ABSTRACT OF THE DISCLOSURE

In bag-loading machines for continuously loading preformed open-ended bags, elevator apparatus having a bag lifting platform arranged transversely of the product loading path of travel and slidably mounting two bag filled trays, one releasably held registered for bag-loading operation, the other held in reserve for quickly moving into registered position and pushing an emptied tray on to storage rails, and an indexing means provided for incrementally raising the platform being responsive to the sensing of a tray held bag supply by pivoted bag spreader elements.

BACKGROUND

This invention relates to bag-loading machines for preformed open-ended bags of highly flexible thin sheet material or film, and more particularly to the elevator mechanism for accurately presenting a supply of empty bags in the form of stacked batches for continuous product-loading operations. As will be recognized by those familiar with machines of the above type the bags to be filled by such machinery are conventionally held in stacked bundles on a wicket. The wicket is positioned on elevating apparatus for raising the stack as article feeding mechanism successively inserts the products into the bags and strips the loaded bags from the wicketed stack. The positioning of the wicket and elevator mechanism designed to raise the top bags of a stack to the proper loading level for continued operation are of various types. Insofar as is known, prior elevator mechanism for holding wicketed bags and for properly inserting a fresh supply while the machine is stopped is a relatively time consuming operation in order to properly arrange the stack and make the necessary adjustments to position it for continuation of the loading operation. It is an object of the present invention to provide a tray device and elevator mounting apparatus which will not only accommodate a wicket of bags which may be readily set up and registered properly in the path of travel of the machine for such loading operations, but also to provide for holding a preloaded tray of wicketed bags in reserve for the easily accomplished rapid change over to a new supply whenever the bags of each wicket are depleted. Accordingly, a minimum amount of interruption of machine loading operations is necessary. Another object of this invention is to provide a positive indexing mechanism for lighting the elevator as the supply of bags is gradually depleted and to actuate this mechanism by utilizing the action of a known type of spreader mechanism which is primarily designed to hold open the mouth of the bag while the product is fed into the bag. In this connection lower spreader members when pivoted against the stack of bags are used as a detector to sense the level of the bag supply and if below an acceptable product loading level to cause the bags to be elevated by actuating a limit switch mechanism.

In the present invention an elevator platform is disposed transversely of the path of travel of the product in the machine loading channel. The platform is designed to carry two trays on each of which a wicket or stack of bags is prepositioned. One tray is releasably locked to register the bags in the loading path. The other is held in reserve. When empty the platform is lowered and the registered tray is released and pushed onto storage rails as the reserve tray is moved into registered position. The platform is then raised and the tray is quickly and automatically set into operative relation by the spreader detector action so as to resume loading.

The operation of the mechanism and additional specific objects and advantages of the invention will be appreciated from the following description of the embodiment thereof as shown by the accompanying drawings, in which,

FIG. 1 is a front elevation in diagrammatic form of a bread bagging machine in which the present invention may be incorporated;

FIG. 2 is a perspective view of the elevator frame and lifting apparatus and showing other portions of the machine to indicate a tray of bags positioned in operative position on the platform for loading operations;

FIG. 3 is a side elevation of the elevator mechanism shown by FIG. 2, the platform being in its lower position;

FIG. 4 is a front end view of the apparatus shown by FIG. 3;

FIG. 5 is a perspective view of a tray unit;

FIG. 6 is a detail view showing a switch actuator assembly for automatically operating the lifting mechanism; and

FIG. 7 is a schematic drawing showing mechanism for actuating the bag spreader elements and indicating the use thereof for sensing the level of the empty bags and operating the switch mechanism of FIG. 6.

In FIG. 1 a bag loading machine is diagrammatically illustrated as an example of the type of machine in which the apparatus of the present invention may be incorporated. The machine shown is adapted for bagging products such as bread loaves. Indicated at 2 is an infeed station on which a loaf of bread 4 may be deposited by suitable conveyor mechanism (not shown). A continuously moving endless conveyor at 6 has spaced pusher paddle assemblies 8 which are adapted to push the loaves 4 from the infeed station along a loading channel or path of travel to a loading station at 10. At station 10 a bag 12 is shown as receiving a loaf 4 through the open mouth of the bag. The mouth of the bag is first blown open by means of an air jet indicated at 14. Spacer elements of a known type (not shown in FIG. 1) may then be inserted into the mouth and held open for loading the bag. From the position of loaf 4 at station 10 the loaf is advanced against the closed bag end and thus strips the bag from the top of a wicketed stack of bags. The loaded bag is then carried across a platform at 16 in the loading path of travel and to a discharge station generally indicated at 18. The pusher at this point is withdrawn from contact with the loaf and carried back to the inlet end of the path. At station 18 the loaded bag may be picked up by conveyor apparatus (not shown) and advanced through known mechanism for closing and tying off the mouth of the bag. This type of bag loading machine is known in the art and it will also be recognized that there are also other bag-loading machines of the type wherein a reciprocable pusher inserts the products into the bags and advances the loaded bags to a suitable discharge station for tying operation.

In FIG. 1 is also shown a control panel at 20 with push buttons mounted at the front of a housing 22 which encloses the framework and driving mechanism for var-
ious parts of the machine. Also supported by the framework of housing 22 is the elevator platform and mechanism of the present invention. The elevator mechanism and tray carriage is indicated generally by numeral 24. Brieﬂy the apparatus is designed to provide for releasably holding one "active" tray of bags on the lifting platform in a position of registration with the loading path for products to be fed into the bags, and a second "hand-by" tray preloaded with bags and in a position to be quickly moved into the registered position once the supply of the ﬁrst tray is depleted. The platform holding the two trays extends transversely of the loading path of traveled, and may be considered as being divided into two sections. One section is vertically offset directly below said path of travel and the other section is laterally thereof. The latter section extends outwardly at the front of the machine as in FIG. 1. On said front section the reserve or "standby" tray is mounted. When the "active" tray is empty, machine operation stops automatically.

The operator then lowers the platform, releases the empty used tray, and immediately moves the reserve tray into registered position which pushes the empty tray onto storage rails at the back of the machine. Once the reserve tray is "registered" the operator quickly raises the platform in and tray into operative "loading" position. The bagging operations may then be continued. A further preloaded tray can then be mounted in standby position on the front platform section for the next changeover. Empty trays pushed onto the storage rails can accumulate and be removed as desired for preloading with bags and later use.

The platform and tray carriage 24 is shown in detail in FIGS. 2, 3, and 4. A bag table or platform support (FIG. 2) is conveniently in the form of a casing generally designated as 30 and comprising a mounting plate 32 afﬁxed at the front of housing 22 (see FIGS. 1, 3, 4) from which extends a vertically disposed and forwardly directed frame 34 having an upper ﬂanged portion 36 and lower ﬂanged portion 38. Centrally of frame 34 is provided a vertical enlarged portion 40 forming a bore for support of an elevator lift shaft 42 as will be more particularly described. At the outer end of the frame 34 is a ﬂanged end face 44 on which is supported ratchet mechanism for actuating the elevator lift shaft. The ﬂanged face 44 (see FIG. 4) is provided with frame extensions 46 and 48 at each side thereof. According to FIGS. 2 and 3 a ratchet shaft 50 is supported at its outer end in the extension 48. A handle operated turning wheel 51 is ﬁxed on the end of the shaft. At its other end adjacent the portion 40 the shaft is mounted in a supporting bracket member at 52. Outwardly of extension 48 shaft 50 carries a ratchet wheel 54 and at its other end adjacent bracket 52 a pinion gear 56 pinned by collar 58 to shaft 50. Gear 56 is in mesh with teeth 60 of a rack formed on elevator lift shaft 42, the casing 40 of shaft 42 being formed with side opening 62. As shown by FIGS. 2 and 3, the upper end of the lift shaft 42 extends upwardly of the frame ﬂange 36 and is secured to a bag table slide block 64 as by a set screw bolt at 65 in a depending boss of the block. Below the lower frame ﬂange 38, shaft 42 is provided at its lower end with a mounting strap 68 ﬁxed thereto by screw bolt 70. Strap 68 extends to one side of frame 30 and ﬁxed to the strip is the outer end of a plunger 72 of a vertically positioned air cylinder 74. Cylinder 74 is mounted on a plate 76 projecting from and ﬁxed to the underside of ﬂange 38. Cylinder 74 is a damper to cushion the drop of the elevator table as will be later described.

Fixed at the outer end of shaft 50 adjacent ratchet wheel 54 is a ratchet actuator arm 80. Pivoted mounted at the end of arm 80 is the head 82 of a plunger 84 of an air cylinder 86. Cylinder 86 is mounted (FIG. 4) on the end of a mounting plate 88 which is ﬁxed by screw bolts 90 to and angled downwardly from the lower end of ﬂange 44.

Pivoted on arm 80 on mounting pin 92 is a lift pawl 94, the nose of the pawl (FIG. 4) being held against the teeth of the ratchet wheel 54 by spring 96. One end of spring 96 is pinned to the end of pawl 94, the other end being pinned to the end of a pawl detent plate 98. Plate 98 is pivoted as at 100 on frame extension 46. The upper edge of detent plate 98 bears against the lower edge of a set of guide pins 102 pivot on frame extension 46 for urging the nose of the stop pawl to engage the teeth of the ratchet wheel 54. Fixed to pawl 102 is the stem of a hand release knob 103.

As will be apparent, particularly from FIG. 4, retraction of plunger 84 by action of the piston of cylinder 86 will rotate ratchet 54 (clockwise as in FIG. 4) by the notch and thereby drive pinion gear 56 to raise lift shaft 42 and the bag table support structure for the elevator platform which will now be described.

The table slide support 64 mounted on lift shaft 42 extends outwardly from a position over mounting plate 32 to hang beyond the end of the upper ﬂange 36 of the frame 30. As shown in FIGS. 2 and 3 an upwardly offset extension 104 is provided at its outer edge with an open ended slot 106 to receive a depending guide post 108 fixed in the underside of support 64.

Support 64 (FIGS. 2 and 3) is ﬂanged at the top and ﬁtted with longitudinally spaced fastener bolt assemblies at 110 for securing to the upper surface thereof a slide plate 112. Slide plate 112 overhangs the top of slide support 64 and is provided with depending skirts at 114 and 116. To the overhang having the shorter skirt 114 is secured, as by screw bolts 118, an elongated slide block 120. To the overhang having skirt 116 is secured an elongated strip member 122 as by screw bolts at 124. The outer edge portion of the strip 122 overhangs the slide plate 112. The slide block 120 and strip 122 extend from one end of the support 64 to the other and provide tracking means for slidably receiving tray units each adapted to contain a stacked supply of empty bags preferably held by a wicket as will be described.

The assembly of the bag tray unit is best shown by FIG. 5. A bottom panel is provided as at 130 with opposed side panels 132 and a depending front lip 134. Against the upper portions of the outer faces of side panels 132 are ﬁxed, as by spot welding, a pair of tray side support members 136. Support members 136 are outwardly offset from panel 132 along the lower portions and form a recessed channel between these portions. As illustrated in FIGS. 138. The lower edges of supports 136 extend below the underside of bottom panel 130. The forward portions of these edges are welded to the upper surface of a right angled front support 140. The front lip 134 of the bottom panel 130 is also ﬁxed as by welding along the upper edge of the front surface of the depending portion of angled support 140. The rearward underedge portions of the tray support plates 136 are welded at a right angled rear support 142. It will thus be seen that the spaced relation of the front and rear angled supports 140, 142 from the bottom panel 130 and the attachment of the front lip 134 provides clearance for a sliding fit of a tray extension plate 144 between said angled supports 140, 142 and bottom 130. The tray extension also has upstanding side guides 146 at each edge which slidably ﬁt in channels 138 between support members 136 and tray side panels 132.

The extension is also provided with elongated slots 148 in which are received short studs 150 ﬁxed as by welding to the underside of the tray bottom 130 and provided at their outer edges by wing nuts 152. Accordingly, the extension can be secured in any adjusted position and thus be set for supporting various lengths of bags on the tray.

Referring to the angled front support 140 it will be noted that along the rear face thereof and ﬁxed thereto as by welding is an angled guide member 154 providing a lip in spaced relation to the underside of the tray lip 134 for support of the support 140. As will be seen from FIG. 4
guide 154 holds the edge of strip 122 between it and support 140 for sliding movement. Also fixed to the depending front skirt of the support 140 at the front side thereof is a bag wicket channel assembly. Referring to FIGS. 4 and 5, this assembly comprises a pair of vertically spaced holding bars 156 fixed to the front face of the vertical portion of support 140. By a pair, a pair of laterally spaced holders 160 in which the legs 162 of a wicket may be inserted. The legs of the wicket are connected by a crosspiece 163. As will be readily recognized in the art the legs of the wicket pass through spaced perforations in the lower edge extensions or lips at the open ends of the bags. The opposite edges at 166 of the upper wall portions are offset therefrom. As each bag is loaded it is stripped from the wicket. The sockets for receiving the legs of the wicket are at 168 (FIG. 5).

As best seen in FIGS 2 and 4, a tray unit loaded with a wicket of empty bags is placed on the tracks of the bag table slide at the outer end thereof so that the outer edge of the strip member is received as a gib between the horizontal lip of the front guide 154 and front angled support 140. The angled rear support 142 is positioned over the edge of slide block 120. When so placed the tray may be slightly moved to a position underneath the loading path or channel of the machine as indicated in FIG. 2.

Exact registration of a tray on the platform with respect to the loading path may be made by registering an opening 170 in the horizontal portion of the angled front support 140 with a releasable holding means (see also FIG. 3). Opening 170 is adapted to be engaged by the tip end of a plunger 172 of a solenoid 174. Solenoid 174 (see FIG. 4) is mounted on a bracket 176 affixed as by welding to the inner face of the skirt 116 of the slide plate 112. The plunger 172 extends upwardly through an opening in the slide plate 112 and adjacent its upper end is fitted with a disk 178. Spring 190 between the disk 178 and surface of plate 112 urges the disk and plunger upwardly. The edge of strip 122 is notched at 171 to accommodate the spring and disk. The tip of plunger 172 will thus spring into opening 170 whenever the tray is moved into position. By energizing solenoid 174 the tip may be retracted to permit removal of a tray from this registered position.

The position of the tray and stack of bags on the elevator platform as registered for bag-loading operations will be appreciated from FIG. 2. The loading path of a bag loaded tray 120 is shown in FIG. 1, is from infeed platform 2 through bag spreader mechanism and into the open mouth of the top bag which is then stripped or torn from the wicket and advanced onto platform 16.

Indicated in FIG. 2 between infeed platform 2 and the tray are portions of the spreader elements, here shown as upper and lower funnel-like members, for holding the mouth of the bag open while a loaf is being pulled into the bag. Also a bag sensor plate is shown at 200 over which the loaf is advanced from platform 2. Plate 200 is anchored in a fixed position, its downstream end resting on cross bar 163 of the wicket. On each side of the plate 200 are indicated a pair of upper spreader elements 204 and one pair of lower spreader elements 206. When the upper edge of the mouth of the top bag is blown open as by air jet 14 (FIG. 1), the spreaders are adapted to extend into the mouth and are spread apart to hold open as the loaf is inserted by the pusher 8. This particular spreader action is known in the art and various mechanisms may be employed to accomplish this function. The open mouth of the bag acts as a funnel to allow the lower funnel-like spreaders are used in connection with the sensor plate 200 to maintain the top of the stack of bags at the feeding level of the product.

Referring now to FIG. 6 a limit switch mechanism is shown at the underside of plate 200. This mechanism is mounted on a pivot block 208 fastened to the underside of plate 200. A pivot pin is at 212 in a yoked portion 210 of the block. On pin 212 is pivoted the end of a pair of forked arms of a switch mounting member 211, one such arm being shown at 214. A switch at 216 is mounted between the arms and at the outer end of member 211 is an extension 218 receiving in an aperture thereof the stem of a depending screw bolt 220 fixed in plate 200. A nut 222 on the end of bolt 220 holds the switch arm in an adjustable lower position, a spring 224 surrounding bolt 220 urging the arm against the nut. The spring is seated at its other end against the underside of a switch actuating lever at 226 also apertured for passage of bolt 220.

Actuating lever 226 lies against the underside of plate 200 and is also pivoted on pin 212 having a pivot block 228 rotatable on the pin between the arms 214 of member 211. Lever 226 extends beyond the end of the mounting member 211 and at its outer end is provided with a cross bar 230 fixed thereto as by welding on a flanged portion thereof. Bar 230 extends laterally of each side of plate 200 and on each extension is fitted a tube 232 (see also FIG. 2). Against the underside of lever 226 (FIG. 6) is a spring leaf trigger at 234 opposed to the button 236 of the switch. In the construction shown the switch mounting arm 211 and actuating lever 226 are yieldably held in position by spring 224 on bolt 220. It will be seen that when the bar 230 is moved downwardly by striking the tubed extensions, lever 226 will pivot on pin 212 against spring 224 and thus cause trigger 234 to actuate the switch. The switch is connected in circuit with a solenoid valve 240 for operation of cylinder 86 (FIG. 4) of the elevator ratchet mechanism. Actuating the switch causes cylinder 86 to operate arm 80 and drive the wheel 54 to raise the table and tray of bags.

The switch lever is operated by the lower funnel members to raise the level of a stack of empty bags in a tray whenever a sufficient number of bags have been loaded and stripped to cause the top bag level to be lowered below the feeding level along which the products are traveling. As will be noted from FIGS. 2 and 7 the cross bar 163 of the wicket is held in a notch at the underside of the plate 200. Whenever the tray is raised, the wicket is thus held stationary while the stacked bags are pushed upwardly by the tray to maintain the compactness of the remaining bags on the wicket for further loading operations.

The wicket holds the lip extensions only of the lower bag wall as will be appreciated, and thus the body of the bags is offset upwardly therefrom at the level of the surface of the plate 200 (FIG. 7). It will be further realized that the spreaders will be advanced in collapsed position for the ends to project into the mouth of a bag opened by the air jet. The spreaders are then opened up to hold the bag mouth for entry of the product. Thus, as the lower spreaders are pivoted to swing downwardly and lie in contact with the upper surface of the stack, the limit of pivotal movement is determined by the stack level. If this level is at or near the level of plate 200 the spreaders will not contact the switch lever tube extensions 232. If, however, the stack has been depleted to the extent that the topmost bag is sufficient lower than plate 200, the spreaders will strike the lever, actuate the switch, and cause the tray to be raised by the ratchet mechanism described. The mechanism for actuating the spreaders 204 and 206 and thus operating the switch lever is schematically shown by FIG. 7.

In FIG. 7 the sensor plate 200 is indicated as fixed on front mounted bracket 252. A similar embodiment of sensor elements 204 and 206 is shown carried on the post of a mounting bracket 252 and pivoted at 254 and 256 respectively. A shaft at 258 is rotatably mounted in the bracket and fixed on the shaft is a pivot arm 260. At the top of arm 260 is pivoted a link 262 which is pivoted at its other end to the lower end of an actuating
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lever 264 fixed on the pivot of the upper spreader 204. A lower link 266 is also pivoted on pivot arm 260 and passes through a stud-like piece 263 projecting upwardly from the lower spreader 206 above pivot 256.

Pivot arm 260 is normally urged in the direction of the bracket post by spring action as schematically indicated by spring 276. When fastened at its ends and post, it is held in the position shown as will be later described. Bracket 252 is mounted on a spreader carriage, a side plate portion thereof being indicated at 272. A shaft 258 and a rod 274 passing through the bracket is supported in plate 272 and a similar plate at the other side of sensor plate 200. As indicated side plate 272 of the carriage has a pair of rollers at 276 which are received in a recessed groove indicated at 278 of a frame mounted guide support.

The spreader carriage is reciprocably movable to shuttle back and forth for each bag loading operation. Fixed to the underside of the carriage is a bracket to which is pivoted a link 280 carried on one arm 282 of a bell crank fulcrummed on a fixed shaft 283. The other arm of the crank is at 284, a face cam follower roll 286 being at the other end for movement of the crank to advance and retract loader elements.

As previously stated the spreaders are advanced in collapsed position (as shown) into the open mouth of the bag. The spreaders are then opened up for entry of the product. The opening operation is spring operated. In FIG. 7 on the back side of side plate 272 and fixed to pivot shaft 258 is an actuating lever 258 angularly related to pivot arm 260 and carrying a roller at its outer end in contact with the upper edge of an arm 290 of a funnel spreader bell crank lever. The other arm of the lever is at 292, the fulcrum being at 294. Arm 292 is also cam actuated having follower 296 at its outer end. The arm 292 is moved as to the right when the collapsed spreaders are inserted into the bag. Thus, arm 290 is lowered and lever 288 is released for the pivot arm 260 to spring as to the right open up the spreaders. The position of the lower spreader on the stack of bags is indicated in phantom lines. It will readily be seen that in the event the stack is at a lower level the spreader 206 will strike the switch actuator 232 to raise the level.

In operation when the elevator platform is raised to the level where the stack of empty bags is depleted the machine is stopped. This may be accomplished by suitable switch mechanism as, for example, the bag detecting finger or feeler switch unit at 11 located above the loading station 10 in FIG. 1. In the event no bag remains on the tray to be blown open by the air jet 14, the detector switch 11 operates to stop the machine. Referring to FIG. 2 the platform is then lowered by turning knob 103, fixed to the shaft 42 fixed on the lower end of shaft 42 and acts as a dampener. In the lower position, see FIG. 3, the empty tray may now be released by energizing solenoid 174 as by one of the push buttons of panel 20 (FIG. 1).

The plunger 172 thus is out of engagement with opening 170.

As soon as the empty tray is thus released the reserve tray with full supply of wicketed bags can be manually moved to push the empty tray onto the storage rails shown at 111 (FIG. 3). The tip of the locking plunger 172 may remain depressed by holding the control button. When the next tray is approximately registered the solenoid may be deenergized and the operator may move the tray back and forth by the plunger until opening 170 of the reserve tray comes into registration with the plunger. The snap of the plunger in the opening will indicate to the operator by feel when the tray is properly registered. As soon as so registered, the operator can then manually turn the lifting wheel 51 of shaft 50 and raise the platform until the new tray engages the notch at the underside of sensor plate 200 or nearly so. At this point the spreader mechanism as schematically shown in FIG. 7, may be operated as by another of the control panel push buttons and without feeding product through the spreaders. In this way lower funnel elements 206 will seek to detect the top lever the arm and the post. Until the proper level is reached the actuator switch will thus be actuated to operate the ratchet and lift the platform. When at the correct level the bagging operations can be resumed and when convenient the operator may place another reserve pre-loaded tray with a full wicket of bags on the front section of the platform.

What is claimed is:

1. In elevating apparatus for bag-loading machines having means for maintaining the top of a stack of pre-formed open-ended empty bags at a loading level to successively receive products pushed along the plane of a loading path into the open mouths of the bags and against the closed ends thereof for advance to a discharge station and thereby stripping the bags from said stack; a platform movable between upper and lower levels, said platform extending transversely of said loading path in offset relationship therebelow and having a first portion directly underneath said loading path of travel and a second portion laterally thereof, a tray having means for positioning a stack of empty bags thereon said tray and platform having interengageable members for guided movement of the tray from said second portion to said first portion of the platform and releasable locking means for holding said tray in a position of registration and alignment with said loading path on said platform portion.

2. The structure of claim 1 in which said interengageable members of the tray and platform comprise tracking strips extending longitudinally of said platform and angled supports on which said tray is carried slidably interfiting with said platform strips, said locking means for said tray comprises an apertured portion in the base of one of said angled tray supports and a solenoid operated plunger mounted on said platform is engageable in said apertured portion, and storage rails is aligned endwise relation to said platform at its lower level are provided for receiving trays moved off said platform from said registered platform position.

3. The structure of claim 1 in which said tray is provided with a bottom and side walls, and a brace on the top extending forwardly from below the front edge of said bottom wall and provided with vertically disposed spaced wicket-holder members having sockets for receiving the legs of a U-shaped wicket on which said stack of bags may be carried.

4. The structure of claim 1 in which are provided, elevating means for incrementally raising said platform towards its upper level, means for detecting the upper level of the stack of bags on a tray during each bag loading operation, and means for sensing a condition wherein said upper level of bags is below said lower level, said sensing means including a switch with an actuating lever engageable by said detecting means, said switch operating said elevating means.

5. The structure of claim 4 in which said elevating means is a ratchet operated lifting mechanism powered by solenoid operation, the means for positioning a stack of bags on the tray includes a wicket and holder elements therefor positioned at the front of the tray, said sensing means also includes a fixed plate defining the level of travel of said products and the end thereof is engaged by the wicket of a tray elevated in reg-
iered position, the said switch being positioned under said plate and said actuating lever thereof is provided with arms extending laterally of the plate, and said detecting means is provided by lower bag spreader elements carried at each side of said fixed plate and having means to move into the open mouth of a bag and pivot to rest on the top of said stack of bags.