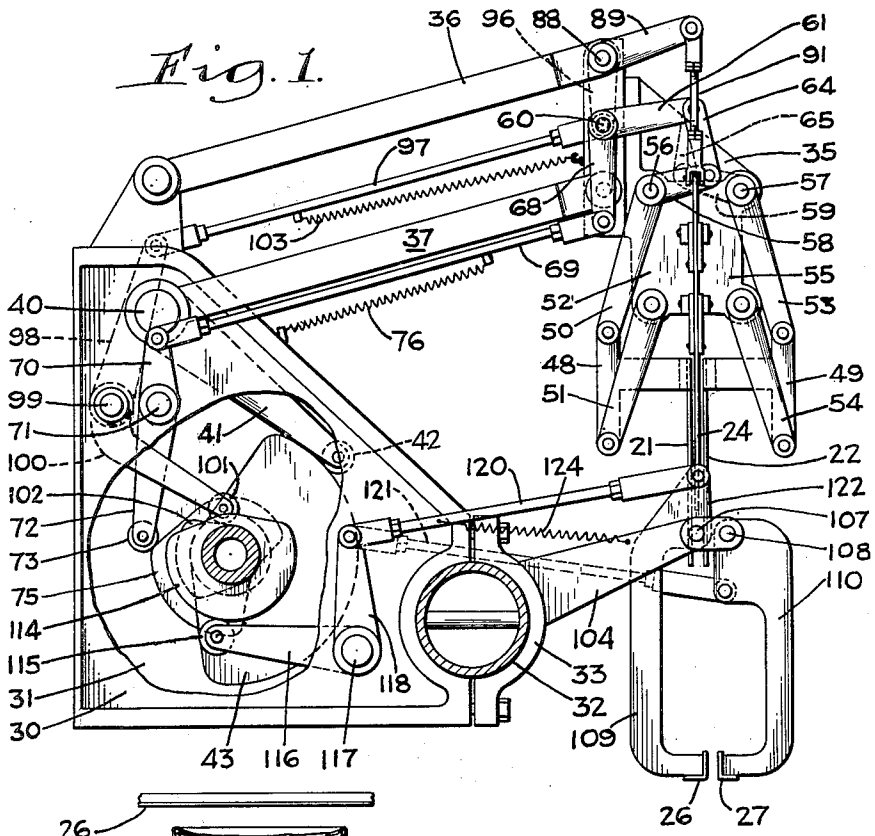
Jan. 13, 1953 H. G. ALLEN 2,624,995

BAG CLOSING MACHINE

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Fig. 1.



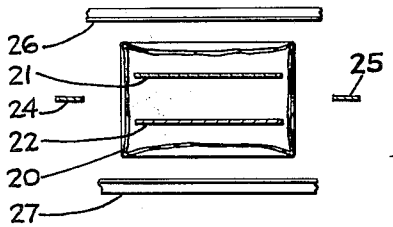




Fig. 4.

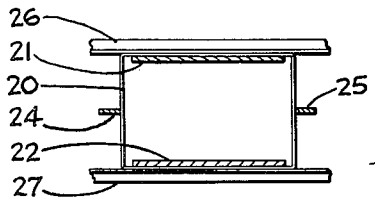



Fig. 5.

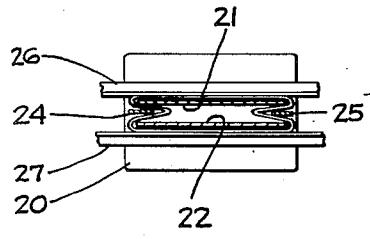



Fig. 6.

INVENTOR.
Howard G. Allen

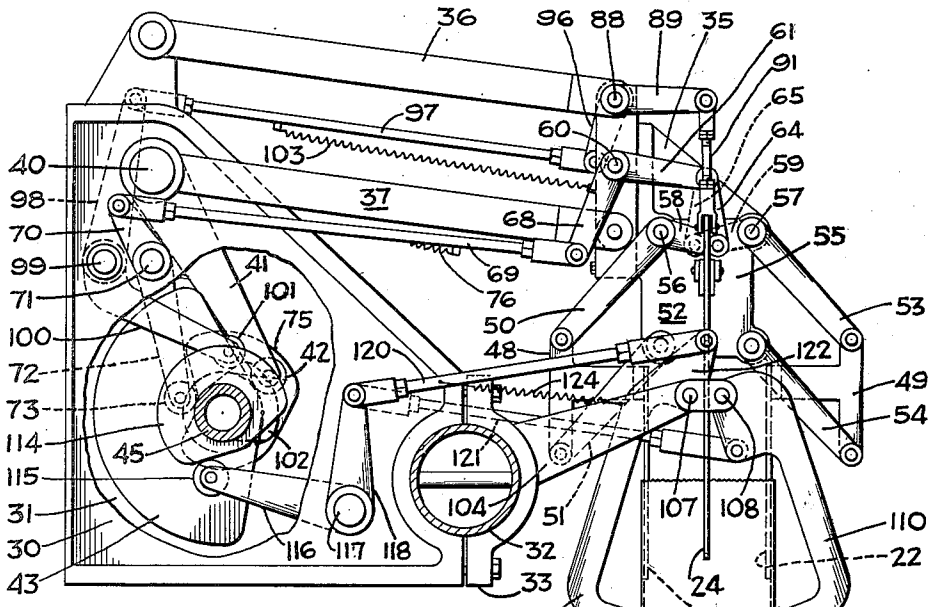
BY
Bean, Brooke, Buckley & Bean.
Attorneys

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BAG CLOSING MACHINE

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Fig. 2.



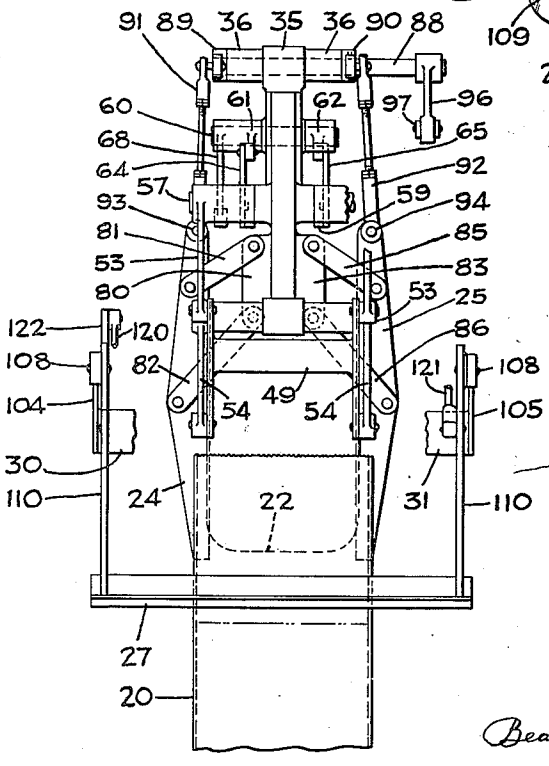




Fig. 3.

INVENTOR.
Howard G. Allen
BY
Bean, Brooks, Buckley & Bean.
Attorneys

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Fig. 8.

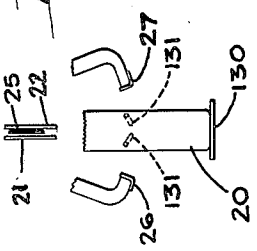



Fig. 10.

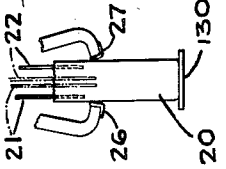



Fig. 12.

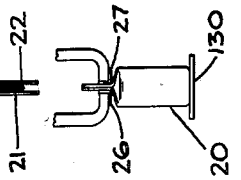



Fig. 7.

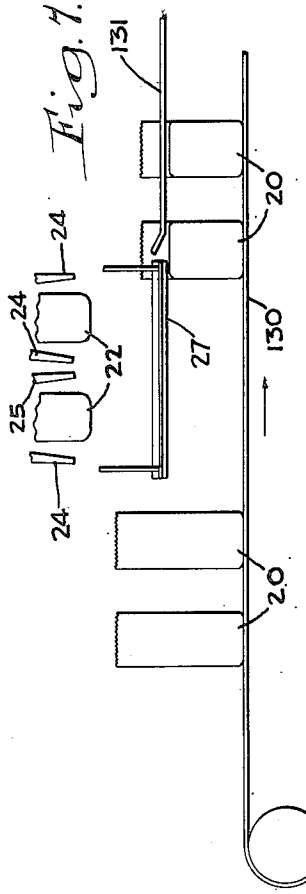



Fig. 9.

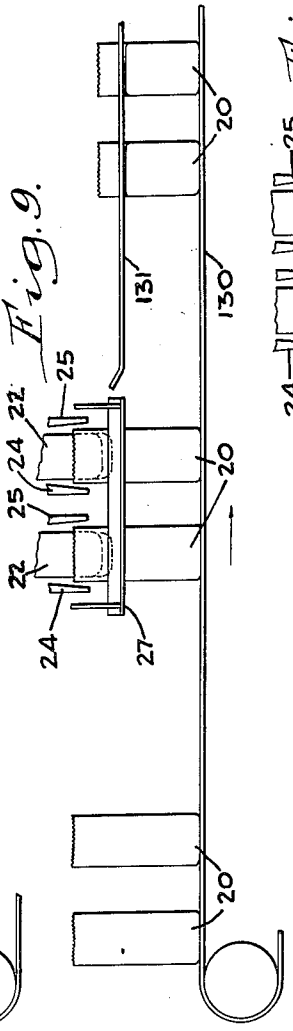
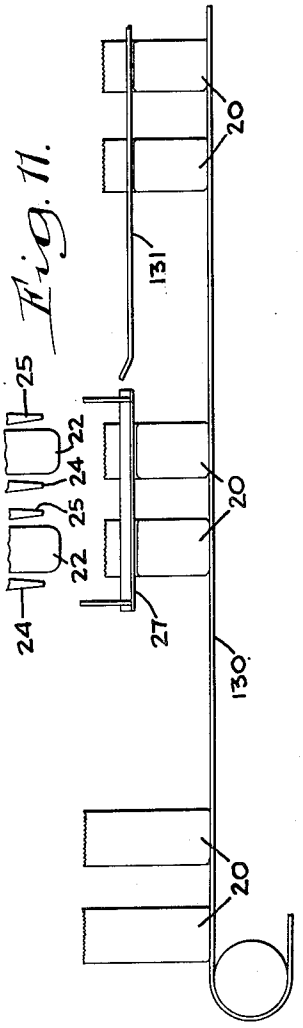



Fig. 11.




Inventor,
Howard G. Allen
by
Bean, Brooks, Buckley & Bean.
Attorneys

Patented Jan. 13, 1953 2,624,995

# UNITED STATES PATENT OFFICE

2,624,995

## BAG CLOSING MACHINE

Howard G. Allen, Niagara Falls, N. Y., assignor to Savannah Sugar Refining Corporation, Savannah, Ga.

Application June 11, 1948, Serial No. 32,332

5 Claims. (Cl. 53—142)

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This invention relates to apparatus for tucking and closing paper bags and analogous receptacles after they have been filled with whatever material or articles which they are to contain.

The present invention provides fully automatic means for continuously receiving paper bags or like receptacles which have previously been filled with material and tucking in the end walls and simultaneously folding the front and back wall of the bag over the top of the contents of the bag, the bag being delivered with the remaining upper portions of the front and back of the bag extending vertically above the filled portion of the bag folded substantially flat against each other, the bag being thus preliminarily closed.

The operation of the apparatus of the present invention ends with delivery of the bag thus closed and is not concerned with the subsequent folding or wrapping and sealing of the top of the bag. The thus closed bags may be finally folded or wrapped and sealed or tied by other automatic machinery with which the present invention is not concerned, or this subsequent treatment of the containers or bags may be performed wholly or in part by hand, insofar as the present invention is concerned.

The principles of the present invention as well as the various objects and advantages thereof will best be understood from a consideration of the following detailed description, taken in conjunction with the accompanying drawings wherein one form of the invention is set forth by way of example. It is to be understood, however, that the invention is not limited to the precise form shown and that various mechanical modifications be made without departing from the spirit of the invention, the scope of which is defined in the appended claims.

In the drawings:

Fig. 1 is a side elevational view of one form of the bag tucking and closing apparatus of the present invention with the parts illustrated in the position they assume just after a properly tucked and closed bag has been delivered therefrom;

Fig. 2 is a view similar to Fig. 1 but with the parts in the position they occupy after the cycle of operation of tucking and closing a bag has just begun;

Fig. 3 is a front elevational view of the apparatus of Figs. 1 and 2 with the parts shown in the position of operation illustrated in Fig. 2;

Fig. 4 is a top plan view showing schematically the bag tucking and closing implements in their relative positions at the beginning of a bag closing and tucking cycle;

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Fig. 5 is a view similar to Fig. 4 but showing the parts in a more advanced position of the tucking and closing cycle;

Fig. 6 is a view similar to Figs. 4 and 5 but with the parts in the position they occupy near the close of a tucking and closing cycle;

Fig. 7 is a fragmentary elevational view showing schematically a conveyor line and a bag tucking and closing station therealong, the tucking and closing apparatus having just delivered a pair of closed bags and being in the process of receiving a subsequent pair of filled bags for tucking and closing;

Fig. 8 is a schematic end elevational view of the apparatus of Fig. 7;

Fig. 9 is a view similar to Fig. 7 but showing the tucking and closing implements in engagement with a pair of bags in the process of tucking and closing them;

Fig. 10 is a schematic end elevational view of the apparatus of Fig. 9;

Fig. 11 is a view similar to Figs. 7 and 9 but wherein a pair of bags have just been tucked and closed and are ready to be moved out of the tucking and closing station; and

Fig. 12 is a schematic end elevational view of the apparatus of Fig. 11.

It will be noted from a casual inspection of Figs. 7 through 12 that the apparatus there shown contemplates a simultaneous tucking and closure of pairs of bags, but this involves merely the duplication of the tucking and closing instrumentalities and for simplicity of illustration the more detailed views, Figs. 1, 2, and 3, show apparatus for closing and tucking a single bag, the principles employed being the same in both cases.

To facilitate ready understanding of the detailed apparatus illustrated in Figs. 1, 2, and 3, it will probably be best to refer first to the schematic top plan views, Figs. 4, 5, and 6, which show schematically the succession of steps involved in a bag tucking and closing cycle of operation. Referring to Fig. 4, the numeral **20** designates a filled paper bag with its top open, and the numerals **21** and **22** designate a pair of bag spreading paddles which have just been inserted in the top of the bag, the paddles at the time of insertion being disposed closer to each other than the normal full open width of the bag top to facilitate and insure proper insertion despite the possibility of the top of the bag being not fully open.

Fig. 5 shows the paddles **21** and **22** in a subsequent position where they have moved apart to spread and square the unfilled top portion of the bag and, if necessary, correct the position

of the bag against minor dislocation. In Fig. 5, also, a pair of side creasing blades or fingers 24 and 25 have moved from the position of Fig. 4 to a position against the sides of the bag ready to begin the side tucking operation. In Fig. 5 a pair of bag holding bars 26 and 27 have moved from the spread position of Fig. 4 to a position where they are against the front and back walls of the bag at a point just above the contents thereof and just below the lower edges of the spreading paddles 21 and 22.

From this point on the spreading paddles 21 and 22, the side tucking fingers 24 and 25, and the bag holding bars 26 and 27 all move simultaneously toward each other in timed relation to tuck the sides of the bag as illustrated in Fig. 6 and wrap the portions of the front and back walls of the bag which are immediately above the contents of the bag over the contents, the remaining upper part of the bag being in flat folded condition as indicated in Fig. 6.

Referring to Fig. 1, the numerals 30 and 31 designate a pair of side frame members which may be supported upon and fixed relative to a supporting tube 32 by means of clamping caps 33, the tube 32 being supported in any desired manner.

The spreading paddles 21 and 22 and the side tucking fingers 24 and 25 of the apparatus are supported from a vertically movable head element 35 which has parallel link connection with frame elements 30 and 31 by means of upper and lower links 36 and 37 which are bifurcated at their front and rear ends for pivotal connection to the frame elements 30 and 31 and head element 35. By reason of this parallel link connection, up and down movement of head element 35 may be effected without altering the vertical attitude of the head element and the various instrumentalities associated therewith.

Lower link 37 is pivotally attached to frame members 30 and 31 by means of a rock shaft 40 to which the spaced bearings at the rear end of link 37 are fixed. Between frame elements 30 and 31 rock shaft 40 carries a cam follower arm 41 which has a cam follower 42 at its outer end for engagement with a lifting cam 43 for lifting head element 35. The weight of the head element and the various parts supported thereby biases links 36 and 37 downwardly to keep cam follower 42 in engagement with cam 43. In Fig. 1 the head element is shown in its raised position and in Fig. 2 the head element has just reached its lower-most position. Cam 43 is fixed to a drive shaft 45 which may be journaled in side frame members 30 and 31 and may be driven in any desired manner (not shown). In Figs. 1 and 2 the rotation of shaft 45 is counterclockwise.

The construction and operation of the bag top spreading paddles will now be described. The spreading paddles have previously been designated 21 and 22 in Figs. 4, 5, and 6, and that designation is retained in Figs. 1, 2, and 3. Paddles 21 and 22 extend downwardly from and are fixed to brackets 48 and 49, respectively. Bracket 48 is connected to head element 35 by means of pairs of upper and lower parallel links 50 and 51, respectively, pivoted to a bracket 52 formed on head element 35, and bracket 49 is likewise supported from head element 45 by means of pairs of upper and lower links 53 and 54 pivoted to a bracket 55 formed on head element 35. The upper links 50 and 53 are pivoted to the brackets 52 and 55 of head element 35 by means of rock shafts 56 and 57, respectively, and these rock shafts have arms 58 and 59 fixed thereto.

The numeral 60 designates a rock shaft journaled in head element 35 and having a pair of forwardly extending arms 61 and 62 fixed thereto. Arm 61 has a depending link 64 pivoted to its outer end which extends downwardly to pivotal engagement with the outer end of arm 58 and arm 62 is similarly connected to the outer end of arm 59 by means of a link 65. It will be seen from the foregoing that clockwise movement of rock shaft 60 will lower links 64 and 65 and thus pivot the links 50 and 53 apart to spread paddles 21 and 22 without disturbing their parallelism.

Rock shaft 60 also carries an operating arm 68 which is fixed thereto and pivotally engages one end of a link 69 at its lower end. The other end of link 69 pivotally engages the outer end of an arm 70 which is fixed to a rock shaft 71, the latter having also fixed thereto a cam follower arm 72 which has a cam follower 73 at its outer end for engagement with a paddle operating cam 75. As shown in Fig. 1, follower 73 is in a position where it is just leaving the highest part of cam 75.

The contour of cam 75 is such that paddles 21 and 22, beginning with the position illustrated in Fig. 1, will move to a mid-position between their fully spread and fully closed position and dwell in such mid-position, as indicated in Fig. 4, until they begin to enter a bag during lowering movement of head element 35. Follower 73 is urged resiliently toward cam 75 by an extension coil spring 76 which is anchored at its left end, as viewed in Figs. 1 and 2, to frame member 30 and at its right end to link 69.

The construction and operation of the blades or fingers for creasing and tucking the side walls of the bag, previously designated 24 and 25, and their mounting and operating instrumentalities will now be described.

Referring particularly to Fig. 3, the finger 24 is mounted from a flange 80 of head element 35 by means of pivoted links 81 and 82 and finger 25 is supported from a flange 83 of head element 35 by means of a pair of pivoted links 85 and 86. This construction maintains a generally erect attitude of the fingers 24 and 25 during their opening and closing movements. A finger operating rock shaft is designated 88 in Fig. 3 and serves also as the means for pivotally connecting the spaced bearings of upper link 36 with head element 35. Rock shaft 88 has fixed thereto a pair of forwardly projecting arms 89 and 90 which loosely engage the upper ends of links 91 and 92, the lower ends of the latter being pivotally attached to the upper ends of fingers 24 and 25 as at 93 and 94, respectively.

Also fixed to rock shaft 88 is an operating arm 96 and arm 96 pivotally connects at its lower end with the bifurcated forward end of a link 97, the other end of the latter being pivotally connected to the outer end of a rock arm 98 fixed to a rock shaft 99 journaled in the side frame members 30 and 31. Also fixed to rock shaft 99 is a cam follower arm 100 having a cam follower 101 for engagement with a finger operating cam 102. As shown in Fig. 1, follower 101 is just reaching its lowest position on cam 102, in which position the fingers 24 and 25 are spread their maximum distance. In Figs. 2 and 3 the fingers are moving toward each other by reason of downward movement of links 91 and 92, the contour of cam 102 rising in this phase of operation. Fingers 24 and 25 are resiliently urged to an

open position and follower 101 is urged toward cam 102 by an extension coil spring 103 which engages link 97 at its left end as viewed in Figs. 1 and 2 and is anchored at its right end to head element 35.

The principal remaining operating parts of the apparatus being described are the bars 26 and 27 for wrapping the front and back wall of the bag over the top of the contents and for holding the bag closed until they reach other holding means outside the range of operation of the bag tucking and closing mechanism per se. This portion of the mechanism is not supported for movement up and down with head element 35 but is carried directly from the frame elements 30 and 31 by means of arms 104 and 105, the latter each having spaced pivot pins 107 and 108 near their outer ends for supporting pairs of arms 109 and 110 between which the holding bars 26 and 27 extend.

A holding bar operating cam is designated 114 in Figs. 1 and 2 and acts upon a follower 115 carried by a follower arm 116 fixed to a rock shaft 117 extending between the side frame members 30 and 31. Rock shaft 117 further carries adjacent its outer ends a pair of upwardly extending arms 118 which pivotally engage a pair of links 120 and 121. The forward end of link 120 is pivoted to an upward extension 122 of one of the arms 109 which support bar 26. The link 121 is pivoted at its forward end to one of the arms 110 at the opposite side of frame members 30 and 31 at a point below the pivotal supports 108 of arms 110. An extension coil spring 124 is anchored at its right end, as viewed in Figs. 1 and 2, to the fixed arm 104 and at its left end it engages link 120 to urge it in a forward holder-opening direction, link 121 being urged resiliently forwardly along with link 120.

From the foregoing it will be seen that a fall in the contour of cam 114 will cause rock shaft 117 to rotate in a clockwise direction as viewed in Figs. 1 and 2 and will project the links 120 and 121 resiliently forwardly. This will cause bars 26 and 27 to move apart from the position illustrated in Fig. 1. In Fig. 2 the profile of cam 114 is rising and accordingly the holding bars 26 and 27 are moving toward each other.

To assist in following the cam profiles in Figs. 1 and 2 it may be stated that, as there shown, holder cam 114 is in the foreground, side finger cam 102 is next behind, lift cam 43 is behind finger cam 102, and paddle cam 75 is in the background.

A full cycle of operation of the apparatus of Figs. 1 through 3 will now be described, beginning with the mechanism in the position illustrated in Fig. 1. As there shown, a complete tucking and closing operation has just been completed and a tucked and closed bag is ready to be moved or has just moved from the region of the tucking and closing mechanism and holding bars 26 and 27 have not yet separated for the reception of a subsequent bag. Head element 35 is raised in Fig. 1, the spreading paddles 21 and 22 are at their closest relative positions, and side tucking fingers 24 and 25 have just reached their fully separated positions.

At this point the lift cam 43, the side finger cam 102, and the holding bar cam 114 are all operating through dwell portions, and paddle cam 75 begins to fall off to an intermediate dwell portion where the paddles are partly separated, approximately as illustrated in Fig. 4. After the paddles have reached this intermediate position and are arrested in such position the holding bars 26 and 27 move to full open position by reason of the engagement of follower 115 with the falling contour of cam 114 and a low dwell portion of cam 114 permits springs 124 to hold the holding bars apart for a predetermined period according to the extent of such low dwell portion.

As soon as holder bars 26 and 27 are open, a filled bag may be moved therebetween by any suitable conveying means and at this point cam 43 falls off to permit the head element 35 to descend and project the partly open spreading paddles 21 and 22 into the open mouth or top of the bag. Before the paddles are fully inserted they begin to spread to full open position since the intermediate dwell of cam 75 then ends and its contour again falls to a lowest dwell portion wherein the paddles are fully spread and fully inserted.

Just prior to full spreading and insertion of the paddles in the foregoing manner, tucking fingers 24 and 25 begin to close and they reach the partly tucking position shown in Fig. 3 prior to the beginning of the rise in the contour of cam 75 which forces the paddles 21 and 22 together. By virtue of this timing the side fingers 24 and 25 positively tuck the sides of the bag against the spring resistance of the paddle spreading spring 76. This causes follower 73 of the paddle control cam 75 to leave the cam because of the late timing of the rise on cam 75.

The actual tucking operation is thus performed with the tucking fingers 24 and 25 moving inwardly positively and the paddles 21 and 22 resisting such movement resiliently by means of the spring 76. The resilient urge of spring 76 is, of course, low enough to permit the tucking fingers to pull the paddles resiliently toward each other and thus perform the tucking operation with the bag held taut by spring 76. This mode of operation also eliminates any need for critical timing of the cams 75 and 102 during the tucking and closing phase of operation.

The rise in the contour of cam 114 which causes holding bars 26 and 27 to close coincides with the closing or tucking movement of fingers 24 and 25 as established by the rise in the contour of cam 102, so that bars 26 and 27 move inwardly against the front and back of the bag simultaneously with the tucking operation to fold the front and back of the bag over the top of its contents, the remainder of the upper end of the bag being held finally between holding bars 26 and 27 as shown in Fig. 12.

At this time the rise in the contour of cam 43 lifts head element 35 and withdraws the paddles 21 and 22 and the tucking fingers 24 and 25 upwardly until they are entirely clear of the bag, the holding bars 26 and 27 remaining closed to hold the bag in tucked and closed position until it is moved from the tucking and closing apparatus.

Reference will now be had to Figs. 7 through 12 and, referring specifically to Fig. 7, a pair of bags 20 are shown being moved from between holding bars 26 and 27 by movement of a conveyor belt 130 upon which the bags rest. Immediately upon leaving their positions between bars 26 and 27 the tucked and closed tops of bags 20 pass between closely spaced rails 131 which replace bars 26 and 27 in holding the bag tops tucked and closed. To facilitate movement of the bags from between bars 26 and 27 to a position between rails 131, the entrance ends of the latter may be flared as in Figs. 7 and 8. In the position of Fig.

7 paddles 21 and 22 and side tucking fingers 24 and 25 are in their raised positions.

So far as the principles of the present invention are concerned, which principles involve merely the bag tucking and closing apparatus per se, it may be assumed that conveyor belt 130 operates intermittently, moving a pair of bags to the tucking and closing position and then stopping while that operation takes place. Actually, the entire tucking and folding apparatus is mounted for movement in the same direction as in timed relation with belt 130 and for retrograde movement to a starting position. The tucking and closing operation is performed without interruption of the conveyor belt 130 and bags 20 during the forward movement of the entire tucking and closing apparatus. Since no claim is made to this refinement of the apparatus, no further reference will be made thereto and the foregoing description presupposes that the conveyor belt 130 stops for the tucking and folding operation, merely for the sake of simplicity of understanding, either mode of operation being feasible.

At a time between the positions illustrated in Figs. 7 and 9 the holding bars 26 and 27 open and a subsequent pair of bags is moved into the tucking and folding position by the conveyor belt 130 and the head element to begin the tucking and folding operation. Figs. 9 and 10 indicate the same approximate position of parts as Figs. 2 and 3. Figs. 11 and 12 indicate the relative positions of parts immediately at the conclusion of a bag tucking and closing cycle, after head element 35 has raised and before the tucked and closed bags have begun to move to positions between rails 131. The tucking and folding parts in Figs. 11 and 12 are in substantially the position illustrated in Fig. 1.

What is claimed is:

1. Bag tucking and closing apparatus comprising a pair of generally parallel relatively flat bag spreading elements of substantially the same width as the bag and insertable in the open top of a bag and movable toward and away from each other flatwise, a pair of bag tucking blades disposed in a common plane extending between said spreading elements and generally parallel thereto, said blades being movable toward and away from each other edgewise, resilient means for urging the spreading elements away from each other and other means for moving the spreading elements toward each other against the urge of the resilient means to permit insertion of the spreading elements in the top of a bag, said resilient means being subsequently operative to move the spreading elements away from each other in the top of the bag to spread and square the same, and means for subsequently moving the tucking blades toward each other whereby the tucking blades move against the sides of the bag to tuck the same between the front and back of the bag to tuck and close the same over the bag contents.

2. Bag tucking and closing apparatus comprising a pair of generally parallel relatively flat bag spreading elements insertable in the open top of a bag and movable toward and away from each other flatwise, a pair of bag tucking blades disposed in a common plane extending between said spreading elements and generally parallel thereto, said blades being movable toward and away from each other edgewise, resilient means for urging the spreading elements away from each other and other means for moving the spreading elements toward each other against the urge of the resilient means to permit insertion of the spreading elements in the top of a bag, said resilient means being subsequently operative in the top of the bag to spread and square the same, and means for subsequently moving the tucking blades and the spreading elements both toward each other in timed relation whereby the tucking blades move against the sides of the bag to tuck the same between the front and back of the bag to tuck and close the same over the bag contents.

3. Bag tucking and closing apparatus comprising a pair of generally parallel relatively flat bag spreading elements insertable in the open top of a bag and movable toward and away from each other flatwise, a pair of bag tucking blades disposed in a common plane extending between said spreading elements and generally parallel thereto, said blades being movable toward and away from each other edgewise, resilient means for urging the spreading elements away from each other and other means for moving the spreading elements toward each other against the urge of the resilient means to permit insertion of the spreading elements in the top of a bag, said resilient means being subsequently operative in the top of the bag to spread and square the same, and means for subsequently moving the tucking blades and the spreading elements both toward each other in timed relation whereby the tucking blades move against the sides of the bag to tuck the same between the front and back of the bag, and a pair of spaced bars parallel to the spreading elements and movable toward each other against the outside of the front and back of the bag just above the contents thereof to close the same over the bag contents.

4. Bag tucking and closing apparatus comprising a pair of generally parallel relatively flat bag spreading elements insertable in the open top of a bag and movable toward and away from each other flatwise, a pair of bag tucking blades disposed in a common plane extending between said spreading elements and generally parallel thereto, said blades being movable toward and away from each other edgewise, resilient means for urging the spreading elements away from each other and other means for moving the spreading elements toward each other against the urge of the resilient means to permit insertion of the spreading elements in the top of a bag, said resilient means being subsequently operative in the top of the bag to spread and square the same, and means for subsequently moving the tucking blades and the spreading elements both toward each other in timed relation whereby the tucking blades move against the sides of the bag to tuck the same between the front and back of the bag, a pair of spaced bars parallel to the spreading elements and movable toward each other against the outside of the front and back of the bag just above the contents thereof to close the same over the bag contents, and means for raising the spreading elements and the tucking blades to withdraw them clear of the top of the bag.

5. Bag tucking and closing apparatus comprising a pair of generally parallel relatively flat bag spreading elements insertable in the open top of a bag and movable toward and away from each other flatwise, a pair of bag tucking blades disposed in a common plane extending between said spreading elements and generally parallel thereto, said blades being movable toward and away from each other edgewise, resilient means for urging the spreading elements away from each other and other means for moving the spreading

elements toward each other against the urge of the resilient means to permit insertion of the spreading elements in the top of the bag, said resilient means being subsequently operative in the top of the bag to spread and square the same, and means for subsequently moving the tucking blades and the spreading elements both toward each other in timed relation whereby the tucking blades move against the sides of the bag to tuck the same between the front and back of the bag to close the same over the bag contents, and means for raising the spreading elements and the tucking blades to withdraw them clear of the top of the bag.

HOWARD G. ALLEN.




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