

May 24, 1966

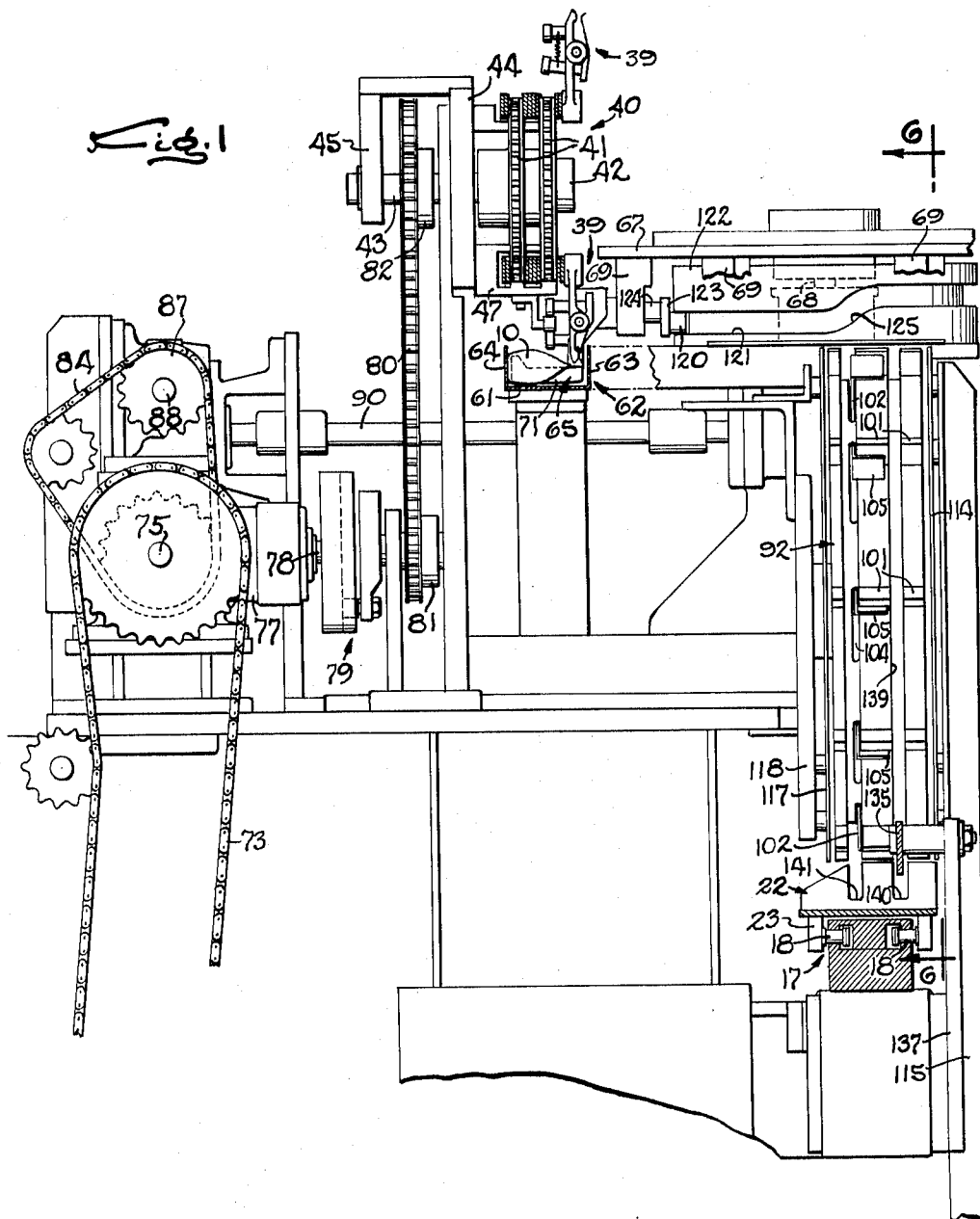
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3,252,384

TRANSFER MECHANISM

Filed Oct. 11, 1963

7 Sheets-Sheet 1



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7 Sheets-Sheet 2

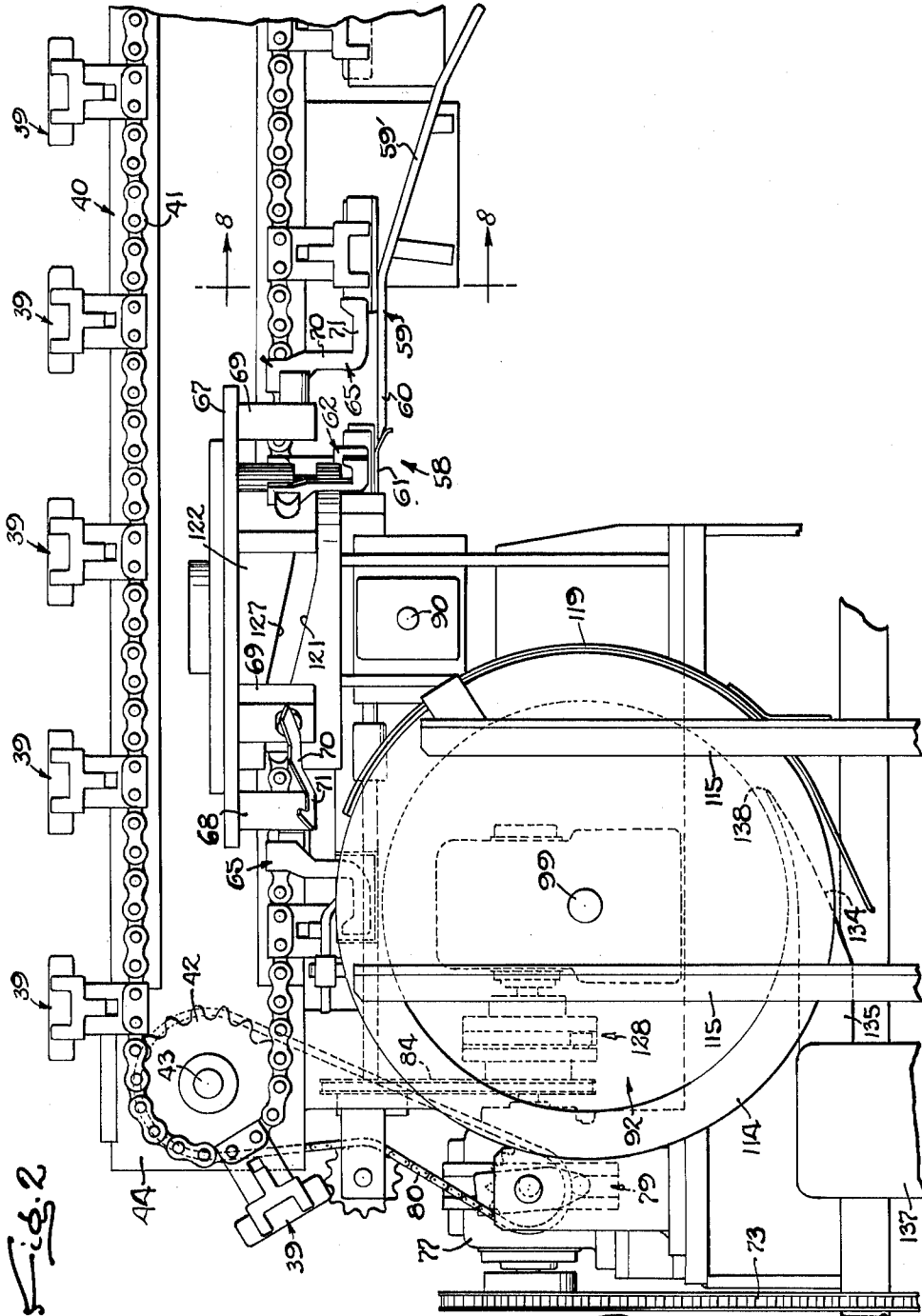


Fig. 2

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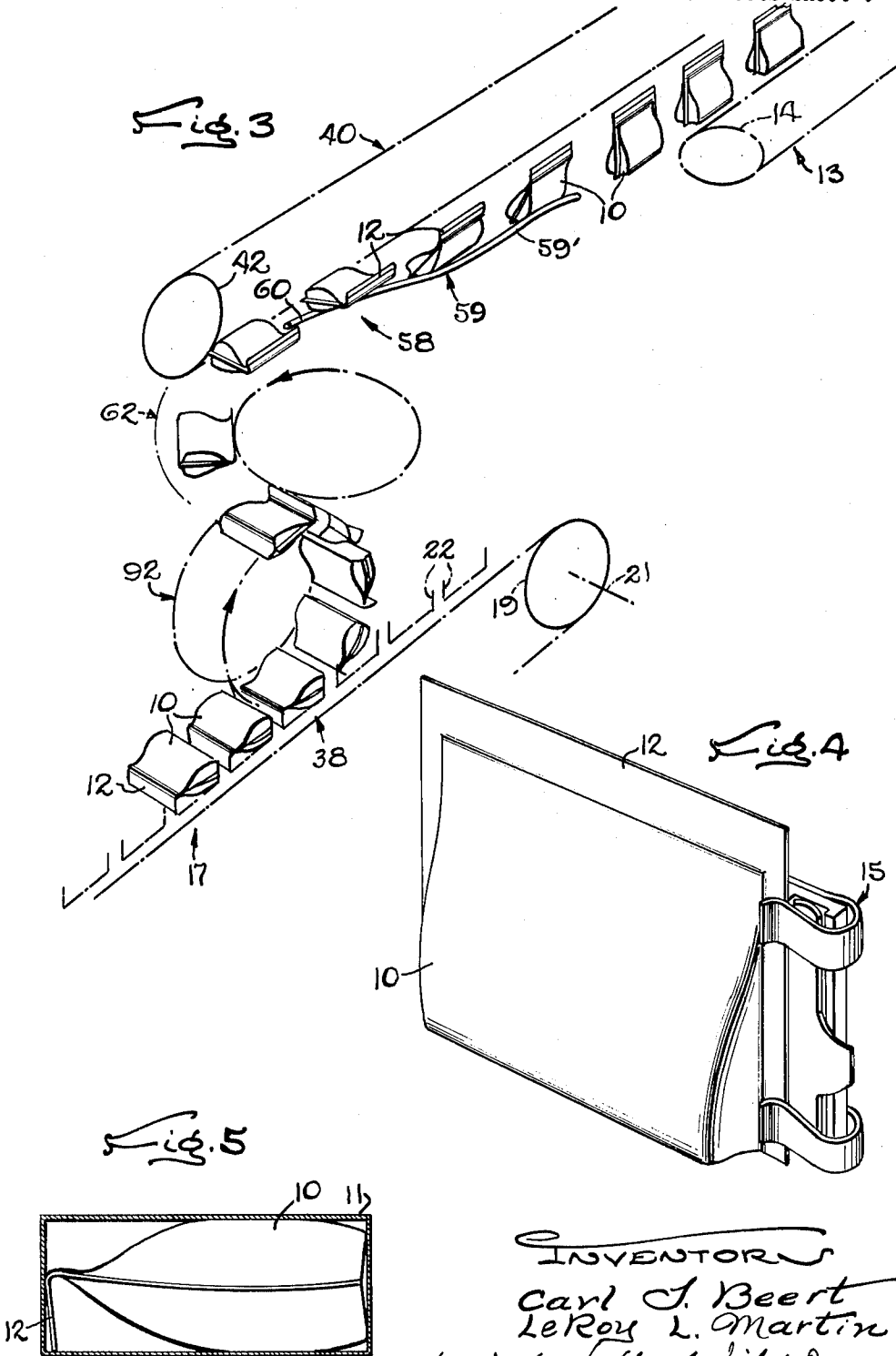
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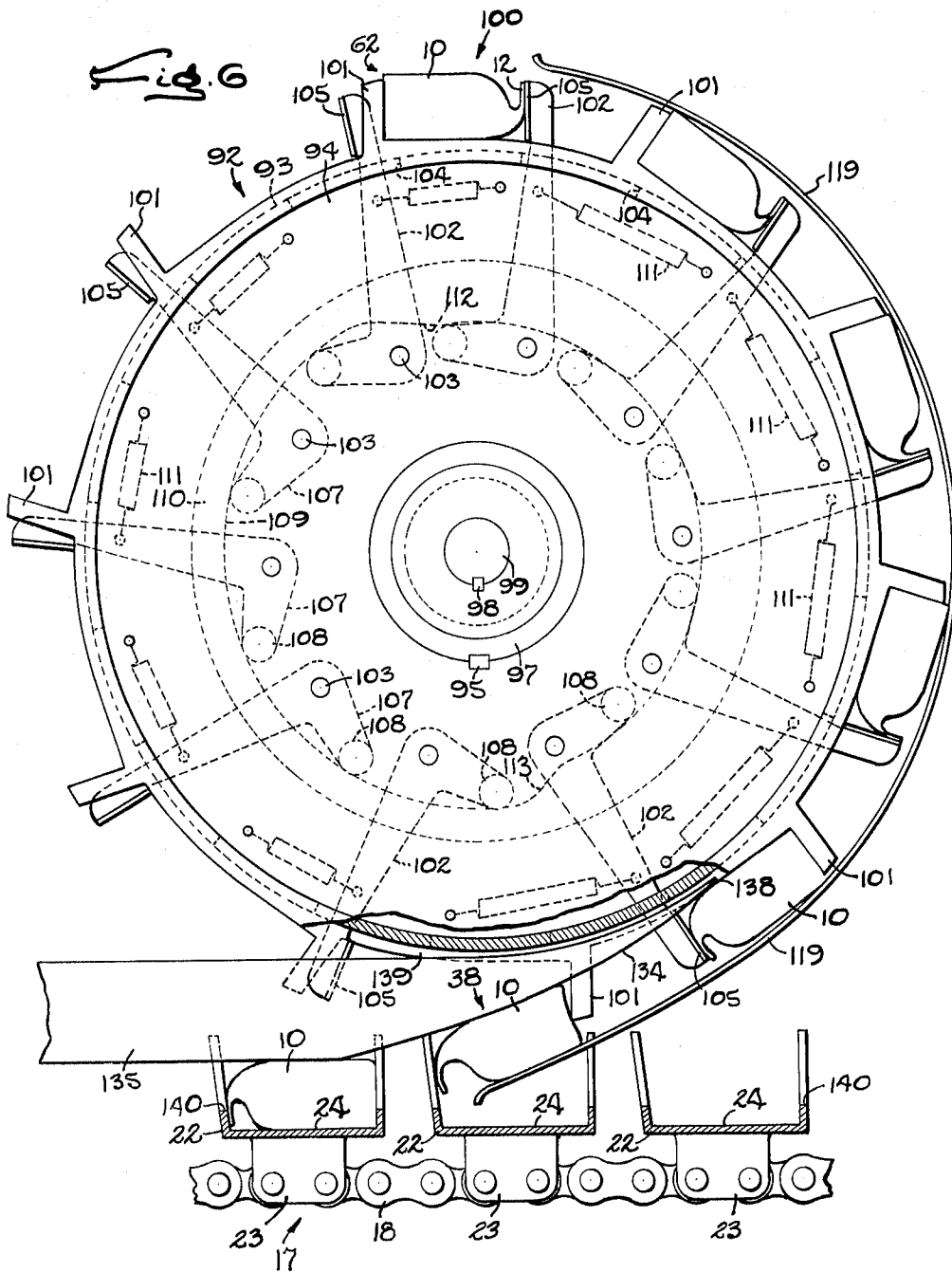
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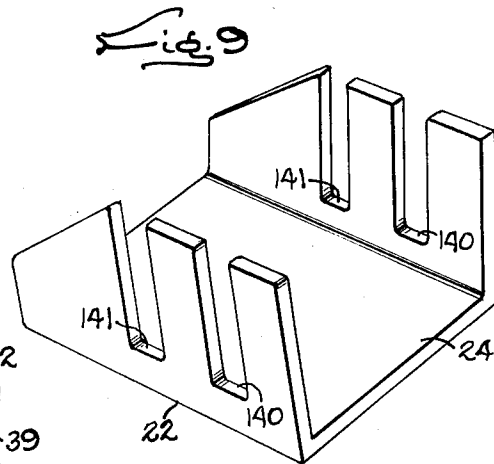
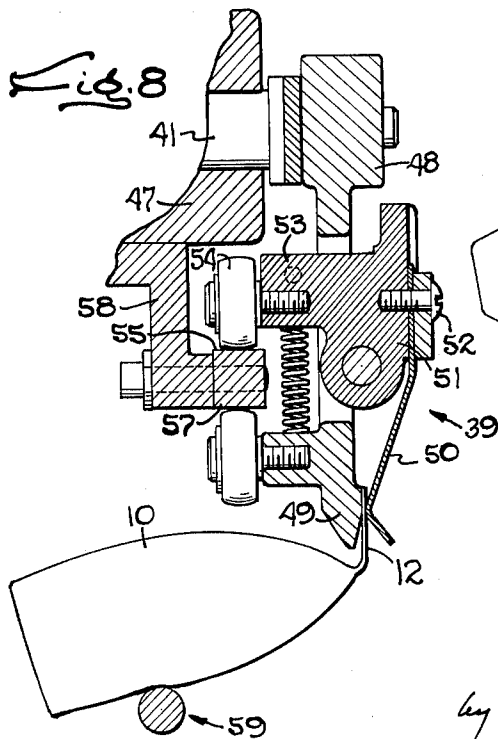
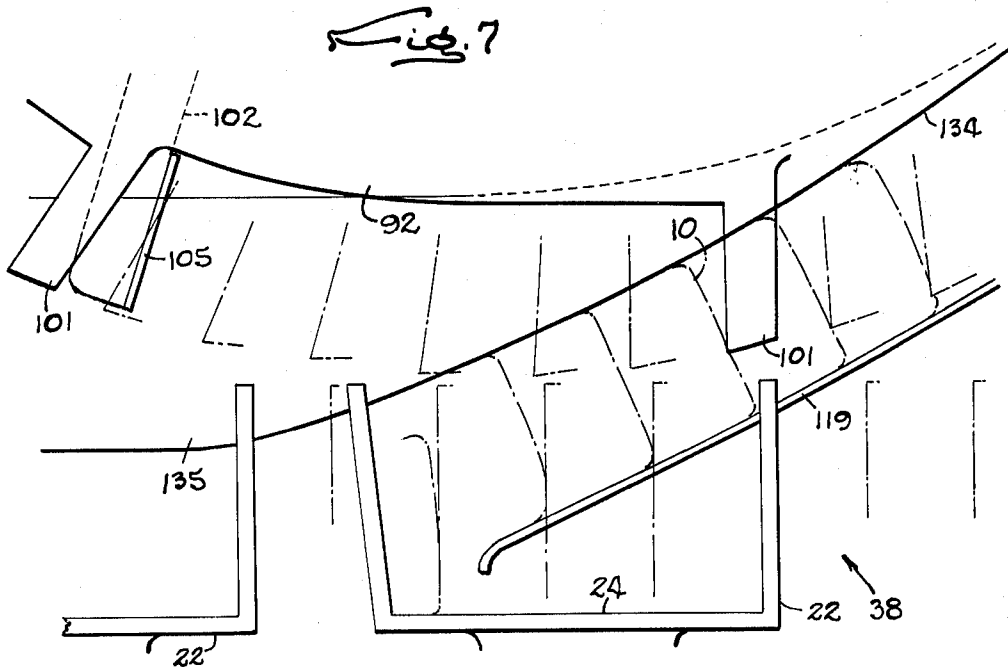
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7 Sheets-Sheet 6

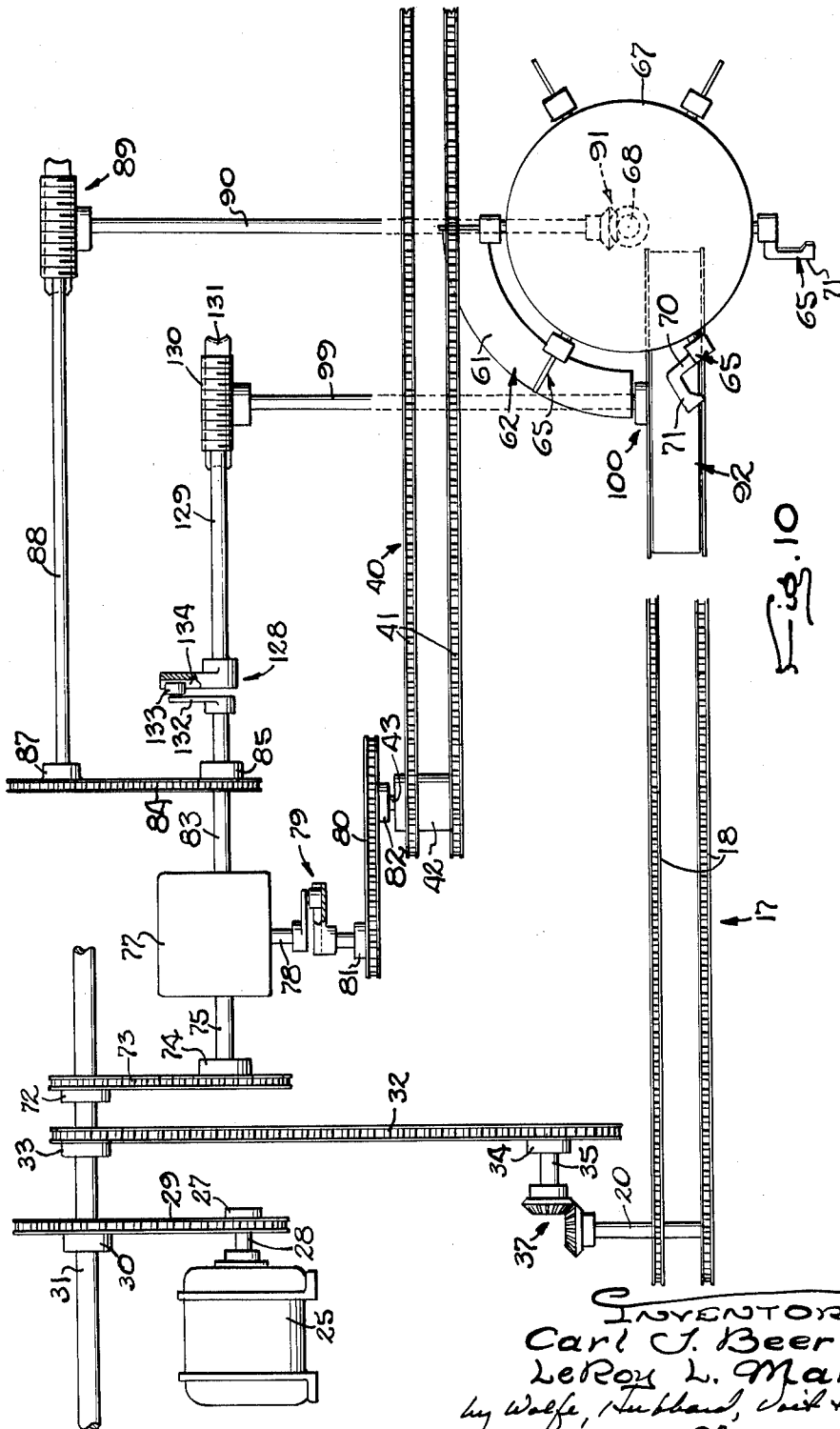


Fig. 10

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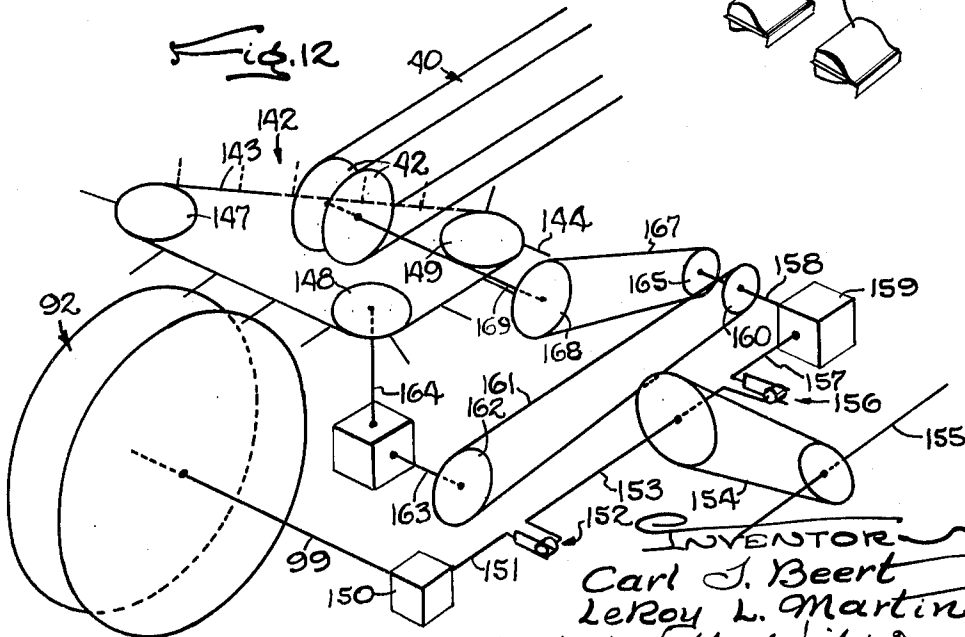
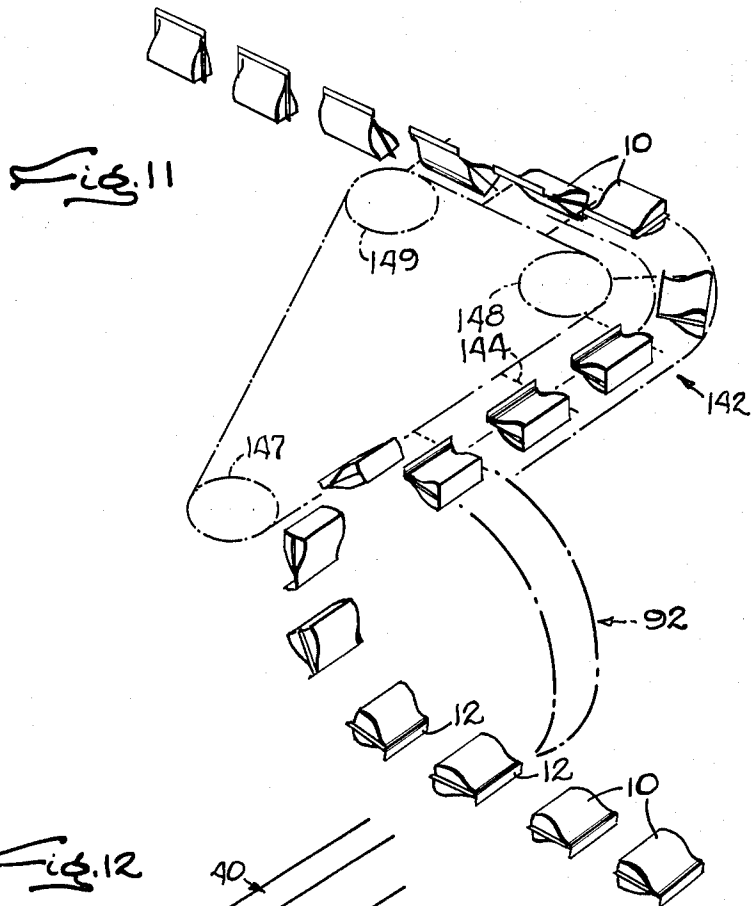
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7 Sheets-Sheet 7



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TRANSFER MECHANISM

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 Filed Oct. 11, 1963, Ser. No. 315,586
 7 Claims. (Cl. 93-8)

This invention relates generally to high speed packaging machines and, more particularly, to mechanism for transferring flexible bags filled with fluent material such as a powdered product from the bag forming machine to a carton loading carrier while orienting the bags for transfer in a particular position into cartons. The bags shown generally herein are the gusset-bottom type of relatively wide cross-section and narrow upper end portions which are folded over to form a flap at the upper end and make the bag more compact for cartoning.

When filled with a powdered product and handled at high speed, flexible bags are relatively instable and are easily distorted during the various transfer operations performed on the bags both to orient the bags in a predetermined attitude and to push them into cartons. Because the filled bags have greater resistance to distortion from side edge to side edge than from top to bottom, it is desirable to push the bags edgewise into the cartons.

The general object of the present invention is to provide novel transfer mechanism for transferring the bags smoothly and at high speed to the carton-loading carrier and orienting the bags for edgewise transfer onto the carrier while firmly supporting the bags at all times to maintain the product distribution in the bags.

Another object is to fold the flaps on the upper ends of the bags quickly and smoothly as an incident to one of the orienting steps.

A further object is to hold the flaps folded during all subsequent orienting and transfer steps.

A more detailed object is to provide novel devices cooperating to turn the bags first from the vertical positions in which they come off the bag-forming machine to horizontal positions, and then ninety degrees in a horizontal plane, both of these turns being executed smoothly, rapidly, and with adequate support for the bags to prevent bag distortion.

The invention also resides in the mechanism for feeding the bags into the carton-loading carrier.

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

FIGURE 1 is a fragmentary cross-sectional view taken substantially in a vertical transverse plane through a packaging machine embodying the novel features of the present invention.

FIG. 2 is a fragmentary side elevation of the portion of the machine shown in FIG. 1.

FIG. 3 is a fragmentary perspective view schematically illustrating the path of the bags through the transfer mechanism.

FIG. 4 is an enlarged perspective view showing a bag held in a bag clip of the type used on the carrier for the bag-forming position of the machine.

FIG. 5 is an enlarged view showing a bag in a carton, the carton being shown in section.

FIG. 6 is an enlarged fragmentary view taken along the line 6-6 of FIG. 1 with parts broken away and shown in section.

FIG. 7 is an enlarged view similar to a portion of FIG. 6 and schematically illustrating the transfer of bags from the transfer wheel to the carton-loading carrier.

FIG. 8 is an enlarged cross-sectional view taken sub-

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stantially along the line 8-8 of FIG. 2 with a bag gripped in the transfer carrier clip.

FIG. 9 is an enlarged perspective view of a carton-loader carrier bucket.

FIG. 10 is a fragmentary schematic view of the drives for the various elements of the machine.

FIG. 11 is a schematic view similar to FIG. 3 but differing in one of the turns of the bags and showing a modified form of the invention.

FIG. 12 is a fragmentary schematic illustration of the modified form showing the various drives for this form.

As shown in the drawings for purposes of illustration, the invention is embodied in a continuous motion machine for forming, filling and closing bags 10 at high speed, transferring the completed bags to a loading station (not shown) while orienting the bags for insertion into cartons 11 (FIG. 5) on a carton carrier (not shown), and finally loading the bags into the cartons and sealing the latter closed. The illustrative gusset-bottom bags are formed by a sheet of flexible material folded intermediate its ends to form two side panels which are sealed together along three side margins and joined together across the remaining margins by a relatively wide bottom wall, the package thus formed being filled with a quantity of fluent material such as a powdered product. Because of their wide cross-sectional thickness, such bags have a substantially greater volume than envelope-type bags of corresponding height and width. Herein, the bag construction is shown only generally.

To make the completed bag more compact and thereby conserve carton space, the upper edge portion 12 of each bag is folded over to form a flap and thereby reduce the overall length or height of the bag. Thus, the bags fit more compactly in the cartons 11 as shown in FIG. 5.

Apparatus for forming, filling and closing these bags 10 is well known to those skilled in the art, and therefore, is not shown herein. The completed bags are disposed in spaced edge-to-edge relation on a carrier formed by an endless chain 13 shown schematically in FIG. 3 and trained around to horizontally spaced sprocket wheels 14, the bags being carried on the chain by clips (FIG. 4) evenly spaced along the chain and gripping the leading edges of the bags. Adjacent the downstream end of the carrier, the clips are opened and the bags are released for transfer to a carton-loading carrier 17 running alongside the carton carrier and eventually are loaded from this carrier into cartons.

In this instance, the loading carrier 17 is formed by two endless chains 18 (FIGS. 6 and 10) disposed in spaced vertical planes and trained around two pairs of side-by-side sprocket wheels 19 (FIGS. 3 and 10) mounted on horizontal shafts 20 and 21 suitably journaled on the machine frame. Evenly spaced along these chains are a plurality of holders or buckets 22 of generally U-shaped front-to-rear cross-section disposed above the chains when on the upper runs thereof and each secured to the chains by means of two lugs 23 depending from the bottom wall 24 of each bucket and fast on links of the respective chains. The latter are driven continuously at a speed correlated with the speed of the chain 13 by a motor 25 (FIG. 10) and a drive train including a sprocket wheel 27 on the motor shaft 28, an endless chain 29 driven by this sprocket and running around a sprocket wheel 30 on an idler shaft 31 to rotate the idler shaft, a second endless chain 32 driven by a second sprocket wheel 33 on the idler shaft and driving a sprocket wheel 34 on a parallel stubshaft 35 suitably journaled on the frame, and meshing bevel gears 37 on the stubshaft and on the shaft 20 rotatably supporting the sprockets 19 at one end of the loading carrier. Preferably the entire machine is arranged substantially in a straight line with the loading carrier paralleling the carrier chain 13.

The loading carrier 17 is driven in a direction to move its upper run to the left as viewed in FIGS. 6, 7 and 10 and one bag 10 is loaded into each bucket 22 by transfer mechanism at a transfer station indicated generally at 38 in the drawings. With the carrier running alongside the carton carrier, the bags are pushed and guided laterally out of the buckets and into alined cartons 11 in a well known manner as the bags and cartons pass through the loading station spaced along the carrier 17 from the transfer station. As previously stated, bags of this type are relatively unstable with respect to product distribution, and are easily distorted during the loading operation, particularly if the loading force is applied to the bottom of the bag. Accordingly, it is highly desirable to push the bags edgewise into the cartons to take advantage of the greater cross-sectional rigidity of the bags in this direction.

The present invention resides in the novel mechanism for transferring the bags 10 at high speed from the carrier chain 13 to the buckets 22 while orienting and conditioning the bags for edgewise loading into the cartons 11 without disturbing the product distribution in the bags. In accordance with the invention, all of the orienting steps and flap-folding operation are accomplished smoothly and at high speed while maintaining even product distribution in the bags, and the flap 12 is folded as an incident to one of the orienting steps and thereafter positively held in the folded condition until the bag has been inserted in a carton.

It will be seen from FIGS. 3 and 11 that orientation of the bags 10 in the illustrative machine involves two primary steps, namely, turning of the bags from vertical positions to horizontal positions, and turning the horizontal bags ninety degrees in a horizontal plane to orient the longitudinal axis of each bag with the longitudinal axis of the carton. Herein, the transfer mechanism also turns the bags upside down as an incident to feeding of the bags into the buckets 22 on the loading carrier 17.

The first step in the orientation of the bags 10 is performed while the tops of the bags are gripped in clips 39 spaced along a transfer carrier 40 comprising two endless chains 41 disposed in spaced vertical planes (see FIG. 1) and trained around two sets of sprocket wheels 42 mounted on horizontal shafts 43 journaled in two horizontal frame bars 44 and 45 and positioned so that this carrier overlaps the downstream end of the carrier chain 13. The chains 41 are guided and braced by a rail 47 supported on the frame bar 44 and having a contoured groove in which the chains ride. The clips 39 are fast on the chains and project downwardly when on the lower runs of the chains far enough to grip the tops of the bags prior to release of the latter by the clips 15 on the chain 13 and thereafter hold the bag tops with the bags hanging below the chains.

In this instance, each clip 39 is formed by a lug 48 fast on the chains 41 as shown in FIG. 8 with the lower end portion of the lug forming a first finger 49 extending downwardly along one side of the top of the bag, and a second finger 50 projects downwardly along the other side of the bag top and is supported on a block 51 pivoted on the lug 48 for swinging about an axis paralleling the path of the chains. In this instance, the fingers 50 are flexible spring plates fastened by screws 52 to the pivot blocks. An arm 53 projects laterally from the pivot block and carries a follower roller 54 which rides on a cam track 55 on a bar 57 supported on brackets 58 hanging beneath the underside of the rail 47. It will be seen that the pivot block, the depending spring finger, and the laterally projecting arm constitute a bell crank that is rocked back and forth by rises and falls on the cam track to swing the spring finger toward and away from the fixed finger and grip and release bag tops disposed between the fingers. The cam track is contoured to close the clips 39 on the bag tops before the bags are released by the clips 15 on the chain 13, and

to open the clips when the bags reach a transfer station adjacent the downstream end of the transfer carrier indicated generally at 58 in the drawings.

As the bags 10 are carried toward the transfer station 58, the bag bodies are turned into horizontal positions and the flaps 12 are folded in one simple and smooth operation by a turning element 59 (FIGS. 2, 3 and 8) having a surface facing toward the sides of the bags and bending laterally under the transfer carrier 40 toward the bags and upwardly to swing the bodies upwardly while the tops are held in vertical positions by the clips 39. Herein, the turning element is simply a rod having an end portion 59' (FIGS. 2 and 3) inclined upwardly and across the path of the bags to engage the bag bodies and cam the latter upwardly as they slide along the rod, and a second portion 60 disposed beneath the turned bag bodies to hold the latter in the turned position. The downstream end (FIG. 2) of the rod is level with a horizontal plate 61 and thus guides the bags onto the plate at the transfer station 58.

The plate 61 is the bottom wall of a trough 62 of U-shaped cross-section (see FIG. 1) having arcuate sidewalls 63 and 64 spaced apart a distance corresponding to the height of the bags 10 after the flaps 12 are folded, and the bags are moved into the open end of the trough in the position shown in FIG. 1 so that the side walls hold the flap in the folded condition after the clips 39 are opened and during the next step in orienting the bags. As shown most clearly in FIG. 10, the trough curves through an arc of approximately ninety degrees. Successive bags deposited in the open end of the trough are moved through the trough by a series of pushers 65 which thus cooperate with the trough to form an arcuate carrier operable to turn each bag ninety degrees in a horizontal plane while holding the flaps securely in place.

Herein, the pushers 65 take the form of L-shaped arms (see FIGS. 1, 2 and 10) angularly spaced around a circular plate or wheel 67 fast at its center on an upright shaft 68 journaled on the frame and supporting the wheel above the level of the trough 62 with the peripheral edge of the wheel coaxial with and generally above the curved inner sidewall 63 of the trough. The pushers are supported by blocks 69 (see FIG. 2) fast on and depending from the underside of the wheel, one leg 70 of each pusher being pivoted intermediate its ends on the associated block and normally disposed in a vertical plane with the other leg 71 projecting horizontally from its lower end. The horizontal legs are somewhat shorter than the width of the trough 62 and are positioned to pass through the latter with their lower edges closely adjacent the bottom 61 of the trough.

The pusher wheel 67 is rotated in timed relation with the advance of the bags 10 on the carrier 40 to swing one pusher 65 into and through the trough after each bag is loaded into the trough. For this purpose, the drive motor 25 for the loading carrier 17 also drives both the carrier 40 and the pusher wheel 67. As shown in FIG. 10, a third sprocket wheel 72 on the idler shaft 31 drives an endless chain 73 trained around a sprocket 74 on a stubshaft 75 journaled in and projecting to the left from a gear box 77. This shaft drives a second shaft 78 through suitable gearing, and the shaft 78 drives the carrier sprockets 42 through a vari-speed drive connection 79 which imparts a continuous but varying speed motion to a chain 80 trained around sprocket wheels 81 and 82, the latter being mounted on the sprocket shaft 43 to drive the carrier 40 at a varying speed. A third shaft 83 projecting from the gear box 77 drives the pusher wheel 67 through an endless chain 84, sprocket wheels 85 and 87 on the shaft 83 and on parallel shaft 88 journaled on the frame, and a worm and worm wheel connection 89 between the shaft 88 and a shaft 90 geared at 91 to the pusher wheel shaft 68.

After being turned through a ninety degree arc by trough 62 and the pushers 65, each bag 10 is loaded onto a

wheel 92 which effects the final transfer of the bags to the loading carrier 17. As shown most clearly in FIGS. 1 and 6, the transfer wheel is formed by a generally cylindrical shell 93 having an integral web 94 closing one of its ends and keyed at 95 to a hub 97 itself keyed at 98 to a shaft 99 journaled on the frame for rotation about a horizontal axis far enough below the level of the trough 62 so that the bottom of the trough is in a plane generally tangent the top of the shell at a second transfer station 100.

Evenly spaced around the periphery of the wheel 92 are a series of radially projecting lugs 101 which cooperate with the outer ends of radially projecting movable arms 102 alternating the with lugs to form a series of pockets evenly spaced around the wheel for receiving successive bags from the trough 62 at the transfer station 100. Each of the arms 102 is pivoted at its inner end on the web 94 by means of a horizontal pivot pin 103 (FIG. 6) and projects through an elongated slot 104 in the shell a distance approximately the same as the projection of the lugs 101, the arms being swingable back and forth along the slots toward and away from one of the lugs and carrying pressing plates 105 on their outer ends facing toward the associated lug.

Fast on the inner end of each arm 102 is a shorter arm 107 which projects radially from the pivot pin 103 approximately at a right angle with the radial arm and carries a follower roller 108 adjacent its free end, the two arms constituting a bell crank operable upon back and forth generally radial movement of the follower roller to increase and decrease the spacing of the associated lug 101 and pressing plate 105. An endless cam track 109 (see FIG. 6) formed by the interior of a generally circular ring 110 is stationarily mounted on the frame and disposed within the shell 93 so that the rollers ride along the track as the wheel is rotated with the shaft 99. Each crank is urged in a clockwise direction about its pivot by a coiled tension spring 111 which is stretched between the web and the arm 102 to hold the roller against the track.

Adjacent the top of the track 109 is a rise surface 112 operable to rock each crank counterclockwise (FIG. 6) from an open position shown on the left in FIG. 6 to a closed position shown on the right. Adjacent the bottom of the cam track is a fall surface 113 which permits the springs 111 to rock the cranks back in a clockwise direction to the open position, increasing the spacing of the pressing plates 105 from the lugs 101. In the open positions, the spacing of the lugs and plates is greater than the height of bags 10 with folded flaps 12 while, in the closed positions, the spacing is the same as the bag height. With this arrangement, bags may be pushed onto the wheel 92 when the pockets are open, just before the rollers 108 reach the rise 112, and the pockets immediately close so that the bags are clamped in the pockets and held securely therein with the flaps folded over. Then, adjacent the bottom of the wheel, the pockets open to release the bags.

A disc 114 (FIG. 1) larger than and coaxial with the wheel is stationarily mounted on posts 115 closely adjacent the end of the wheel remote from the trough 62 and a similar disc 117 is mounted adjacent the opposite end of the wheel on a post 118 and is formed with a gate aligned with the trough to admit bags from the trough into the pockets. Thus, the discs 114 and 117 close the sides of the pockets, and prevent the bags from shifting laterally out of the pockets as the wheel turns. A pair of arcuate bars 119 (FIGS. 2, 6 and 7) supported on the right-hand post 115 (FIG. 2) follow the curvature of the wheel 92 and are spaced from the latter to hold the bags against the periphery of the wheel and prevent shifting of the product as the bags are turned upside down.

Mounted on each pusher leg 70 is a follower 120 which rides in a groove 121 encircling a cylinder 122 fast on

the frame below the pusher wheel 67, the groove forming a cam track for controlling the angular position of the pusher about its pivot. Preferably, the followers project inwardly from crank arms 123 (see FIG. 1) fast on the inner ends of pivot pins 124 supporting the pushers on the blocks 69. As each pusher enters the trough 62, the groove holds the pusher in a vertical plane with the lower edge of the horizontal leg 71 adjacent the trough bottom. This condition is maintained until the pusher reaches the gate through the disc 117. Then, however, a rise at 125 (FIG. 1) in the groove elevates the follower 120 with the result that the pusher tilts in a clockwise direction (FIG. 1) to swing the horizontal leg 71 rearwardly relative to the pivot and raise the leg out of the trough as shown most clearly in FIG. 2. Thus, the leg passes freely over the top of the disc 114, leaving the bag in the pocket at the top of the wheel 92. Before the pusher again reaches the forward end of the trough, the grooves turns downwardly at 127 (FIG. 2) to return the pusher to its vertical position. It will be seen that a smooth, high-speed transfer is effected without sacrificing control or support of the bag during the transfer.

Preferably, the drive train for the transfer wheel 92 also includes a vari-speed drive connection 128 (FIG. 10) which imparts a continuous motion to the wheel while varying the speed of rotation alternately between fast and slow rates, the variations being correlated with the feeding of bags into the pockets so that the wheel moves relatively slowly as a bag is pushed into a pocket and then more rapidly between transfers to present another pocket to the end of the trough 62 before the next bag reaches the end of the trough. This arrangement permits operation of the machine at the optimum overall speed while effecting the transfers with the wheel moving relatively slowly.

As shown in FIG. 10, the transfer wheel shaft 99 is driven by a shaft 129 through a worm 130 and worm wheel 131, and the shaft 129 is rotated by the vari-speed connection 128 which comprises a crank arm 132 on the shaft 83, and a roller 133 mounted on the free end of the crank arm and projecting into a radial groove in a crank 134 fast at one end on the end of the shaft 129, the two shafts 83 and 129 being slightly offset from each other. As the roller rotates concentrically about the axis of the driving shaft 83, it rotates eccentrically about the driven shaft 129 thereby varying the effective length of the crank 128 and, accordingly, varying the speed of rotation of the driven shaft 129 and the transfer wheel 92. The vari-speed drive connection 79 driving the carrier 40 is substantially the same in construction and operation.

The final transfer of bags 10 from the transfer wheel 92 to the buckets 22 on the loading carrier 17 also is effected smoothly with a continuous motion and with positive control to hold the flaps 12 folded and prevent distortion of the bags. As shown in FIGS. 2, 6 and 7, the carrier is generally tangent to the underside of the wheel at the transfer station 38 and the bags are cammed and guided downwardly out of the wheel pockets and into the carrier buckets by the curved edge 134 of a plate 135 stationarily mounted on a post 137 (FIG. 1) and disposed immediately below the underside of the wheel. The plate tapers to a point 138 which is disposed in a peripheral groove 139 in the wheel so as to lie between the wheel and passing bags, and the curved edge is inclined gradually downwardly and radially outwardly from the point relative to the wheel curvature to cam bags out of the respective pockets. The lower end portion of the rods 119 follow the curvature of the edge 134 and are spaced from the latter a distance equal to the bag thickness to cooperate with the edge in forming a chute for guiding bags into the carrier buckets, the bags being securely supported between the cam edge and the rods.

The side walls of the buckets 22 are notched at 140 (see FIGS. 6 and 9) to permit the plate 135 and the rods

119 to extend below the tops of the buckets as shown in FIGS. 6 and 7. A second notch 141 accommodates a second plate or rod if one is used. As each follower roller 108 passes the fall surface 113 of the cam track 109, the associated pocket is opened and the bag therein is released. The bag bottoms, however, remain in contact with the trailing lugs 101 until after the bag has been lowered far enough to be engaged by the trailing bucket walls and pressed tightly into the bucket with the flap held folded by the front wall thereof. The underside of the plate 135 continues along the top of the loading carrier 17 and holds the bags down until the latter are transferred to the cartons.

In FIG. 7, successive relative positions of the bags 10 and the trailing bucket walls are shown in broken lines to illustrate manner of feeding of a bag into a bucket. The loading carrier 17 is driven at a constant speed which, of course, is correlated with the varying speed of the transfer wheel 92 to present a bucket 22 to receive the bag from each pocket around the wheel.

A modified form of the invention is shown schematically in FIGS. 11 and 12 in which the transfer carrier 142 comprises an L-shaped trough having an arcuate curve connecting the two legs of the trough. In place of the wheel 67, an endless chain 143 supports evenly spaced pushers 144 movable through the trough to move the bags from the transfer carrier 40 to the wheel 92, the chain being trained around three sprocket wheels 147, 148 and 149 to follow a generally triangular path passing over the two legs of the trough, over the wheel 92, and finally back to the leading trough end.

As before, the pushers 144 are pivotally mounted and provided with followers (not shown) riding along a cam track and operable to raise the pushers above the wheel as bags are deposited in the wheel pockets. In this instance the bags are turned upwardly to the right (FIG. 11) and then horizontally to the left, the opposite of the turns made in the preferred form. The primary difference resulting is the direction of offset of the carton-loading carrier 17 from the transfer carrier 40.

As shown in FIG. 12, the wheel 92, the transfer carrier 40 and the pusher carrier 143 may be driven at correlated varying speeds. For this purpose, the wheel shaft 99 is driven through meshing bevel gears in a box 150 by a shaft 151 having a vari-speed connection 152 of the type described with a shaft 153 driven by a chain 154 from a power-rotated shaft 155. The shaft 155 also drives both the transfer carrier 40 and the pusher carrier 143 through a second vari-speed connection 156 (FIG. 12) driving a stubshaft 157 and another stubshaft 158 through gearing in a box 159. One sprocket wheel 160 on the stubshaft 158 drives an endless chain 161 rotating a sprocket wheel 162 and its supporting shaft 163 which drives the shaft 164 of the pusher carrier sprocket 148. A second sprocket wheel 165 on the stubshaft 158 drives a chain 167, a sprocket wheel 168, and its supporting shaft 169 which also supports and drives the sprocket wheels 42 at one end of the transfer carrier. The direction of axial offset of the shafts 151 and 157 from the shaft 153 are such that the slow steps of the wheel 92 coincide with the rapid steps of the pusher carrier 143.

From the foregoing, it will be seen that the illustrative machine orients the bags 10 for edgewise transfer into cartons 11 while positively and firmly supporting each bag during each orienting and transfer step, and performs these steps smoothly during the high speed operation of which such machines are capable. As a result, the flaps 12, which are folded automatically as an incident to one of the orienting steps, are held in the folded condition throughout the remainder of the transfer and even product distribution in the bag is maintained to prevent package distortion that could hamper the final loading operation as well as reduce the attractiveness of the package.

We claim as our invention:

1. In a machine for loading bags into cartons, the com-

ination of, a frame, a first carrier mounted on said frame for movement along a first horizontal path to a first transfer station, means spaced along said carrier for gripping the tops of bags, advancing a succession of bags along said path with said bags vertically disposed, and releasing the bags at said transfer station, a member mounted on said frame along said path and having a surface engageable with the bodies of said bags below said carrier, said surface bending laterally toward said bodies and upwardly toward the level of said carrier to cam the bag bodies into horizontal positions while the tops thereof are held vertical thereby to form folded flaps at said tops, a second carrier mounted on said frame at said transfer station and positioned to receive the bags, said carrier including means for supporting the bags in said horizontal position with the flaps held in the folded position and turning the bags ninety degrees in a horizontal plane while carrying the bags along a second path to a second transfer station, a wheel journaled on said frame below said second station for rotation in a vertical plane with the top of the wheel tangent to the plane of said second path to receive the bags at said second station, means defining angularly spaced pockets around the periphery of said wheel for receiving successive bags and holding the same in angularly spaced relation against the wheel with said flaps held in said folded positions and carrying the bags around the wheel to a third transfer station adjacent the bottom of the wheel, a third carrier tangent to said wheel at said third station and mounted on said frame for movement along a third path, a second transfer device for transferring bags from said wheel to said third carrier at said third station, means on said third carrier for receiving successive bags at said final station and advancing the bags along said third path while holding said flaps in said folded positions, and mechanism for driving said carriers and said wheel in timed relation with each other whereby each bag is formed with a folded flap and oriented for transfer into a carton.

2. A machine as defined in claim 1 in which said second transfer device comprises a cam mounted on said frame adjacent said third station with its loading end spaced inwardly from the insides of said bags and inclined outwardly relative to the wheel curvature to cam bags out of the wheel pockets and onto said third carrier.

3. A machine as defined in claim 2 in which said pocket defining means includes a plurality of angularly spaced lugs projecting radially from said periphery and formed with a circumferential groove extending radially through said lugs and inside said wheel periphery, the leading end of said cam being disposed within said groove.

4. A machine as defined in claim 2 further including an arcuate holding member between said second station and said third station, said member following the curvature of said wheel in spaced relation therewith toward said third station to hold bags in said pockets, and following the incline of said cam adjacent said third station to coact with the cam in guiding bags out of the pockets.

5. In a machine for loading flexible bags in a predetermined attitude into cartons, the combination of, a frame, a first carrier mounted on said frame for movement along a first path to a first transfer station, means spaced along said carrier for gripping the tops of bags, supporting the bags in generally vertical positions and advancing the same along said path to a said transfer station, and releasing the bags at said transfer station, a member mounted on said frame along said path and operable to turn the lower portions of the bags ninety degrees into horizontal positions while said tops are gripped and held vertical thereby to form flaps at said tops, a second carrier extending along a first arcuate path from said transfer station in a horizontal plane through a ninety degree arc to a second transfer station and positioned to receive bags released by said first carrier, said second carrier including means for holding said flaps in vertical positions and

moving successive bags along said arcuate path to said second station, a third carrier extending along a second arcuate path from said second station to a third station through a 180 degree arc in a vertical plane and positioned to receive bags at said second station, said third carrier including means for supporting said bags and holding said flaps folded while moving the bags along said second arcuate path to a third transfer station, a fourth carrier extending along a path generally tangent to said second arcuate path at said third station and including means for holding said bags in spaced relation with the flaps folded, means for transferring bags from said third carrier to said fourth carrier at said third station and mechanism for driving said carriers in timed relation with each other whereby each bag is formed with a folded flap and oriented for subsequent transfer into a carton.

6. In a cartoning machine, the combination of, a frame, a carrier on said frame movable along a predetermined path, means spaced along said carrier for gripping the tops of bags to be cartoned and advancing the bags along said path with the bags vertically disposed, and a turning device mounted on said frame and extending along said path alongside said bags, said device having a surface engageable with the sides of said bags when the later are vertical and bending laterally and upwardly to swing the lower portions of the bags into generally horizontal positions while the tops of the bags are held vertical by said gripping means thereby to form folded flaps at the top of the bags while orienting the bags for transfer into cartons.

7. In a machine for loading bags into cartons, the combination of, a frame, a first carrier on said frame movable along a first path to a first transfer station, means spaced along said carrier for gripping one edge portion of the bags, advancing the latter along said path,

and releasing the bags at said transfer station, means mounted on said frame along said path for turning the bags into positions generally perpendicular to said edge portions thereby forming folded flaps on the bags, a wheel journaled on said frame adjacent said transfer station, means associated with said wheel for receiving and holding successive bags in angularly spaced relation on the periphery of the wheel with the flaps folded, a transfer device for loading successive bags onto said wheel to be carried around the wheel to a second transfer station, a second carrier tangent to said wheel at said second transfer station and mounted on said frame for movement along a second path, means on said second carrier for receiving successive bags from said wheel and advancing the bags along said second path while holding the flaps in folded positions and mechanism for rotating said wheel and operating said carriers and said transfer device in timed relation with each other whereby said flaps are folded and held folded as the bags are oriented for loading into cartons.

References Cited by the Examiner

UNITED STATES PATENTS

2,082,352	6/1937	Neumair	198—210
2,311,736	2/1943	Cleminson	53—116
2,337,528	12/1943	Stuckert	198—210
2,603,344	7/1952	Cordis	198—170
2,773,584	12/1956	Densmore	198—170
2,942,719	6/1960	Bofinger et al.	198—33.3
3,106,809	10/1963	Forthmann	53—116

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