 301 are rubber belts 313, 314, and 315 which are of the same width as the belts 310, 311, 312 and which are in contact with these latter belts over a substantial portion thereof adjacent the periphery of the delivery roll 302, as shown at 316. Interposed between the belts 311, 314 and 312, 315 is a downwardly depending finger 317 fixed on a rod 318 rotatably mounted within the frame structure 307. This rod is operatively connected as shown at 318 with a bag counter 319, see Fig. 1.

The bag counter 319 may be of any conventional construction, and associated with the same is a switch and electric circuit, not shown, which

is connected with the solenoid **55** of the clutch **50**. Every time a bag passes through the delivery mechanism F the finger **317** is operated by the bag itself, and in this way a counting of the turned bags is effected irrespective of the strokes of operation of the machine. In other words, if the machine is operated empty no operation of the counter **319** will be effected. Therefore, if the operator fails to serve a bag during a cycle of operation of the machine, the empty stroke of the same will not be counted. When a certain predetermined number of bags have been received by the delivery mechanism F the switch of the counter is operated and the electric circuit of the solenoid which is also connected with a source of electrical energy is closed so that the solenoid will be energized and the clutch sections **51** and **52** will be interconnected to thereby transfer rotation of the shaft **28** to shaft **29** which in turn causes operation of the conveyor H by means of the sprocket wheels **87**, **88** and sprocket chain **89**.

The drive pulley **309** is operatively connected with the drive pulley **70** by means of a drive belt **325**, as will be best seen from Fig. 2, so that upon rotation of the shaft **28** and drive pulley **70** the drive pulley structure **309** is rotated, which in turn causes rotation of the shaft **308**. Due to the fact that the belts **310**, **311**, and **312** trained around the delivery roll **302** which is driven by the pulley structure **309** are in frictional engagement with the belts **313**, **314** and **315** over a substantial part of the periphery of the delivery roll **302**, rotation of the delivery rolls **300** and **301** is caused, with the belts trained around the same travelling in the same direction as the belts trained around the lower delivery rolls **302** and **303**. The direction of travel of the various belts of the delivery mechanism F has been indicated by arrows in Fig. 3.

It will therefore be seen that when a bag is delivered between the upper and lower sets of belts of the delivery rolls **300** and **303**, the bags will be gripped by the belts and will be carried along therebetween and discharged at **326** in a downward direction upon the discharge mechanism G of the machine. The position of the delivery rolls **300** and **303** with respect to each other is of great importance. These two rolls are so arranged that a V-shaped mouth **327** is formed by the belts trained around the same. The upper delivery roll **300** is positioned between the delivery rolls **302** and **303** above the belts trained around the same, so that when the ram with a turned bag thereon moves toward the delivery mechanism F (see Fig. 10) the head of the same will strike the delivery belts **313**, **314** and **315** at a point indicated at **328**, so that while the ram continues its forward movement into the mouth **327** the ram will be forced in a downward direction (see Fig. 11) into a position where the bag supported thereon is forced into contact with the lower as well as the upper sets of belts of the delivery mechanism. The friction created between the bag and the upper and lower delivery belts during travel of the belts in the direction as indicated in Fig. 3, causes an immediate gripping of the bag, and removal of the same from the ram. The bag is received between the upper and lower belts and carried along with the same around the delivery roll **302** and discharged at **326**, as above stated. In view of the fact that the bag and ram contact first the upper delivery belts and are subsequently forced into equalized gripping contact with the upper and lower belts, a proper positioning of the bags within the mouth **327** of the belts is effected and a positive pick-up of the bags at a predetermined position of the ram is obtained. At the same time, any possible vibrations of the front end of the ram or the effects thereof are minimized. This arrangement permits therefore a proper timing of the pick-up of the bags due to the fact that always a sufficient friction between the belts and the bag is obtained when the ram is in a position as indicated in Fig. 11.

The delivery belts may be preferably made from rubber; however, any other material or substance which offers sufficient friction to the material of the bags may be used.

The drive pulley structure **309**, a detail of which has been shown in Fig. 16, consists of two conical members **340** and **341**. Both of these members are provided with conical belt engaging surfaces **342** and **343**, respectively, between which the drive belt **325** previously referred to is positioned in frictional engagement therewith. The member **340** is fixed upon the shaft **308**, while the member **341** is slidably mounted thereon but fixed for rotation therewith by means of a key **344** received within a groove **345** of the member **341**. The end of the shaft **308** is threaded and screwed thereon is a nut **346**. The shaft **308** carries a washer **347** adjacent the nut **346** and interposed between said washer and the member **341** is a coil spring **348** which holds the members **340** and **341** normally in a position as shown in Fig. 16.

Extending through the housing **2** of the machine in the vicinity below the bag delivery mechanism F is a transverse shaft **350** which carries on one side of the housing adjacent the side wall **3** thereof a crank arm **351** fixed thereto which is provided with an internally threaded sleeve **352** within which a threaded rod **353** is received which is rotatably mounted within a bearing lug **354** carried by the rear wall **8** of the machine. Secured to the threaded rod **353** adjacent the rear wall of the machine is a crank handle **355**, as will be best seen from Fig. 1. The threaded sleeve **352** is pivotally secured to the arm **351** in any convenient manner, so that upon rotation of the threaded rod **353** in one or the other direction by manipulation of the crank handle **355** a corresponding movement of the arm **351** in one or the other direction will be obtained, causing a corresponding rotation of the shaft **350**.

Fixed upon the other end of shaft **350** adjacent the side wall **4** of the machine is a supporting arm **360** provided with a bearing pin **361** upon which a pressure roller **362**, which is in contact with the drive belt **325**, is rotatably mounted.

Upon rotation of the shaft **350** in one or the other direction as above stated, the pressure roller **362** will be moved either toward or away from the drive belt **325**.

When the pressure roller **362** is moved in a direction toward the driving belt **325** the tension of the belt is increased and the part **341** of the pulley structure **309** is shifted away from the part **340** against the tension of the coil spring **348**. This increases the width of the groove **363** formed between the members **340** and **341**, causing the drive belt **325** which travels within this groove to move closer to the axis of the shaft **308**, so that the speed of rotation of the shaft **308** and the entire bag delivery mechanism is thereby increased.

When the pressure roller **362** is moved in an opposite direction from that above described, the tension of the drive belt **325** is released and spring **348** forces the member **341** toward the member **340**, thereby forcing the drive belt **325** farther away from the axis of the shaft **308**. This obviously will reduce the speed of rotation of the shaft **308** and the bag delivery mechanism F.

Mounted upon the fly shaft **73** is a fly **370** which consists of a plurality of spaced brackets **371** which carry straight bars **372**, which may be preferably made from wood, secured thereon. (See Figs. 3 and 8). These bars **370** extend in an upward direction (see Fig. 3) and end a short distance below the bag delivery mechanism F. An abutment member **373** prevents contact of the bars **372** of the fly with the rear wall **8** of the machine when the fly is in a position as shown in Fig. 3.

The fly **370** is swung backward and forward during the operation of the machine by means of the actuating mechanism **71**, **72**, **76**, **78**, and **79** previously described. When the bags are discharged from the bag delivery mechanism F the fly **370** is in a position as shown in Fig. 3 and as soon as the bags have been discharged from the bag delivery mechanism F the fly is swung in an outward direction, so that the turned bags falling from the delivery mechanism F are engaged thereby and placed upon transversely extending belts **374** and **375** of the conveyor H. A predetermined number of bags is usually placed upon the conveyor H before the same is actuated. Upon actuation of the conveyor H in a manner as previously described, the pile of bags placed thereon by the fly **370** is moved in a transverse direction as indicated by an arrow in Fig. 4 and shifted out of the path of the fly **370**, so that the pile of bags may be removed by the operator while the next pile of turned bags is assembled upon the conveyor H by the fly **370** of the machine.

The operation of the machine is as follows. When the drive mechanism K of the machine is operated by the motor **30** the ram D is reciprocated in a substantially horizontal direction, and the gripping fingers **241** and **242** are reciprocated in a vertical direction in timed relation with respect to the operation of the ram D. During the reciprocation of the gripping fingers **241** and **242** the same are swung toward and away from each other, i. e. the gripping fingers are in their innermost position at their highest point of travel and in their outermost position at their lowest point of travel. The delivery belts are operated and the fly **370** is oscillated in timed relation with respect to the operation of the ram D. The brush **228** is raised into operative position upon forward movement of the ram and lowered into inoperative position upon rearward movement of the same.

Assuming that during the continuous operation of the machine the bag holding mechanism E is in its uppermost position and the bag gripping fingers are swung inwardly into bag receiving position, the operator opens the mouth of a bag to be turned and serves the opened bag to the gripping fingers **241** and **242**, (see Fig. 1) with the gripping fingers extending into the mouth of the bag. At this time the ram moves rearwardly toward its retracted position and shortly before the ram reaches its retracted position the gripping fingers **241** and **242** swing outwardly and move downwardly toward their lowermost position, as shown in Fig. 2. While the gripping fingers **241** and **242** move toward their outward or gripping position incident to their downward travel, the mouth of the bag served thereto is gripped thereby, distended, and firmly held thereon. At the same time, brush **228** moves to its uppermost position. When the gripping fingers **241** and **242** are in their lowermost position, as shown in Fig. 2, with the mouth of the bag firmly held thereon in distended position, the ram D is in its rearmost position. Thereupon during the continuing operation of the machine the ram D moves toward the bag and engages the same at **380** and forces the rear portion of the bag through the distended mouth thereof between the gripping fingers **241** and **242**. The bag is thereby turned or reversed.

While the ram D performs the initial turning operation of the bag, i. e. enters between the gripping fingers **241** and **242** the head of the ram D is held in contracted position, as shown in Fig. 4 by means of the grooved rollers **150** and **152**. However, while the ram continues its movement toward the delivery mechanism F during the bag turning operation, the head of the ram is spread apart as soon as the same has passed the gripping fingers **241** and **242**, so that the turned bag is straightened over its full width.

While the ram now proceeds in a direction toward the bag delivery mechanism F the entire bag is turned and pulled off the gripping fingers **241** and **242** before the ram head reaches the delivery mechanism F, so that the turned bag is now solely supported upon the ram D. During the continuing forward movement of the ram toward the bag delivery mechanism F the bag is presented to the delivery belts of the delivery mechanism F which engage the same and rapidly remove the bag from the ram in a manner as above described, and discharge the bag in a downward direction upon the fly **317**, which at this time is in receiving position.

While the bag is removed from the ram by the delivery mechanism F, the fingers **241** and **242** begin to move upwardly and swing inwardly incident to their upward movement. At the same time brush **228** moves downward into inoperative position. Thereupon, the ram begins its return movement and shortly after the beginning of the return movement of the ram the fingers **241** and **242** are completely swung in and in their uppermost position, and while the ram completes its return stroke to retracted position a new bag is served to the fingers **241** and **242** of the machine. Upon beginning of the next forward stroke of the ram, the discharge of the turned bag from the delivery mechanism is completed and the fly **370** swings rapidly toward the conveyor H placing the bag thereupon and returns immediately to bag receiving position. Thereupon the cycle of the machine repeats in the same manner as above described.

This operation of the fly **370** is always effected at a predetermined position of the ram and the speed of the delivery mechanism is adjusted in such a manner that, irrespective of the length of the bag, the rear end of the same leaves the delivery mechanism at the time the fly **370** moves to discharge position. No variation in the speed of operation of the ram, bag holding mechanism and fly is therefore necessary to adjust the machine for handling bags of various length.

The brush **228** which is in its uppermost or operative position during the forward movement

of the ram engages the lower side of the bag and straightens the bag upon the ram.

The gripping fingers **241** and **242** of the machine are adjusted by turning crank handle **272**, so that during the downward movement of the fingers effected by the vertical shafts **175** and **176** in a manner as previously described herein, the fingers swing outwardly and slightly before the end of their outward movement firmly engage the bag. The outward movement of the fingers is, of course, limited by the width of the bag handled by the machine. Therefore, with the fingers **241** and **242** now held against further outward movement by the bag stretched therebetween, the transverse bar **250** will be moved in a downward direction against the tension of the coil spring **288** so that no further outward movement of the gripping fingers will result. This permits engagement of the fingers **241** and **242** with the mouth of the bag under substantially predetermined pressure irrespective of slight variations in the width of the bag. This resilient gripping pressure corresponds to the pressure of the spring **288** and may be varied in accordance with the requirements of practice by rotating sleeve **276** in one or the other direction. A locking mechanism **385** may be provided to hold the sleeve **276** in adjusted position.

While I have described a particular embodiment of the present invention, it will be obvious that various changes and modifications may be made in the details of the apparatus shown herein, without departing from the spirit of the present invention, and the scope of the appended claims.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent, is:

1. A bag turning machine comprising bag holding means, bag turning means, means for removing the bags from the turning means, means for operating the bag holding, bag turning and bag removing means including an endless belt and an expansible pulley cooperating therewith, and means for varying the tension of said belt to expand said pulley to thereby vary the speed of operation of the bag removing means independent of the speed of operation of the bag holding and turning means for effecting removal of the bags of various length from the bag turning means during a predetermined path in the operation of the same.

2. A bag turning machine comprising bag holding means for engaging the mouth of the bag and for holding the same in distended position, bag discharge means, a ram reciprocably mounted cooperating with the bag holding means for engaging the positioned bag and for reversing and receiving the same during the advancement of the ram toward said holding means, means for removing the reversed bag from the ram and for delivering the same to the discharge means, means for operating the ram, bag holding, bag removing, and bag discharge means in timed relation with respect to each other, and means for independently adjusting the speed of operation of the bag removing means for effecting delivery of the bags of various length to the discharge means in timed relation to the operation thereof.

3. A bag turning machine comprising a ram, bag holding means for presenting the bags to be turned to said ram and for holding the bags in distended position, means for operating the ram for turning and receiving the bags presented thereto by the holding means, bag discharge means, means for removing the turned bags from the ram and for delivering the same to the discharge means, means for operating the bag removing means and said discharge means in timed relation, and means for varying the speed of operation of the bag removing means to thereby vary the timed relation between the bag removing and bag discharge means.

4. A bag turning machine comprising a ram, bag holding means cooperating with the ram, bag discharge means, bag removing means cooperating with the ram, means for operating said ram, bag holding, bag removing and bag discharge means in timed relation with respect to each other, and means for varying the speed of operation of the bag removing means independent of the speed of operation of the ram, bag holding and discharge means for effecting removal of bags of various length from said ram and delivery thereof to said discharge means irrespective of the timed relation between said ram and discharge means.

5. A ram structure for bag turning machines comprising a plurality of spaced bars, flexible rods carried by said spaced bars, head members secured to the flexible rods and operatively associated with the spaced bars, and means interposed between said spaced bars for adjusting the position thereof with respect to each other.

6. A ram structure for bag turning machines comprising a pair of spaced head members, flexible means for supporting said head members, rigid bars connected with said flexible means for supporting the same and operatively associated with the head members, and means for adjusting the position of the rigid bars relative to each other for varying the position of the head members and said flexible means with respect to each other.

7. A ram structure for bag turning machines comprising spaced rigid bars, flexible rods secured with their rear ends to said bars and freely movable at their front ends transversely with respect to said bars, head members connected to the front ends of the rods and slidably engaged with said bars, and means interposed between the rigid bars for adjusting the head members with respect to each other.

8. A ram structure for bag turning machines comprising a pair of cooperating ram members each including a rigid supporting bar, a flexible bar, a head member fixed to the flexible bar and slidably mounted on the rigid bar, means for supporting said cooperating ram members in spaced relation adjacent each other, and means for adjusting the position of said cooperating ram members relative to each other.

9. A ram structure for bag turning machines, comprising spaced rigid bars, flexible rods extending with their rear portions parallel to the bars and angularly disposed at their front ends relative to the bars, means for rigidly connecting the rear portions of the rods to the rear portions of said bars, and head members connected to the front ends of the rods movably associated with the front ends of the bars.

10. A bag turning machine comprising bag holding means for holding the mouth of the bag in distended position, a reciprocable flexible ram cooperating with the holding means for reversing the bag held thereby and for receiving the reversed bag thereon, and means for removing the turned bag from the ram, said removing means comprising cooperating upper and lower belt members forming a V-shaped mouth therebe-

tween, and means for moving said belt members in the same direction toward the apex of the V-shaped mouth, the position of said belt members with respect to each other and with respect to said ram being such that upon entry of the ram into the V-shaped mouth the ram is engaged and forced by the upper belt member into equalized frictional contact with both of said belts at a predetermined position in the movement of said ram.

11. A bag turning machine comprising bag holding means for holding the mouth of the bag in distended position, a reciprocable flexible ram cooperating with the holding means for reversing the bag held thereby and for receiving the reversed bag thereon, and means for removing the turned bag from the ram, said removing means comprising upper and lower belt members, rolls for supporting said belt members to form a V-shaped mouth therebetween, and means for operating said rolls for moving said belt members in the same direction toward the apex of the V-shaped mouth, the position of one of said rolls and the upper belt member being such that upon entry of the ram into the V-shaped mouth, the ram is forced into equalized frictional engagement with both of said belt members.

12. In a bag turning machine, bag removing means comprising cooperating endless belts, rolls for supporting said belts to form a V-shaped charge opening and a V-shaped discharge opening with said belts in contact therebetween, and means for operating said rolls for causing travel of said belts from the charge toward the discharge opening, one roll of one of said belts being positioned intermediate the rolls of the other of said belts and above the belt trained around the same.

13. In a bag turning machine a bag holding mechanism comprising a stationary frame, cooperating spaced bag gripping fingers, bearing means for movably supporting said fingers for swinging movement toward and away from each other, an auxiliary frame vertically reciprocable within the stationary frame for supporting said bearing means, means associated with the auxiliary frame and bearing means for adjusting the spacing of said bearing means and fingers with respect to each other, an actuating bar vertically movable on said stationary frame, means for normally holding the actuating bar in predetermined position on said frame, actuating means fixed to said gripping fingers and cooperating with the actuating bar for swinging the gripping fingers toward and away from each other upon reciprocation of the auxiliary frame.

14. A bag turning machine, comprising, means for holding the bag, means for turning the bag and for receiving the same, means for discharging the bag, means for removing the bag from the bag turning means and for delivering the same to said discharge means, means for operating the bag turning means, bag holding, bag removing and bag discharge means in timed relation with respect to each other, and means for independently adjusting the speed of operation of the bag removing means for effecting delivery of the bag to said discharge means in timed relation therewith irrespective of the length of the bag.

15. In a bag turning machine, a ram including flexible rods normally flexed to expanded position, means for operating said ram, and means cooperating with said ram for flexing the rods toward each other upon movement of the ram in one direction and for controlling the flexing of the rods to expanded position under their inherent resiliency upon movement of the ram in the opposite direction.

16. In a bag turning machine, spreadable bag holding means, means for adjusting the spread of the bag holding means, a ram cooperating with the bag holding means and comprising flexible rods normally flexed to expanded position, means for adjusting the width of the ram, means for operating the bag holding means and ram in timed relation with respect to each other, and means automatically adjustable upon adjustment of the width of the ram for flexing the rods toward each other and for controlling the flexing of the rods away from each other incident to the operation of the ram.

17. A bag turning machine comprising a ram including flexible rods normally flexed to bag distending position, means for reciprocating said ram, means for engaging the flexible rods of the ram to contract the ram during backward movement of the same and for controlling the flexing of the rods to bag distending position to expand the ram during forward movement of the same, bag holding means for holding the mouth of the bag in distended position and for presenting the bag to the ram whereby the bag is received upon the ram, removed from the bag holding means and turned incident to the expansion and forward movement of the ram, and means for removing the turned bag from the expanded ram.

18. A bag turning machine comprising a ram including flexible rods normally flexed to bag distending position, means for reciprocating said ram, means for engaging the flexible rods of the ram to contract the ram during backward movement of the same and for controlling the flexing of the rods to bag distending position to expand the ram during forward movement of the same, bag holding means for holding the mouth of the bag in distended position and for presenting the bag to the ram whereby the bag is received upon the ram, removed from the bag holding means and turned incident to the expansion and forward movement of the ram, means for removing the turned bag from the expanded ram, and means for adjusting the width of said ram.

19. A bag turning machine comprising a ram including spaced flexible rods normally flexed to bag distending position, means for reciprocating said ram, means for engaging the flexible rods of the ram to contract the ram during backward movement of the same and for controlling the flexing of the rods to bag distending position to expand the ram during forward movement of the same, bag holding means for holding the mouth of the bag in distended position and for presenting the bag to the ram whereby the bag is received upon the ram, removed from the bag holding means and turned incident to the expansion and forward movement of the ram, means for removing the turned bag from the expanded ram, and means for adjusting the width of said ram to thereby vary the spacing of said rods.

20. A bag turning machine comprising a ram including flexible rods normally flexed to bag distending position, means for reciprocating said ram, means for engaging the flexible rods of the ram to contract the ram during backward movement of the same and for controlling the flexing of the rods to bag distending position to expand the ram during forward movement of the same,

bag holding means for holding the mouth of the bag in distended position and for presenting the bag to the ram whereby the bag is received upon the ram, removed from the bag holding means and turned incident to the expansion and forward movement of the ram, means for removing the turned bag from the expanded ram, means for adjusting the width of said ram, and means cooperating with the ram for maintaining the rod engaging means in predetermined relation with respect to the rods irrespective of the adjusted width of the ram.

21. A bag turning machine comprising a ram including flexible rods normally flexed to bag distending position, means for reciprocating said ram, stationary means for engaging the flexible rods of the ram to contract the ram against the tension of the flexible rods during backward movement of the same and for controlling the flexing of the rods to bag distending position to expand the ram during forward movement of the same, bag holding means for holding the mouth of the bag in distended position, means for operating said bag holding means for presenting the bag to the ram whereby the bag is received upon the ram, removed from the bag holding means and turned incident to the expansion and forward movement of the ram, and means for removing the turned bag from the expanded ram.

22. In a bag turning machine, bag holding means, a ram cooperating with the bag holding means and including flexible rods normally flexed away from each other, means for operating the bag holding means and ram in timed relation, and means for flexing the rods toward each other and for controlling the flexing of the rods away from each other incident to the operation of the ram.

23. In a bag turning machine, bag holding means, a ram cooperating with the bag holding means, said ram comprising spaced rigid members and flexible rods secured with their rear ends to said rigid members and with their front ends normally flexed away from each other, means for operating the bag holding means and said ram in timed relation, and means for flexing the front ends of the rods toward each other and for controlling the flexing thereof away from each other incident to operation of the ram.

24. In a bag turning machine, bag holding means, a ram cooperating with the bag holding means, said ram comprising spaced rigid members and flexible rods secured with their rear ends to said rigid members and with their front ends normally flexed away from each other, means for operating the bag holding means and said ram in timed relation, means for flexing the front ends of the rods toward each other and for controlling the flexing thereof away from each other incident to operation of the ram, means for adjusting the width of the bag holding means, and means for adjusting the spacing between the rigid members for varying the width of the ram.

25. In a bag turning machine a bag holding mechanism comprising a stationary frame, cooperating spaced bag gripping fingers, means for supporting said fingers for movement toward and from each other, an auxiliary frame vertically reciprocable within the stationary frame for supporting said finger supporting means, means associated with the auxiliary frame and finger supporting means for adjusting the spacing of the bag gripping fingers, vertically movable actuating means on said stationary frame, resilient means for normally holding the actuating means in predetermined position on said stationary frame, and means secured to said bag gripping fingers and cooperating with the actuating means for moving the bag gripping fingers toward and away from each other incident to the reciprocation of the auxiliary frame.

26. In a bag turning machine a bag holding mechanism comprising a stationary frame, an auxiliary frame movably mounted within the stationary frame, bag gripping fingers movably mounted on the auxiliary frame, an actuating bar movably mounted on the stationary frame, resilient means for normally holding said bar in a predetermined position, means for reciprocating the auxiliary frame, and means cooperating with the bag gripping fingers and bar for moving the bag gripping fingers toward and away from each other incident to the reciprocation of the auxiliary frame.

27. In a bag turning machine a bag holding mechanism comprising a stationary frame, an auxiliary frame movably mounted within the stationary frame, bag gripping fingers movably mounted on the auxiliary frame, an actuating bar movably mounted on the stationary frame and including elongated slots extending transversely to the direction of movement of said bar, abutment means on the stationary frame for engaging the bar, means including a spring for normally holding the bar in a predetermined position with respect to the stationary frame in engagement with said abutment means, gripping finger actuating means secured to the bag gripping fingers and extending into the slots of said bar for sliding movement therein, and means for reciprocating the auxiliary frame and bag gripping fingers relative to said bar for moving said fingers toward and away from each other, the tension of said spring being such as to move said bar with respect to the stationary frame opposite to the direction of movement of the auxiliary frame to arrest the movement of the gripping fingers away from each other upon exertion of a gripping pressure exceeding the tension of said spring.

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