July 14, 1953 W. J. HAESSLER 2,645,365

TRANSFER DEVICE FOR BOX WRAPPING MACHINES

Filed July 12, 1950 4 Sheets-Sheet 1

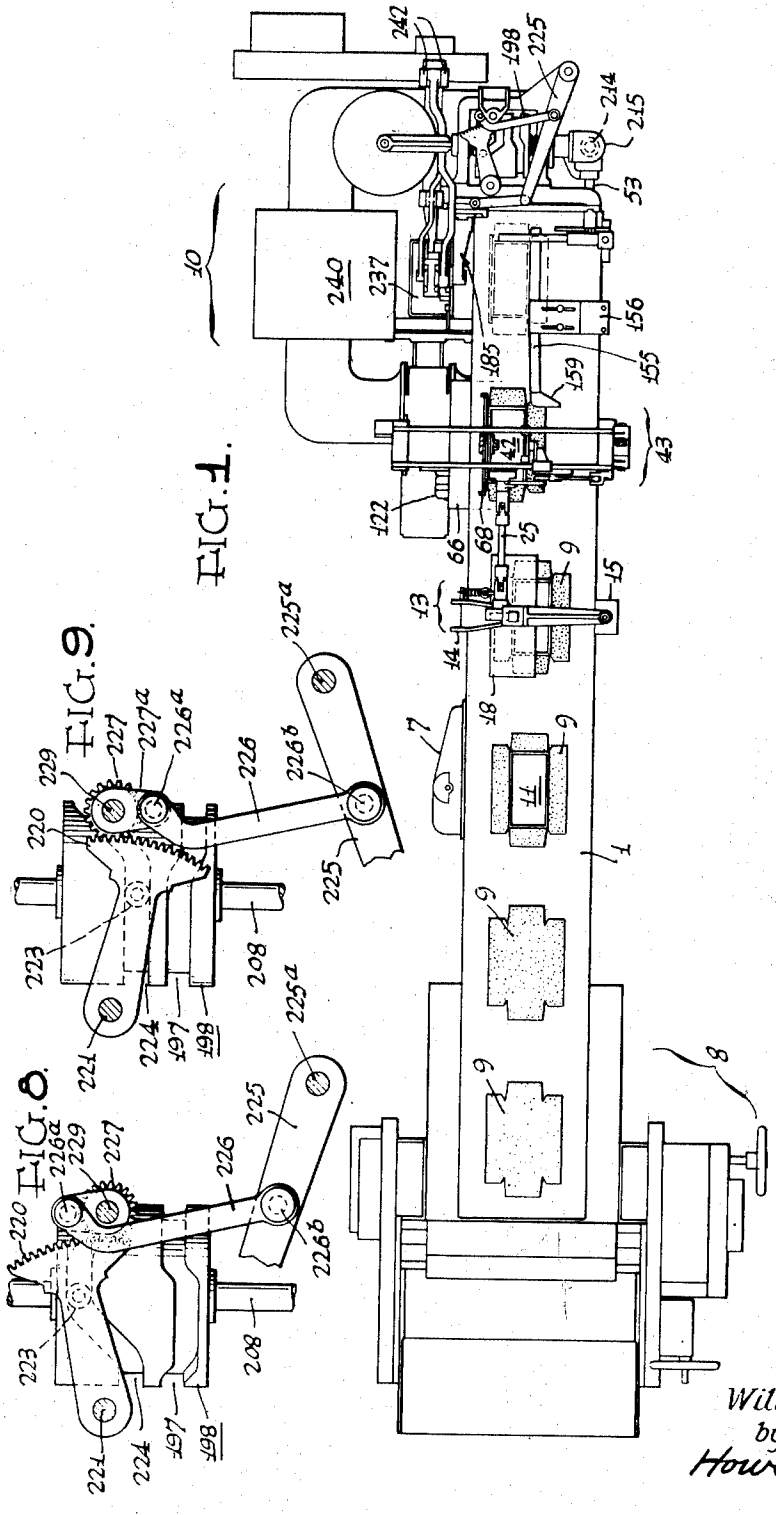


FIG. 1.

FIG. 9.

FIG. 8.

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FIG. 2.

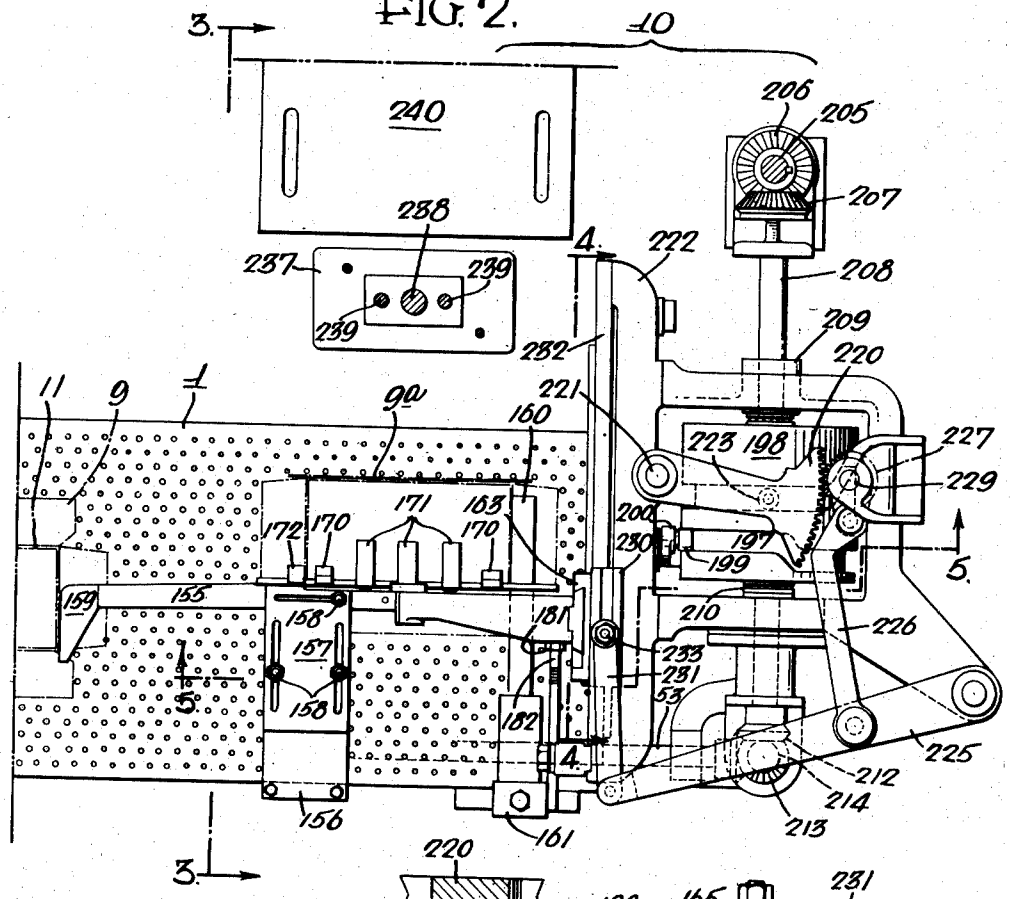
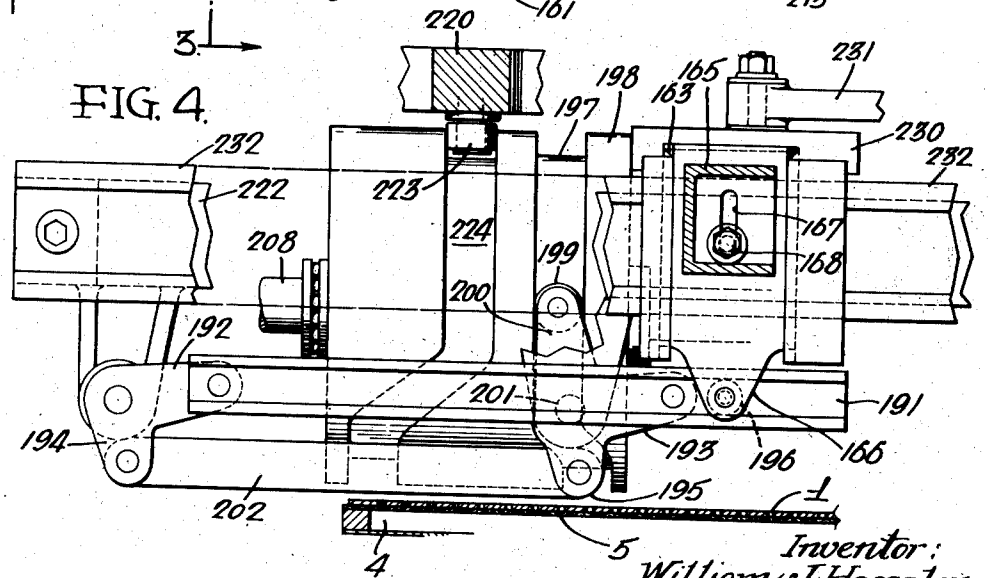


FIG. 4.



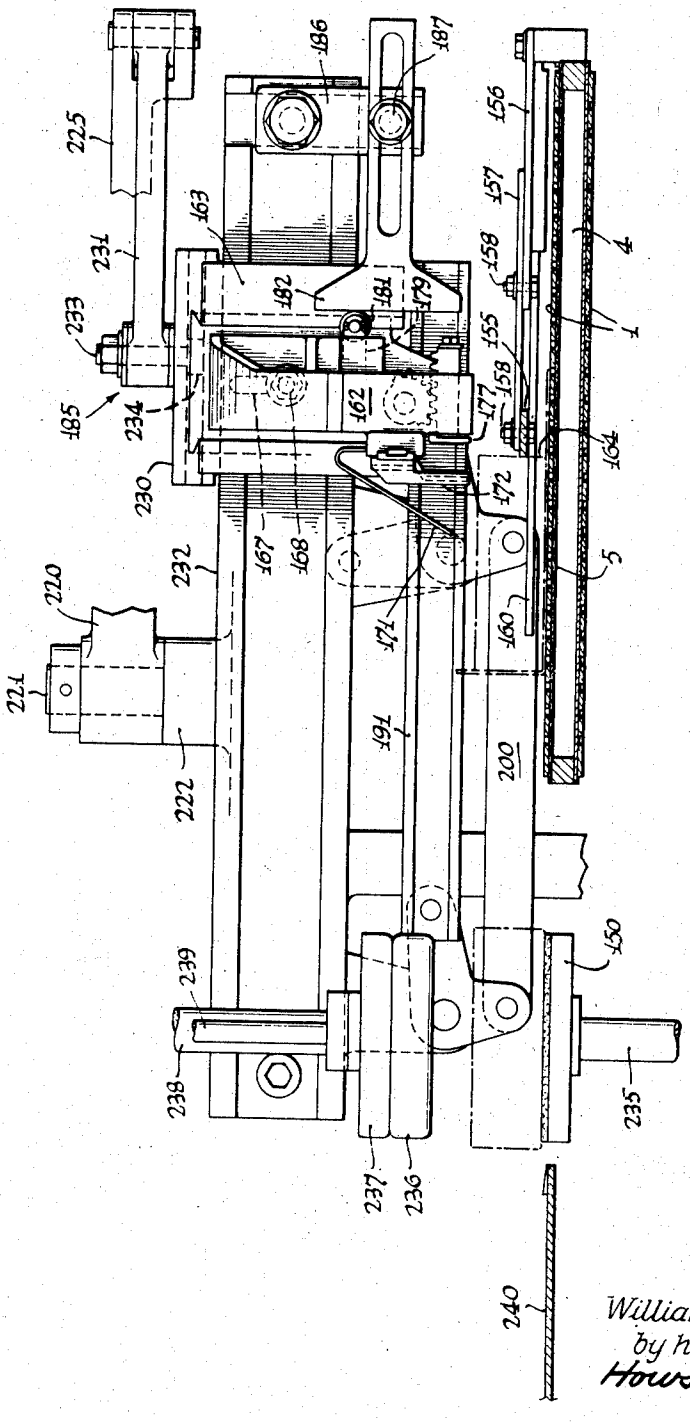
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TRANSFER DEVICE FOR BOX WRAPPING MACHINES

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FIG. 3



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TRANSFER DEVICE FOR BOX WRAPPING MACHINES

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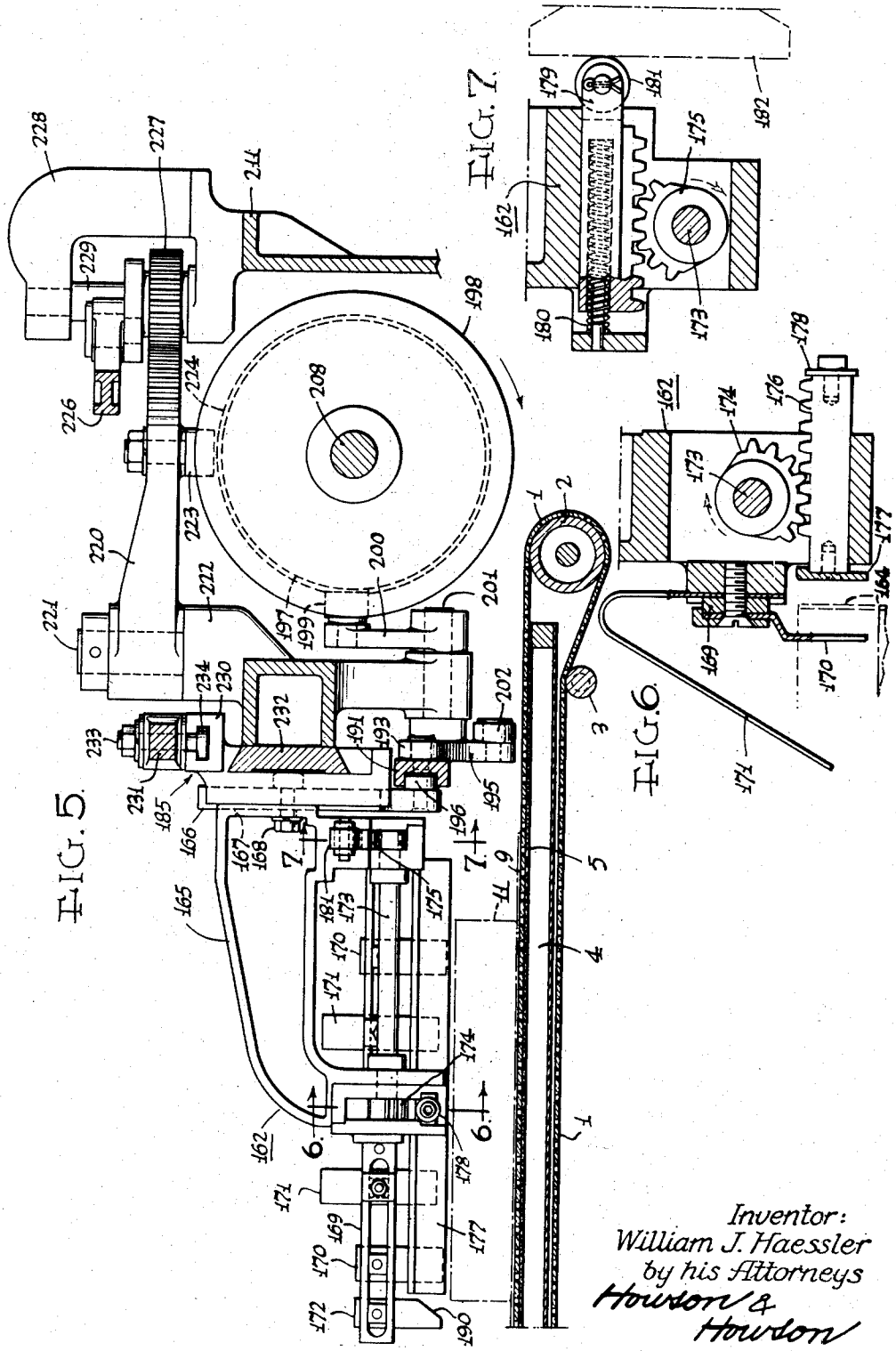


FIG. 5.

FIG. 6.

FIG. 7.

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Patented July 14, 1953

2,645,365

UNITED STATES PATENT OFFICE

2,645,365

TRANSFER DEVICE FOR BOX WRAPPING MACHINES

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Application July 12, 1950, Serial No. 173,315

5 Claims. (Cl. 214—1)

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This invention relates to box wrapping machinery and more particularly to improvements in such machinery which increase production and eliminate or simplify manual operation. Box wrapping machines of the type referred to herein comprise a forming block on which the box blanks and labels are positioned in timed relation to the vertical reciprocation of the forming block and the box forms which cooperate therewith. A gluer may be used to apply a coating of adhesive to the labels and to deposit them on a conveyer belt properly timed and registered so that box blanks may be either manually or automatically positioned on the labels. Cross feed mechanism then transfers the box and labels from the conveyer belt to the forming block assembly. All previously known machines of this type have had one or more serious disadvantages. For example, automatic or semi-automatic machines have utilized structure for feeding the box blanks to the forming block which has not adequately provided for accurate registry and timing. As a result, frequent shutdowns have been necessitated to clear the machine. An important cause for such jamming has been due to the presence of excessive backlash and play in the drive mechanism for the various assemblies. In many plants, manual operation is used exclusively for the positioning and feeding operations to avoid the above-mentioned excessive jamming and shutdown periods.

The present apparatus overcomes the above difficulties and may be characterized as semi-automatic since in the form disclosed, an operator registers the box blank on each label. However, the accuracy of the present machine and its efficiency enable automatic registering devices for depositing the boxes on the labels to be satisfactorily employed therewith. The wrapping machine described herein includes a gluer at one end which deposits labels on a perforated vacuumized conveyer belt. These labels are carried to the operator's station where the box blanks are registered on the labels by the operator. From thence, the box blanks are pressed firmly against the labels by a tamper to insure complete adhesion between the box and the label over the bottom surface of the box. The conveyer then carries the flat labels, together with the boxes, to a positioning or tack-up station. At this point, the conveyer belt travel is momentarily interrupted and the label together with the box blank, is pushed transversely of the conveyer belt in such a manner that one edge of the label is tacked to one side of the box blank. This is accomplished by means of one or more air jets

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which lift a side flap of the label from the top surface of the conveyer belt, whereupon a plate or blade folds this flap of the label around the bottom edge of the box blank and presses it against the side of the box.

After the above tack-up operation has been completed, the belt starts automatically and carries the box blank with the partially applied label to a cross feed mechanism which accurately transfers the label and the box to the forming assembly transversely off of the conveyer belt. At this station, the forming block and box forms which reciprocate vertically, press the box blank and the label downwardly through a series of tools which apply all sides of the label to the box blank to complete the wrapping operation. It will be understood that the details of the gluer as well as the forming block assembly and its associated mechanism, are well known in the art.

The cross feed assembly, and the improved drive, represent distinct advances in the art whereby substantial increased production may be achieved. For example, it has been found entirely feasible to handle as many as 16,000 boxes per day. Furthermore, the mechanism is such that it may be readily and quickly adjusted to accommodate different box and label sizes.

A primary object of the invention is to provide an improved cross feed assembly for a machine of the class described.

A further object is to provide suitable driving connections for the cross feed assembly in a box wrapping machine.

Referring now more particularly to the drawings:

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

Fig. 2 is an enlarged top view of the right-hand end of the structure of Fig. 1, showing the tack-up assembly and the cross feed assembly;

Fig. 3 is an enlarged transverse section as seen at 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary sectional view as seen at 4—4 of Fig. 2;

Fig. 5 is a longitudinal sectional detail as seen at 5—5 of Fig. 2;

Fig. 6 is a fragmentary sectional detail as seen at 6—6 of Fig. 5;

Fig. 7 is an enlarged sectional detail as seen at 7—7 of Fig. 5;

Fig. 8 is an enlarged fragmentary detail showing the segmental gear and pinion of Fig. 1 in a limit position; and

Fig. 9 is a view similar to Fig. 8 showing the gear and pinion in the alternate limit position.

In accordance with the present invention, when a label has been adhesively secured to one side of the box blank the conveyer transfers the box and label to a subsequent station near the terminus of the belt. At the same time that the conveyer belt stops, a cross feed arm drops into position in registry with the side of the preceding box opposite the one to which the label has been previously tacked, whereupon this box is engaged by gripper mechanism on the cross feed arm at the start of the transverse movement of the arm. The box blank together with the attached label, are then moved transversely to the forming block assembly which is at one side of the belt. Suitable means on the cross feed arm are provided for ejecting wrapped boxes from the forming block in the event that a box has been missed for one reason or another. This is important because ordinarily the following box blank ejects the preceding wrapped box from the forming block. It will be apparent that accurate timing and elimination of chatter and backlash as well as over-travel in the above sequence of operations, is of especial importance. The machine to be described in more detail hereinafter, incorporates positive drive for the tack-up assembly as well as the cross feed to secure accurate timing and registry of the mechanism.

The present box wrapping machine incorporates an endless conveyer belt 1 which is perforated and driven from driving rolls in the gluer, an idler roll 2, as well as a plurality of idler rolls 3. Belt 1 runs over and seals the top of a vacuum or low pressure air duct 4 which is provided with a screen 5 at its top to support the belt 1. In accordance with conventional practice, one or more vacuum pumps or exhaust blowers are connected to duct 4 by means of a vertical conduit 7. The blower provides reduced air pressure in duct 4 to retain proper registry and flat contact with belt 1 after the gluer assembly 8 applies the paper labels 9, 9 thereto. The labels 9 are not only registered transversely on the belt but are placed thereon in spaced timed relation, in accordance with a trip mechanism (not shown) connected to the wrapping machine. Before being placed on the belt, the upper surfaces of the labels 9 are coated with a suitable adhesive in the gluer. The details of box label gluers are well known in the art and are shown and described in the Haessler Patent No. 2,368,759.

As the labels 9 proceed along with the upper ply of conveyer belt 1, they reach a station approximately midway between the gluer 8 and the wrapping machine proper 10. At this point, an operator positions a box blank 11 in the center of each label 9, as shown in Fig. 1. Suitable electrical controls (not shown) may be located at the operator's station so that the machine may be stopped and started at the operator's will. It will be understood however, that the automatic cycling of the mechanism includes momentary interruption of the belt travel so that the box blank may be positioned by the operator, as well as to permit the tack-up and cross feed mechanisms to function, as described hereinafter. After the box blanks 11 have been placed on the labels 9 by the operator, the conveyor belt 1 carries the boxes and labels to the next station whereupon the belt automatically stops in registry with a tamper or pressing assembly 13. This assembly comprises a frame 14 which is secured at one end to the side of duct 4 and is adjustably supported at the other end by means of a bracket 15. The tamping head 18 is mounted to raise

and lower with respect to the conveyor 1 and is driven through a shaft 25. Each time that the tamper head is raised, the conveyer belt 1 again moves to carry the box and label to the subsequent station in registry with the tack-up assembly 43.

After the operations at the tack-up station have been completed by the assembly 43, the conveyer 1 is automatically started to carry the partially glued box and label to the cross feed station near the terminus of the belt. It is important that the box blanks be delivered to the correct location transversely of the conveyer belt in accordance with the stroke of the cross feed mechanism and the width of the boxes. For this purpose, a guide arm 155 supported on a bracket 156 by means of a slotted plate 157, is both longitudinally and transversely adjustable thereon by means of bolts 158, 158. The forward end 159 of guide arm 155 also serves as a limit stop for properly locating the box blanks at the tack-up station. After the tack-up operation, the boxes are delivered by means of arm 155 to the cross feed station (Fig. 2) and the box travel is arrested by a limit stop 160 which is adjustably mounted on bracket 161. As seen in Fig. 2, it will be apparent that the length of limit stop 160 is such that the tacked up flap always clears the end of the limit stop to avoid any interference therebetween.

When a box blank is suitably positioned against limit stop 160, the gripper head assembly 162 moves downwardly in ways 163 to engagement position with the side 164 of the box, preparatory to pushing it transversely off the conveyer 1. The gripper head assembly 162 comprises a bracket 165 to which a plate 166 is adjustably secured. Plate 166 is slotted at 167 and relative movement of the plate with respect to the gripper head assembly 162 is achieved by means of loosening cap screw 168. This adjustment is made to accommodate boxes of various depths. Bracket 165 carries an arm 169 which is longitudinally slotted and provided with a plurality of gripper fingers 170, 170, a plurality of kickers 171, 171, and an aligning finger 172. A shaft 173 is carried in general alignment with arm 169 and is journaled in bracket 165 at either end. Shaft 173 carries at either end a pair of oppositely facing segmental pinions 174 and 175 (Figs. 6 and 7). Outboard pinion 174 then cooperates with a horizontally slidable rack 176 which has a gripper plate 177 at one end thereof and a limit stop 178 at the opposite end. Pinion 175 is driven by a spring-loaded rack 179 which is drilled to receive a helical compression spring 180 and is provided with a roller 181 that contacts the gripper actuating bracket 182 when the cross feed head nears the end of its return stroke.

Referring to Figs. 3, 5–7, when the cross feed assembly 185 moves to the right (as shown in Fig. 3) roller 181 contacts the face of actuating arm 182 which is adjustably supported on bracket 186 by means of bolt 187. Continued movement of the cross feed assembly moves rack 179 to the left (as seen in Fig. 7) which in turn pivots shaft 173 in a counterclockwise direction. This counterclockwise rotation of shaft 173 retracts the gripper plate 177 due to counterclockwise rotation of pinion 174 and righthand movement of rack 176. In this position, there is substantial clearance between gripper fingers 170 and gripper plate 177. The gripper head assembly is then lowered by mechanism to be described more fully hereinafter, so that the edge 164 of the box blank is

positioned between 170 and the gripper plate 177 (shown in Fig. 6).

Because it is important that the box blank and label be accurately positioned with regard to the gripper head assembly 162, the biased edge 190 of finger 172 serves to align the box accurately in the event that it has bounced back from limit stop 160.

The gripper head assembly 162 is actuated vertically in ways 163 by means of channel 191 which is pivotally mounted on arms 192 and 193 of bell cranks 194 and 195 respectively (Fig. 4). Roller 196 is secured to the bottom of plate 166 and when channel 191 is raised and lowered, roller 196 runs in the track of the channel 191. Actuation of bell cranks 194 and 195 is accomplished by a cam track 197 in barrel cam 198. Cam track 197 controls cam follower 199 mounted on arm 200 which in turn pivots bell crank 195 through shaft 201. Thus, both bell cranks 194 and 195 are simultaneously turned through tie rod 202 with which they are connected. Since the entire gripper head assembly must reciprocate horizontally, roller 196 is free to move longitudinally in channel 191 regardless of the elevation of the channel.

The actuating mechanism for the cross feed is driven from the main shaft 205 (Fig. 2) by means of a pair of miter gears 206, 207 and cross shaft 208 which is journaled at 209 and 210 in frame member 211. Barrel cam 198 is keyed to shaft 208 and the shaft extends through frame 211 to provide suitable driving connections for the tack-up assembly. This is accomplished by means of miter gears 212, 213, a vertical stub shaft 214, an angle gear box 215, and shaft 53. The positive drive for the cross feed and tack-up assembly by means of gears and shafting of adequate dimensions, is an important feature in securing accurate timing of the mechanism. Heretofore, this has been a serious disadvantage of wrapping machines because of excessive play and backlash.

The cross feed drive is accomplished by means of a segmental gear 220 which reciprocates on shaft 221 mounted in frame member 222 (Figs. 5, 8 and 9). Segmental gear 220 carries a cam follower 223 which runs in cam track 224 of cam 198 (as shown clearly in Fig. 4). Reciprocation of gear 220 causes lever arm 225 to oscillate in a horizontal plane by means of a drag link 226 which is connected to spur gear 227 through crank arm 227a. Gear 227 reciprocates back and forth in accordance with the movement of gear 220 and is pivotally mounted in bracket 228 on shaft 229. Lever 225 is connected to the cross head 230 on the cross feed assembly 185 by means of a connecting link 231 and is pivoted to the frame at 225a. Cross head 230 is adapted to reciprocate horizontally on ways 232 in accordance with the movement imparted to it through link 231. Suitable adjustment for the transverse positioning of the cross feed assembly is provided by means of a bolt 233 having a head 234 slidable in a T-slot of the cross head 230 (Fig. 5).

An important feature of the driving connections described above is illustrated in Figs. 8 and 9 which show segmental gear 220 and its associated pinion 227 in opposite limit positions. It will be noted that in each limit position corresponding to a time when the conveyer belt 1 is stationary, the centers of shaft 229, pin 226a and pin 226b are substantially in a straight line. This timing securely locks the cross feed assembly and provides a minimum of lost motion as well as accurate positioning and timing.

As previously described, when the cross feed assembly 185 approaches the right-hand limit (Fig. 3) of its transverse travel, roller 181 contacts the face of bracket 182 to retract gripper plate 177 so that the side of the box may be inserted between fingers 170 and the plate 177. When the gripper head assembly has reached the proper point in its transverse travel, the head is lowered by suitable turning of cam 197 and cam follower 199. In this position, the entire assembly is moved transversely on ways 232 by action of barrel cam 198 and cam follower 223. As soon as the assembly has moved sufficiently far to the left (as seen in Fig. 3) roller 181 ceases to contact stop 182 and then spring 180 pivots shaft 173 so that the gripper plate 177 securely clamps the box blank side against gripper fingers 170, 170. Continued transverse travel of the gripper head assembly on ways 232 ultimately positions the box blank and label on the forming block 150 which is supported on a vertically reciprocating plunger 235.

When the box blank is properly positioned on block 150, the box forms 236 and 237 are urged downwardly by means of plungers 238, 239 so that the box blank is pressed tightly on block 150 and stripped from between the fingers 170 and plate 177. The label is then completely glued to the box blank by means of tools (not shown) whereupon the block 150 rises to the position shown in Fig. 3 with the completely glued box resting thereon. As the cross feed assembly brings the next box blank transversely towards the forming block 150, the succeeding box contacts the previously wrapped box on block 150 and pushes it sideways onto platform 240. However, if for any reason there has been a skip in the regular succession of box blanks, there might not be a succeeding box to remove the formerly wrapped box from the block 150. In this event, the next reciprocation of the formers 236 and 237 would smash the previously wrapped box on the block, so that the box that has previously been wrapped must always be removed from block 150, regardless of whether there is a succeeding box in the cross feed assembly. For this purpose, kickers 171, 171 on arm 169 push the preceding wrapped box from block 150 and out of the path of the formers 236 and 237 in the event there is no succeeding box in the gripper head. This not only saves the waste of a completely wrapped box in the event there is a skip in the wrapping operation, but it also eliminates the necessity of shutting down the machine to remove the remnants of a box which would otherwise be jammed in the forming assembly.

The box formers or plungers 238, 239 are actuated by means of levers 241 and 241a pivoted on frame member 242. The levers are in turn operatively associated with barrel cam 243 which is driven from the main motor (not shown). It will be understood however, that this structure is well known in the art.

I have thus provided an improved cross-feed assembly for a box wrapping machine which is relatively inexpensive to manufacture and which enables increased production to be achieved. The timing and operation of the machine render it suitable to full automatic operation, and time lost due to jamming and consequent shutdowns is reduced to a minimum.

Having thus described my invention,

I claim:

1. A cross feed assembly for box wrapping machines comprising: horizontal ways, a frame in

which said horizontal ways are supported, a cross head slidable on said ways, a gripper head assembly vertically movable in said cross head, an abutment adjustably positioned near one end of the ways, means on the gripper head assembly for clamping the side of a box blank, and means operatively associated with said abutment for actuating the gripper means on movement of the cross head into a zone adjacent said abutment.

2. A cross feed assembly for box wrapping machines having a conveyer belt and box forming mechanism, comprising: horizontal ways positioned above and transversely of said conveyer belt, a supporting structure for said horizontal ways, a cross head slidable on said ways, means for reciprocating said cross head on said ways in timed relation with movement of said conveyer belt, a bracket vertically reciprocable on said cross head and supported thereby, means for vertically reciprocating said bracket in timed relation with movement of the cross head, a horizontal shaft carried in said bracket, a horizontally movable gripper plate mounted on said bracket, means for rotating said shaft, and connecting means between said shaft and said gripper plate.

3. A cross feed assembly for box wrapping machines having a conveyer belt and box forming mechanism, comprising: horizontal ways positioned above and transversely of said conveyer belt, a supporting structure for said horizontal ways, a cross head slidable on said ways, a barrel cam journaled on said supporting structure, actuating connections between said barrel cam and said cross head for reciprocating the cross head horizonally on said ways in timed relation with movement of said conveyor belt, a bracket vertically reciprocable on said cross head and supported thereby, actuating means between said barrel cam and said bracket for vertically reciprocating the bracket in timed relation with movement of said conveyor belt, a horizontal shaft carried in said bracket, a horizontally movable gripper plate mounted on said bracket, an abutment adjustably positioned near one end of the horizontal ways, means actuated by said abutment for rotating said shaft, connecting means between said shaft and said gripper plate, a plurality of gripper fingers carried by the bracket positioned to cooperate with the gripper plate for engaging the side of a box blank, and a plurality of kickers carried on the bracket for removing a box from the box forming mechanism.

4. A cross feed assembly for box wrapping machines having a conveyer belt and box forming

mechanism, comprising: horizontal ways positioned above and transversely of said conveyer belt, a supporting structure for said horizontal ways, a cross head slidable on said ways, a bracket vertically reciprocable on said cross head and supported thereby, means for vertically reciprocating said bracket in timed relation with movement of the cross head, a horizontal shaft carried in said bracket, a horizontally movable gripper plate mounted on said bracket, means for rotating said shaft, connecting means between said shaft and said gripper plate, a main driveshaft journaled in said supporting structure, a barrel cam on said driveshaft, a segmental gear pivotally mounted to oscillate in timed relation with the barrel cam, a pinion journaled in said supporting structure in meshing relationship with said segmental gear, a connecting link journaled on and actuated by said pinion, and a lever journaled on said supporting structure, said lever being pivotally connected to the cross head and to said link, the pinion, link and lever being so constructed and arranged that in both limit positions of the pinion the center of the pinion and the centers of the journals at each end of the link, are substantially in a straight line.

5. A cross feed assembly for box wrapping machines having a conveyer belt and box forming mechanism, comprising: horizontal ways positioned above and transversely of said conveyer belt, a supporting structure for said horizontal ways, a cross head slidable on said ways, a barrel cam journaled on said supporting structure, a segmental gear pivotally mounted to oscillate in timed relation with the barrel cam, a pinion journaled in said supporting structure in meshing relationship with said segmental gear, and a lever journaled on said supporting structure, said lever being pivotally connected to the cross head and to said link, the pinion, link and lever being so constructed and arranged that in both limit positions of the pinion the center of the pinion and the centers of the journals at each end of the link, are substantially in a straight line.

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