

[54] **AUTOMATIC BAG PACKING
APPARATUS FOR CHECK-OUT**

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[51] Int. Cl.**B65b 43/14, B65b 43/36**

[58] Field of Search.....**53/29, 187, 188, 189, 190, 53/255, 258, 385, 390**

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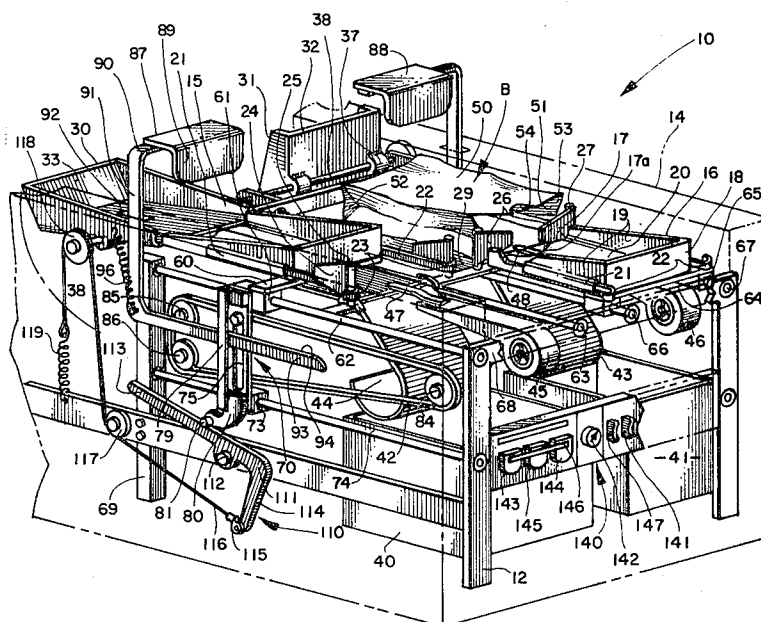
[57] **ABSTRACT**

After articles such as groceries are loaded into a reciprocable shuttle tray they are automatically bagged, handled continuously and ultimately delivered to a point where the loaded bag can be picked up.

Situated on a holding platform in the path of horizontal movement of the shuttle tray is an open ended kraft paper bag inflated from a previously collapsed condition and oriented to admit both the shuttle tray and groceries being carried by it. When set in motion the shuttle tray travels into the bag and pushes it onto a receiving tray that tilts the bag of articles from a generally horizontal alignment to an erect position and deposits the bag of groceries on a conveyor that leads to a pick-up point.

The individual bags are linked to one another by detachable joints and are stored in a supply hopper. As the shuttle tray drives a bag from the holding station to the receiving tray the motion of the bag serves to automatically pull the next or replacement bag into position onto the holding platform. After the shuttle tray has completed its cycle and has been returned to its initial station the replacement bag is expanded, by air from a blower for example, to accept the next load of groceries carried by the shuttle tray.

27 Claims, 5 Drawing Figures



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SHEET 1 OF 2

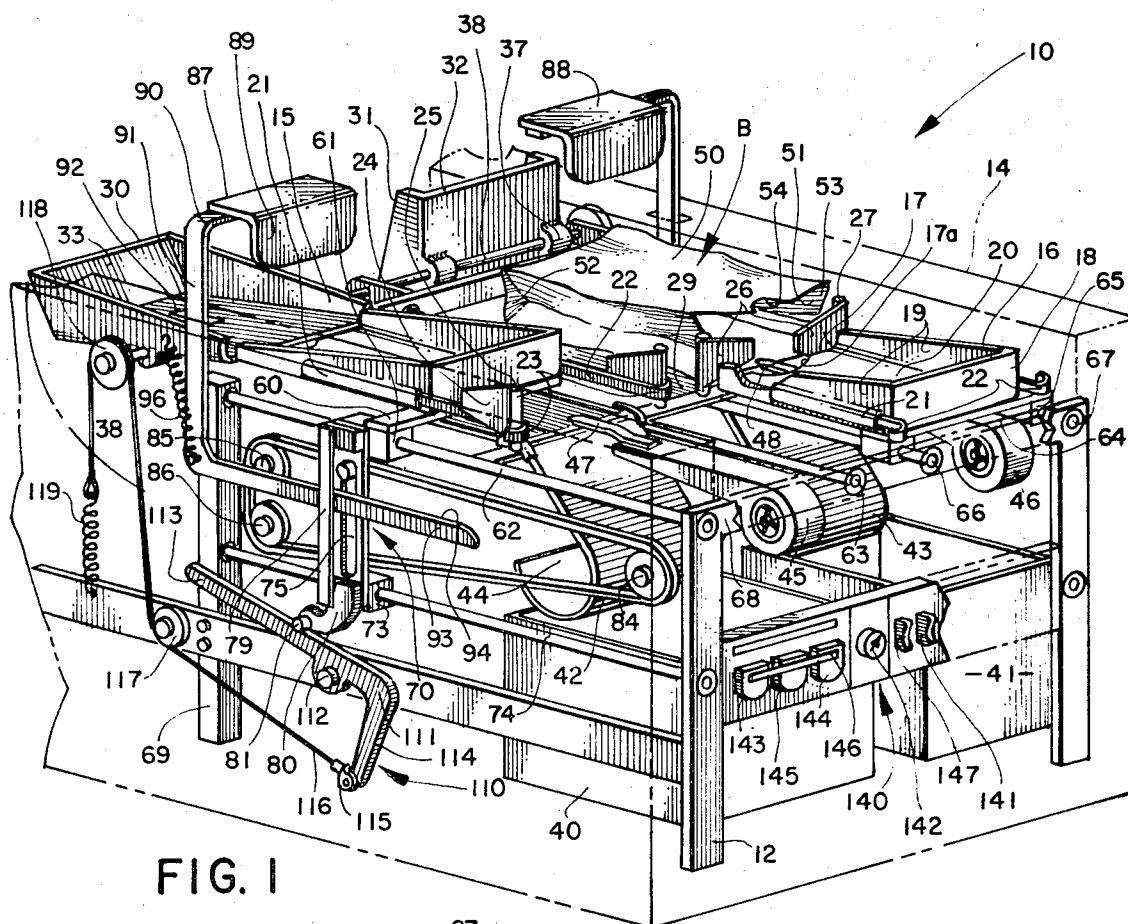


FIG. 1

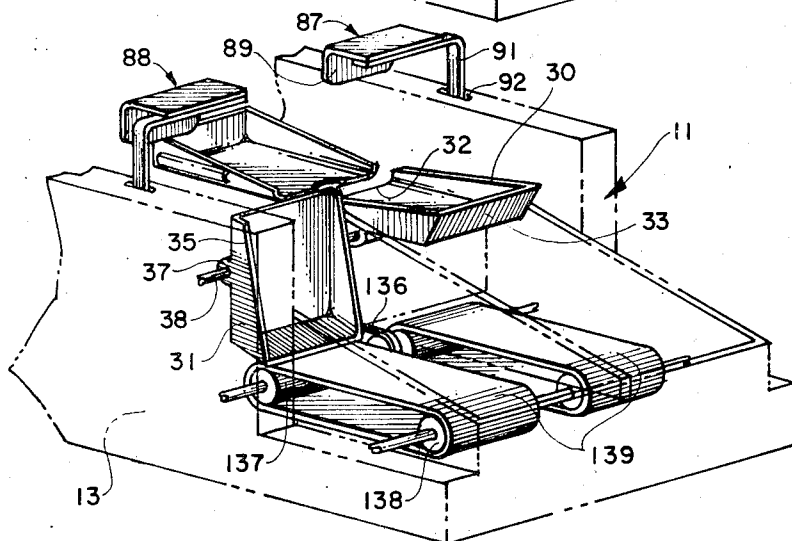


FIG. 2

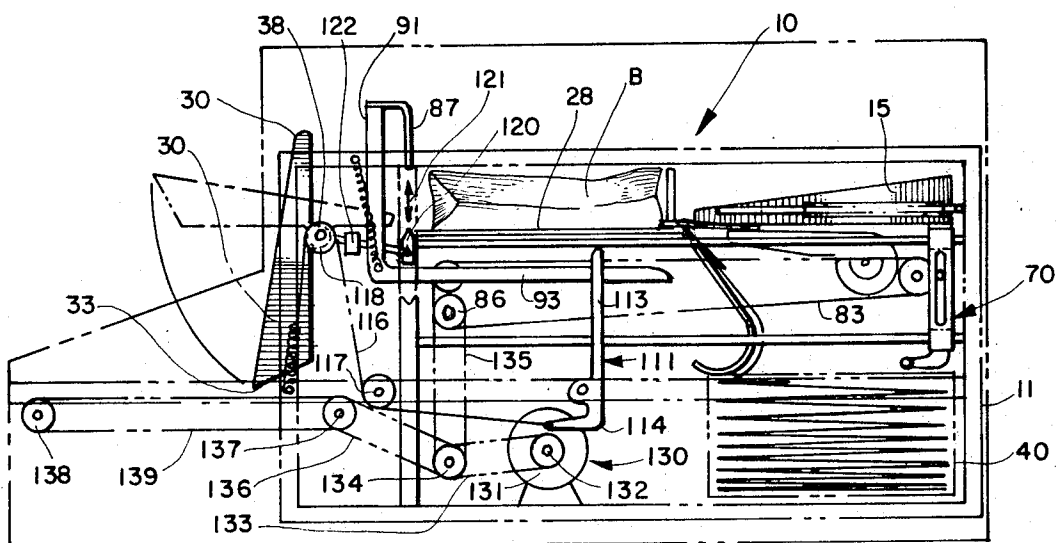


FIG. 5

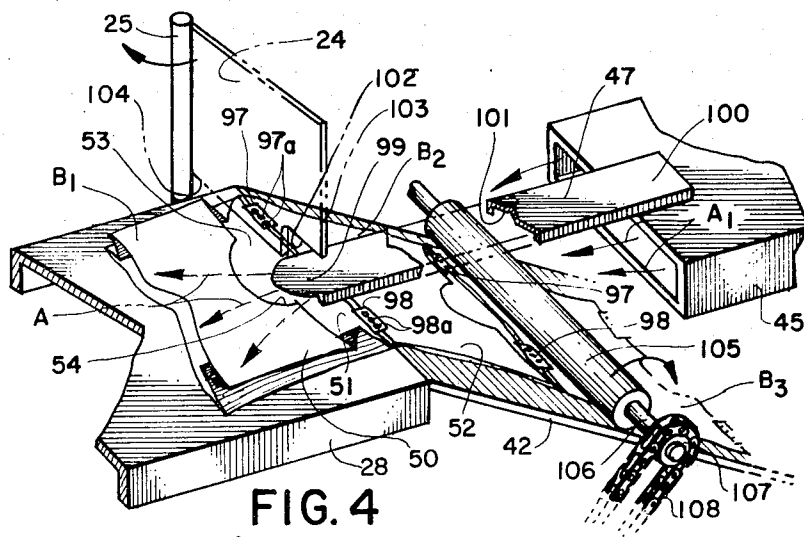


FIG. 4

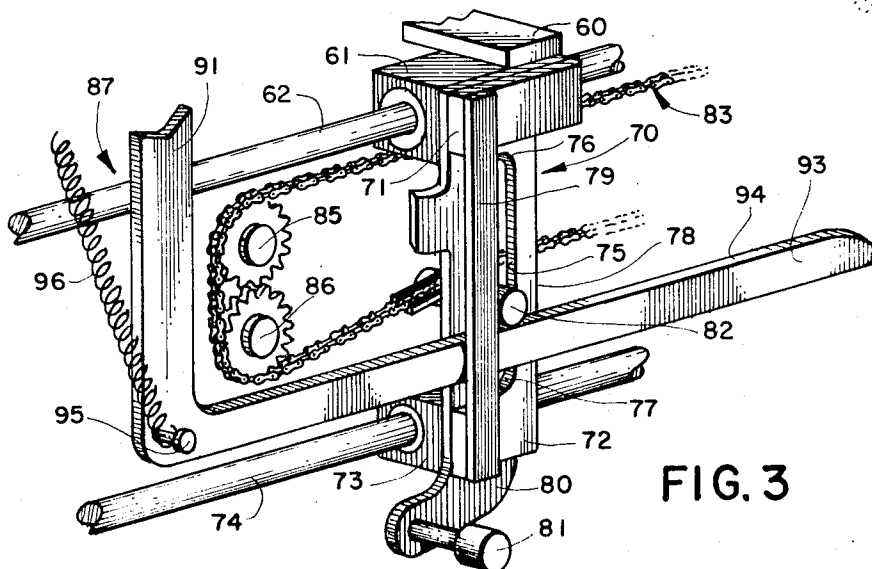


FIG. 3

AUTOMATIC BAG PACKING APPARATUS FOR CHECK-OUT

BACKGROUND OF THE INVENTION

This invention relates generally to article handling equipment and more specifically to apparatus for automatically packaging articles and transferring the packages to a pick-up point.

After articles such as groceries have been checked off by a cash register clerk and paid for by the customer, the articles must ordinarily be manually packaged in kraft bags. If the store is busy when the cash register clerk is required to do the packaging then this is tedious, and especially exasperating to impatient waiting customers. If an assistant or bag boy assists in the packaging efforts then this is of course expensive because of the added manpower.

One type of procedure aimed at overcoming some of the foregoing drawbacks of exclusive manual packaging involves the placing of a manually opened bag on a sloped holding platform so that checked off articles can be placed on a vibrating conveyor which eventually delivers the articles to the bag and randomly deposits them into the bag.

A related type of bag handling apparatus includes a conveyor which carries bags to a pick-up point after the bags have been manually opened and manually loaded.

Mechanical bag openers are known wherein a spade enters a kraft paper bag to unfold the gusset bottom end after which mechanical fingers are caused to grasp the bag and maintain it expanded so that a reciprocating pusher can deliver articles into the bag. Serious problems can arise from attempting to brace the bag and prevent tearing.

SUMMARY OF THE INVENTION

Briefly stated the bag packing apparatus of this invention incorporates a framework and a shuttle tray coupled to the framework for movement along a path between a retracted position where articles such as groceries can be loaded into it and an extended position. A holding platform is arranged to maintain an open-ended kraft paper bag on its side with the open end of the bag facing the shuttle tray so that the shuttle tray can be moved by a transfer means into the bag to contact and eventually push the bag from the holding platform.

A receiving tray coupled to the framework has an entrance end for receiving the major portion of the shuttle tray. When the shuttle tray is freed from the receiving tray and is being returned by the transfer means back to its initial position, the receiving tray is caused to tilt and stand the bag of groceries generally erect for movement onto a conveyor to a pick-up location.

The bag packing apparatus includes a supply hopper containing a stack of flattened open-ended type kraft paper bags. A bag feeder means operates to supply a replacement bag onto the holding platform as a bag loaded with groceries is pushed by the shuttle tray to the receiving tray. The bags are detachably joined to one another and the bag feeder means includes a guide ramp over which the bags may be consecutively slid while being supplied to the holding platform. A blower is oriented to direct air into and inflate the bag prior to the time when the shuttle tray loaded with groceries travels towards the bag.

The transfer means preferably includes a reciprocal carriage connected to the shuttle tray and a drive means operatively connected to the carriage for driving the carriage and shuttle tray between their extreme positions in the cycle.

A blocker unit mounted to the framework top portion has a depending blocking plate normally positioned above the entrance end of the receiving tray. The blocker unit is operatively connected to the drive means in a manner so that the blocker plate is caused to descend and block groceries in the bag from being removed from the bag as the shuttle tray is withdrawn from the receiving tray.

The invention is carried out procedurally by loading articles such as groceries to be packaged into a tray at a loading station and moving the tray loaded with the articles to a holding station and into an open-ended bag laying on its side. The bag is shoved from the holding station to a receiving station by way of physical contact between the bag during continuous movement of the tray. The tray is eventually withdrawn from the bag as the articles remain deposited in the bag. As the bag is pushed from the holding station to the receiving station this motion automatically causes a replacement bag to be pulled from a supply source onto the holding station. The bag open end is physically blocked while the bag rests on the receiving station so that articles will not tend to tumble out of the bag as the tray is backed out of the bag.

BRIEF DESCRIPTION OF THE DRAWINGS

The numerous benefits and unique aspects of the present invention will be fully understood when the following detailed description is studied in conjunction with the drawings in which:

FIG. 1 is a perspective view showing the interrelationships of some of the important components incorporated in an automatic bag packing apparatus for use at a check-out stand constructed in accordance with this invention;

FIG. 2 is a similar type of perspective view taken from the opposite end of the bag packing apparatus shown in FIG. 1;

FIG. 3 is a perspective, fragmentary, detailed view showing some of the components including the drive chain, carriage connected to the shuttle tray, and blocker unit;

FIG. 4 is a perspective, fragmentary, partially schematic view showing air being directed to inflate a kraft paper bag being held steady on a holding platform; and,

FIG. 5 is a side elevational, essentially schematic view of the bag packing apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 and FIG. 2 an automatic bag packing apparatus 10 is shown for use at the check-out stand where an operator or clerk would ordinarily be located to inspect groceries or other articles of merchandise and record the prices of the articles on a cash register or scanning device. The apparatus 10 would preferably be arranged adjacent a conventional rotating or movable counter on which the articles are placed prior to being checked out. The apparatus 10 is supported by a rigid, generally rectangular open

framework 11 constructed from conventional metal struts, beams, columns etc. FIG. 1 is a view towards the front section 12 of framework 11 and FIG. 2 is a perspective view towards the rearward section 13 of framework 11. For the sake of continuity and clarity some of the components shown in FIG. 1 are also shown in FIG. 2 in the same relative positions. The framework 11 may be partially aesthetically covered by a housing constituted by a series of panels as represented by the enclosing phantom lines.

The automatic bag packing apparatus 10 embodies, for purposes of illustration, two identically constructed shuttle trays 15 and 16 which can be operated independently or simultaneously by the check-out stand operator. A detailed description of one shutter tray and the manner in which it operates in connection with associated components will suffice for a full understanding of how both trays operate.

Each shuttle tray 15 and 16 includes an opened rear end 17 formed centrally in its edge with a notch 17a, an upstanding relatively tall front wall 18, an upstanding side wall 19 and a flat bottom wall 20. Secured to the exterior side walls 19 are a pair of sleeves 21 within which a pair of corresponding side strips 22 are slidably mounted. The side strips 22 are formed at their front ends with outwardly projecting hooks 23.

Mounted to framework 11 for use with shuttle tray 15 is a gate constituted by a pair of bumper flaps 24 that are hinged for swinging motion to a pair of erect pivot rods 25. Another gate is constituted by a pair of bumper flaps 26 coupled to erect pivot rods 27 associated with shuttle tray 16. As shall be subsequently described the shuttle trays, when loaded with groceries or other articles, are urged forwardly through their corresponding sets of bumper flaps while carrying the articles into open-ended bags B.

A pair of laterally spaced and generally flat holding platforms 28 and 29 is coupled to the framework 11 and lie within the paths of movement of shuttle trays 15 and 16 respectively.

Farther downstream in the path of movement and oriented adjacent holding platforms 28 and 29 is a pair of receiving platforms or trays 30 and 31 which are constructed somewhat similar to shuttle trays 15 and 16 but are aligned to face in opposite directions than the shuttle trays. Each receiving tray has an open front end 32, a closed sloped rear end 33, upstanding side walls 34 and a relatively flat bottom wall 35. Each receiving tray is formed on its under surface with a pair of mounting lugs 37 fixed by weldments or the like to an associated rocker rod 38 which, as shall be explained, can be automatically rocked at a predetermined time in a sequence of events to tilt the associated receiving platform in order to stand the bag of articles generally erect and set the bag upon a conveyor belt.

Positioned conveniently beneath the shuttle trays 15 and 16, while they are held at their retracted positions such as illustrated by the position of shuttle tray 16 in FIG. 1, is a pair of bag supply magazines or hoppers 40 and 41 that can be easily slid out of framework 11 either longitudinally or laterally to be replenished with another bundle of bags.

The individual bags of each stack of bags are detachably joined to one another at their ends by tear strips and are organized in zig zag fashion. As the de-

mand for a replacement bag arises the upper most bag is pulled into position by a bag feeder arrangement. The bag feeder arrangements associated with hoppers 41 include guide ramps 42 and 43 characterized by convex slide surfaces that are generally scroll shaped in cross section to facilitate smooth motion. Each guide ramp terminates in a curled free end 44 above the associated bag supply hopper.

Mounted to the framework 11 and above associated bag supply hoppers 40 and 41 is a pair of bag inflating means characterized by blowers 45 and 46 structured and oriented to direct streams of air rearwardly towards holding platforms 28 and 29. Secured in cantilevered fashion to the upper portions of blowers 45 and 46 is a pair of hold down tabs 47 and 48 which are formed on their under surfaces with channels or troughs, best seen in FIG. 4, that aid in distributing the streams of air rearwardly to their intended locations. The free ends or rearward most tips of hold down tabs 47 and 48 extend through and beyond the shuttle tray notches 17a and make resilient engagement with the forward lip or margin of the holding platforms 28 and 29.

As shall be described a primary function of hold down tabs 47 and 48 is to pinch or squeeze lower edge margins of the bags against the holding platforms 28 and 29 in order to maintain the bag steady and in optimum position while they are being inflated.

The bag B as shown in FIG. 1 is a kraft-type relatively stiff paper bag capable of being converted from a flattened collapsed condition to an expanded and fully opened condition to receive and hold articles such as groceries. Each bag B has two flat relatively large opposed side panels 50 and 51 and two pleated and relatively narrow opposed side panels. The bag B has a conventional gusset-type closed end 52 and is oriented to lay sideways or horizontal on side panel 51 with its open end 53 facing shuttle tray 16. A semi-circular cut-away zone 54 is formed in the center of the margin of upper side panel 60. The purpose of this orientation and general construction will be fully described.

Each shuttle tray is driven reciprocally on a track way over a rectilinear path by an associated transfer means from a fully retracted position, as illustrated by shuttle tray 16 in FIG. 1, and a fully extended position where it almost wholly is disposed inside of its associated receiving tray for the purpose of depositing a bag loaded with groceries.

Anchored to the forward underside of shuttle tray 15 is a cross piece 60 that terminates in opposing ends with slide blocks 61. Slide block 61 are slidably mounted on a pair of parallel rails 62 and 63 that constitute a track way for shuttle tray 15. In a similar manner shuttle tray 16 has a cross piece 64 terminating in a pair of slide blocks 65 that are slidably mounted on a pair of parallel rails 66 and 67. The forward ends of the rail 62, 63, 66 and 67 are mounted in a frame 68 while their rearward ends are mounted in a series of vertical mounting posts (only one of which is shown).

Referring now primarily to FIGS. 1 and 3 the transfer means for moving the shuttle tray 16 includes a carriage 70 having an upper end 71 coupled to shuttle tray 15 by way of a slide block 61. The lower end 72 of carriage 70 has a slide block 73 which is slidably mounted on a lower rail 74 that is parallel with and positioned

beneath rail 62. An elongated, vertically extending slot 75 having an upper limit 76 and a lower limit 77 is formed in the central portion of a main plate 78. A side guard 79 is spaced laterally outwardly from main plate 78. The lower most portion of 70 terminates in outwardly projecting cams 71 whose function shall be explained.

A drive means for moving shuttle tray 15 back and forth includes a drive chain 83 that mounts and outwardly projecting drive lug 82 which constantly extends through carriage slot 75. Drive lug 82 makes a lost motion connection within slot 75. The drive chain 83 has a pair of idler sprockets 84 and 85 and a drive sprocket 86 which cause the chain 83 to assume a flight that is generally parallel with the path of travel of shuttle tray 15. The rearward portion of drive chain 83 has a segment between sprockets 85 and 86 that is vertical so that when the drive lug 82 moves over this segment it will simultaneously drop through the carriage slot 75. As the drive lug 82 drops through slot 75, the carriage remains stationary and causes the associated shuttle tray to dwell at its maximum penetration in its associated receiving tray.

Associated with receiving trays 30 and 31 is a vertically movable blocker units 87 and 88 respectively. Blocker unit 87 is formed with a depending blocking plate 89 sized to fit into shuttle tray 15 at a predetermined time. Blocking plate 89 is secured to an overhanging mounting bar 90 connected to a vertically oriented slide bar 91 slidably mounted in a vertical guide slot 92 formed on the side of framework 11.

Extending forwardly from the end of slide bar 91 is a lever arm 93 whose upper surface 94 constitutes a cam follower surface. At the juncture between slide bar 91 and lever arm 93 is an outwardly projecting retaining pin 95 to which one end of a return spring 96 is attached, the other end of return spring 96 being coupled to some suitable point of framework 11. Optionally a hydraulic cylinder (not shown) of the type ordinarily used in door opener mechanisms can be coupled to each blocker unit 87 and 88 to dampen motion irregular tendencies.

When shuttle tray 15 reaches its fully extended position and maximum penetration into receiving tray 30 i.e.; approximately 80 percent of the end-to-end length of shuttle tray 15, the drive lug 82 will make initial contact with lever arm 93 and start to drop through carriage slot 75. As this action progresses the biasing force of return spring 96 is overcome and the lever arm 93 is pushed downwardly with the result that the blocking plate 89 is simultaneously pulled downwardly into the shuttle tray 15. The blocking plate 89 is caused to dwell at this position to block articles from tumbling backwardly from the bag B as the shuttle tray starts its retraction stroke for a sufficient period of time dictated by the length of lever arm 93. So long as the drive lug 82 makes sliding or rolling contact with the cam follower surface 94 of lever arm 93 then the entire blocking unit 87 will remain depressed. After the drive lug 82 travels beyond the free or forward tip of lever arm 93, the biasing force of return spring 96 will cause the blocker unit 87 to elevate and return to its normal raised position.

Referring now to FIG. 4 a Bag B₁ is shown being supported on its side panel 51 by holding platform 28 with

the open end 53 aimed towards blower 45. The bag B₁ is joined to the next or replacement bag B₂ by a pair of joining strips 97 and 98 which serve as flexible hinges and are formed along their lengthwise center lines with a series of perforations or tear slits 97a and 98a respectively. By way of example each joining strip may be an inch long and a half inch wide. Alternatively, one relatively long joining strip or more than two relatively short joining strips could be employed. The next succeeding bag B₃ is joined to bag B₂ in the same manner. The perforations facilitate the bags in being separated from one another at the proper time. The separation action is caused by force of gravity which serves to cause consecutive bags to snap apart under the weight of the bag of groceries.

The free tip 99 of hold down tab 47 presses downwardly against lower bag panel 51 to hold the bag B₁ steady prior to and while being inflated. While the bag B₁ is so positioned the blower 45 can be activated by a conventional mechanism to direct the stream of air A₁ outwardly towards bag B₁ with at least a portion of the air stream being collected within an air channel 101 formed on the undersurface of hold down tab 47. A portion of the air is thus deflected and routed directly at the bag open end 53 so as to more quickly and efficiently inflate bag B₁ and expand it to maximum size. The air A₂ driven into bag B₁ is not exclusively supplied through channel 101.

When the bag B₁ is fully inflated and driven towards the receiving tray by the shuttle tray located within bag B₁, the movement of bag B₁ automatically exerts a pulling force on the replacement bag B₂ and pulls it over the guide ramp 42 and into proper position on the holding platform 28. Bag B₂ can then be used in packaging the next load of groceries after the shuttle tray has completed its cycle and has returned to its retracted position.

To further assist in the inflating action the gate flaps 24 (only one of which is shown in dotted lines) are formed in their lower and innermost corners with notches 102. Their inner edges 103 are arranged in abutting relationship and their lower edges 104 bear downwardly against the overlying margin of the open end of bag B₁. Because of the downward force exerted by the flaps 24 on the bag overlying margin air is caused to initially enter the bag B₁ only through the region of cut-away zone 54. Air will travel progressively to the back causing the bag B₁ to become inflated first near the closed end and then near the open end. Air pressure within the bag will ultimately force the overlying margin of bag B₁ to skid upwardly along the flaps 24.

Optionally although not necessarily a positive feed power roller 105 may be arranged to assist in advancing the bags along the guide ramp. Power roller 105 has a shaft 106 secured to a sprocket 107 around which is trained a drive chain 108 linked in some suitable manner to the main motor 131 shown and described in connection with FIG. 5.

As the shuttle tray 15 and 16 are urged rearwardly either simultaneously or independently from their holding platforms 28 and 29 while shoving the bags loaded with groceries, a tilting means 110 operates to gradually swing the receiving trays 30 and 31 from substantially vertical to substantially horizontal align-

ments. When the receiving trays are swung to their horizontal positions the shuttle trays 15 and 16 can ride onto them to deposit the bags of groceries on the receiving trays. When the direction of movement of the shuttle trays has been reversed and they have been moved away from their receiving trays the tilting means 110 functions to swing the receiving trays 30 and 31 from their substantially horizontal alignments back to their substantially vertical alignments. The bags of groceries are ultimately deposited upon conveyors and carried to predetermined pick-up stations.

Referring primarily to FIG. 1 the tilting means 110 is constructed in part from a bell crank 111 pivotally secured to framework 11 by a laterally disposed pivot pin 112. The bell crank 111 has a relatively elongated arm 113 which acts as a cam follower when engaged by the outwardly projecting cam 81 associated with carriage 70. A relatively short arm 114 is connected by way of a clevis 115 to a chain 116. Chain 116 is drawn beneath a lower idler sprocket 117 secured to framework 11 and over an upper idler sprocket 118 that is fixed to rocker rod 38 for simultaneous movement therewith. The other end of chain 116 then extends downwardly where it is connected by an intermediate spring 119 with framework 11.

As indicated by its orientation FIG. 5 when carriage 70 is not in engagement with bell crank 111 then arm 113 stands substantially erect and receiving tray 30 correspondingly stands substantially erect. As indicated by its orientation as shown in FIG. 1, as the carriage 70 starts to engage arm 113 the chain 116 is pulled in such a manner that sprocket 118 causes rocker rod to swing tray 30 gradually to a substantially horizontal alignment for receiving tray 15 and the bag B of groceries. As the outwardly projecting cam 81 reverses its path of movement across arm 113 the biasing force of spring 119 causes bell crank 113 to gradually return to its erect position and receiving tray 30 is urged to correspondingly tilt downwardly and shift the bag B of groceries from a sideways position to an erect position in which condition it can be deposited onto an underlying conveyor belt 139.

The apparatus 10 shown in FIG. 5 may optionally include a vertically movable bag separator 120 that functions to strike or engage the joining strips which link adjacent bags together in order to assist in tearing the joining strips to that the bag B loaded with groceries can be broken away from the next successive bag. The bag separator 120 is arranged to move upwardly at the correct time from a retracted position beneath the junction of the bags as indicated by arrow 121. Bag separator 120 is operatively responsive to movement of rocker rod 38 and is interconnected with rocker rod 38 by a gear system depicted schematically and indicated by numeral 122. System 122 includes any suitable conventional devices capable of functioning to swing or urge bag separator 120 upwardly at some time interval after tray 30 has been moved fully upwardly.

Referring primarily to FIG. 5 a drive system 130 is schematically illustrated that includes a main motor 131 mounted to framework 11. Main motor 131 has a power take off shaft 132 set to drive a chain 133 arranged to rotate a gear 134 that directly or indirectly moves a branch drive chain 135. Chain 135 is coupled through magnetic clutches (not shown) and a shaft to

drive sprocket 86 that moves carriage 70 through its flight. Another branch drive chain 136 is coupled by way of magnetic clutches (not shown) and a drive shaft to a forward roller 137 which drivingly engages conveyor belt 139 and is coupled to a rearward idler roller 138. When the receiving tray 30 is tilted or tipped to its vertical orientation as shown by the solid lines in FIG. 5 the bag B of groceries automatically slides down sloped rear wall 33 onto conveyor belt 139 for movement to the far end above roller 138.

Referring again to FIG. 1 an electrical control panel 140 is schematically shown mounted to framework 11. The electrical circuitry and components are conventional and incorporate timing devices, relays, limit switches, etc. necessary for moving mechanical components in a predetermined sequence. By way of example control panel 140 has a main switch 141 for turning the main motor 31 shown in FIG. 5 on and off. A dial control 142 can be manipulated to regulate the amount of torque on the magnetic clutches used in connection with drive sprocket 86 and the shafts for running the shuttle trays 15 and 16. Knee level switches 143 and 144 correspond with shuttle trays 15 and 16 respectively so that each may be operated independently. An intermediate dual switch 145 can be used to simultaneously close switches 143 and 144 by way of a cross bar 146. Another switch 142 can be operated to independently energize the motors associated with blowers 45 and 46.

OPERATION

Keeping the above construction in mind it can be understood how many of the previously mentioned disadvantages of bag packaging techniques are overcome or substantially eliminated by the present invention.

Although multiple bags can be packages with groceries and handled simultaneously the operation of this invention, for the sake of simplicity and clarity, shall be described by referring to the sequence of events and cycle of movement corresponding to a single shuttle tray.

As groceries are checked off by the cash register clerk they are loaded into shuttle tray 15 and arranged generally sideways. When the groceries have partially or entirely filled shuttle tray 15, whose configuration and volume simulates that of a kraft paper bag, the person contacts and closes switch 143 with a hand or knee. The main motor 131 runs continuously as the automatic bag packing apparatus 10 is primed for operation. When the switch 143 is closed the motor associated with bag inflating blower 45 is turned on and a stream of air is directed to expand bag B resting on the stationary platform 28. As bag B is being expanded shuttle tray 15 remains stationary.

With the bag B fully expanded a magnetic clutch or the like associated with drive sprocket 86 is engaged and movement of carriage 70 is initiated. Movement of carriage 70 from its retracted position as shown in FIG. 5 towards its extended position as shown in FIG. 1 serves to gradually move shuttle tray 15 rearwardly over blower 45 and hold down tab 47 and directly into the bag B as its rests on the holding platform 28.

The leading edge 17 of the shuttle tray 15 bumps the gate flaps 24 and swings them rearwardly as it moves progressively deeper into the bag B and towards the

bag B closed end. As the now continuously moving shuttle tray contacts the bag B closed end the bag is physically shoved along the holding platform 28 with groceries now being occupied by the bag B.

Upon engagement by the outwardly projecting cam 81 of the carriage 70 and elongated arm 114 of the tilting means 110 the receiving tray 30 begins to pivot from a substantially vertical position as shown in FIG. 5 to its substantially horizontal and receiving position as shown in FIG. 1. The shuttle tray 15 proceeds onto tray 33 and the majority of its length (i.e.; preferably 80 percent) overlaps tray 30. Until the open end of the bag passes through a vertical plane extending through blocking plate 89, the blocking plate 89 remains raised.

As drive lug 82 of the carriage 70 drops through the elongated lost motion slot 75 into engagement with lever arm 93 the blocking plate 89 correspondingly descends to cover the open end of the bag B. Movement of the carriage 70 in the reverse direction after drive lug 82 has passed drive sprocket 86 causes the shuttle tray 15 to back out. Due to the blocking plate 89 the groceries are prevented from tumbling out as the shuttle tray is withdrawn from the bag B.

At this point the optionally included bag separator 120 is urged to engage the joining strips between consecutive bags. The tilting action of receiving tray 30 and the gravitational force applied to the joining strips will, alone, be sufficient to tear the strips and separate the bags from one another. As receiving tray 30 approaches its vertical position the bag B of groceries slides down the sloped wall 33 and onto the conveyor 139 for movement to a pick-up point.

When the shuttle tray 15 returns to its starting point it may strike a limit switch (not shown) to disengage a magnetic clutch or the like and discontinue movement of carriage 70.

From the foregoing it will be evident that the present invention has provided an automatic bag packing apparatus for a check-out stand in which all of the benefits and advantages are fully realized.

What is claimed is:

1. A bag packing apparatus, comprising:

- a. a framework;
- b. a shuttle tray coupled to the framework for movement along a path between a retracted position where articles can be loaded into it and an extended position;
- c. transfer means coupled to shuttle tray for moving the shuttle tray between its retracted and extended positions;
- d. a holding platform connected to the framework for holding an open-ended bag on its side with its open end facing the shuttle tray so the shuttle tray containing articles can be moved into the bag by the transfer means to push the bag from the holding platform; and,
- e. a receiving tray coupled to the framework with an entrance size to receive a portion of the shuttle tray as it is moved by the transfer means to its extended position.

2. The structure according to claim 1, including:

- a bag supply hopper for containing a stack of open ended bags; and,
- bag feeder means for supplying a replacement bag onto the holding platform when a bag of articles is

pushed by the shuttle tray towards the receiving tray.

3. The structure according to claim 2, wherein; a stack of kraft paper bags is contained in the hopper, the individual bags being detachably joined to one another at their ends, and, the bag feeder means includes a guide ramp over which the bags may be consecutively slid while being supplied to the holding platform.

4. The structure according to claim 2, including: bag inflating means for inflating a kraft paper bag resting on the holding platform.

5. The structure according to claim 4, wherein; each bag has a cut-away zone in its overlying margin of the open end; and,

the bag feeder means includes a hold down tab oriented to lay in the cut-away zone and pinch the bag underlying margin against the holding platform to assist in steadying the bag as it is being inflated.

6. The structure according to claim 5, wherein; the bag inflating means is a blower; and, the hold down tab is an elongated leaf spring cantilevered to the blower and formed with an air channel positioned to direct air discharged from the blower into the bag.

7. The structure according to claim 6, wherein; the bags are stacked together in zig zag fashion, and, the guide ramp has a convex surface over which the bags slide and is of scroll shape in longitudinal cross section.

8. The structure according to claim 1, including: a gate positioned adjacent the holding platform for facilitating movement of the shuttle tray into the bag.

9. The structure according to claim 8, wherein; the gate is constituted by a pair of normally coplanar flaps hinged on pivot rods to engage the interior sides of a bag when bumped and forced to swing rearwardly by the shuttle tray.

10. The structure according to claim 9, wherein; the shuttle tray has upstanding side walls that slidably mount a pair of strips formed at their forward ends with outwardly projecting hooks positioned to catch on corresponding pivot rods so that the strips can assist in holding the flaps open as the shuttle tray advances to its extended position.

11. The structure according to claim 1, wherein; the transfer means includes a reciprocable carriage connected to the shuttle tray and movable between a first extreme corresponding to the shuttle tray retracted position and a second extreme corresponding to the shuttle tray extended position; and,

a drive means is operatively connected to the carriage for driving the carriage between its extremes.

12. The structure according to claim 11, including: a track way including a pair of parallel rails; and, a cross piece fixed to the underside of the shuttle tray and having a pair of side blocks that slidably engage the parallel rails, one side block being rigidly fixed to the carriage.

13. The structure according to claim 11, wherein; the drive means includes a drive chain having a laterally projecting drive lug; and,

the carriage has a slot through which the drive lug extends to drivingly engage the carriage.

14. The structure according to claim 13, including: a blocker unit mounted to the framework and having a depending blocking plate normally positioned above the entrance and of the receiving tray, the blocker unit being operatively connected to the drive means in a manner so that the blocker plate is caused to descend and block articles in the bag from being removed from the bag as the shuttle tray is withdrawn from the receiving tray.

15. The structure according to claim 14, wherein; the carriage slot is elongated and vertically aligned; the drive chain has a generally vertically oriented segment at the rearward portion of its flight; the blocker unit has a lever arm which is engaged by the drive lug as it drops through the carriage slot and is movably engaged by the drive lug for a predetermined time thereafter, wherein, the drive lug and lever arm coact as a cam and cam follower respectively to keep the blocker unit at its depressed position so long as movable engagement is maintained.

16. The structure according to claim 1, including: tilting means for moving the receiving tray between a substantially horizontal position to accept the shuttle tray and a substantially vertical position to release a bag containing articles.

17. The structure according to claim 16, wherein; the tilting means is operatively connected to the transfer means.

18. The structure according to claim 17, wherein the tilting means includes: a bell crank with one arm engageable by the transfer means and the other arm connected to a chain operatively engaged with the receiving platform.

19. The structure according to claim 16, wherein; the receiving platform has a support wall for supporting a bag of articles as it is being tilted downwardly, the support wall being sloped to permit the bag of articles to slide off the receiving platform.

20. The structure according to claim 16, including: conveyor means having one end disposed generally beneath the receiving tray to accept a bag of articles when the receiving tray is swung to its substantially vertical position by the tilting means.

21. The structure according to claim 1, wherein the bag packing apparatus includes: plural shuttle trays and plural associated transfer means, holding platforms, and receiving trays, and, control means for operating the individual shuttle trays independently or simultaneously.

22. A process of handling articles, comprising the steps of:

loading articles to be packaged into a tray at a loading station;

moving the tray loaded with articles to a holding station and into an open ended bag laying on its side;

pushing the bag from the holding station to a receiving station by way of physical contact between the bag and tray and continuous movement of the tray, and,

withdrawing the tray from the bag without removing the articles from the bag.

23. The process according to claim 22 including the step of:

pulling a replacement bag to the holding station as the bag is pushed from the holding station to the receiving station.

24. The process according to claim 22 including the steps of:

blocking the bag open end at the receiving station to assist in preventing articles from being removed; and,

tilting the bag from a sideways position to an erect position after the tray has been withdrawn from the bag.

25. A bag packing apparatus comprising:

a. a framework;

b. a shuttle tray coupled to the framework for movement along a path between a retracted position where articles can be loaded into it and an extended position;

c. transfer means coupled to the shuttle tray for moving the shuttle tray between its retracted and extended positions;

d. a bag supply hopper containing a stack of open ended bags;

e. a holding platform connected to the framework for holding an open ended bag on its side with its open end facing the shuttle tray so the shuttle tray containing articles can be moved into the bag by the transfer means to push the bag from the holding platform;

f. a receiving tray coupled to the framework with an entrance size to receive a portion of the shuttle tray as it pushes the bag containing articles and is being moved by the transfer means to its extended position;

g. bag feeder means for supplying a replacement bag onto the holding platform when a bag of articles is pushed by the shuttle tray towards the receiving trays;

h. tilting means for moving the receiving tray between a substantially horizontal position to accept the shuttle tray and a substantially vertical position to release a bag containing articles; and,

i. conveyor means having one end disposed generally beneath the receiving tray to accept a bag of articles when the receiving tray is swung to its substantially vertical position by the tilting means.

26. The structure according to claim 25, wherein;

a stack of kraft paper bags is contained in the hopper, the individual bags being detachably joined to one another at their ends;

the bag feeder means includes a guide ramp over which the bags may be consecutively slid while being supplied to the holding platform;

bag inflating means is included to inflate a bag resting on the holding platform;

the transfer means includes a reciprocable carriage connected to the shuttle tray and movable between a first extreme corresponding to the shuttle tray retracted position and a second extreme corresponding to the shuttle tray extended position; and,

a drive means is provided that is operatively connected to the carriage for driving the carriage between its extremes.

27. The structure according to claim 25, wherein the bag packing apparatus includes:
plural shuttle trays, and,
control means for operating the individual shuttle trays independently or simultaneously.

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