Nov. 18, 1969 J. D. SYLVESTER ET AL 3,478,490

BAG LOADING DEVICE HAVING TWO-PART BAG SUPPORT MEANS

Filed Nov. 17, 1967 4 Sheets-Sheet 1

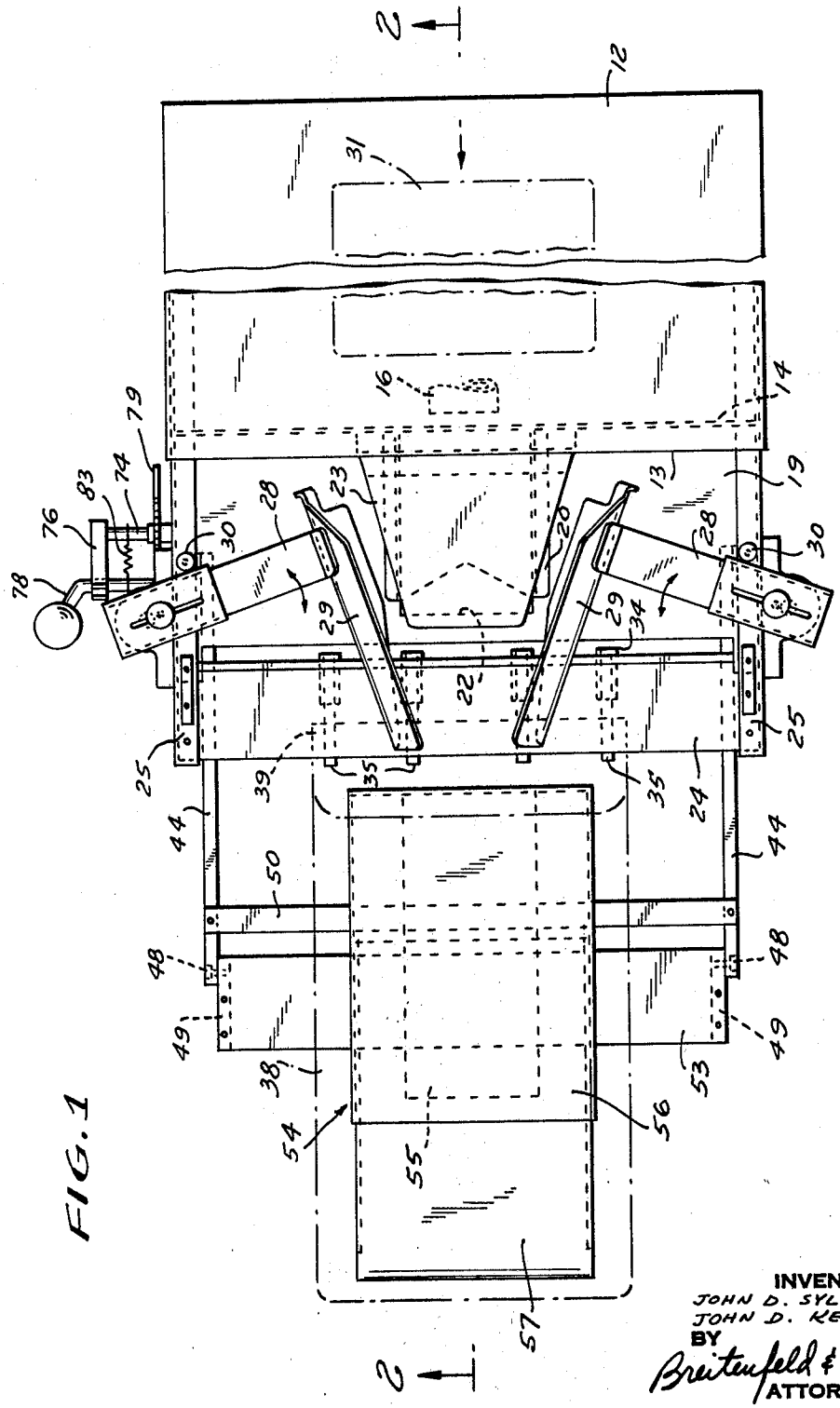

FIG. 1

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BAG LOADING DEVICE HAVING TWO-PART BAG SUPPORT MEANS

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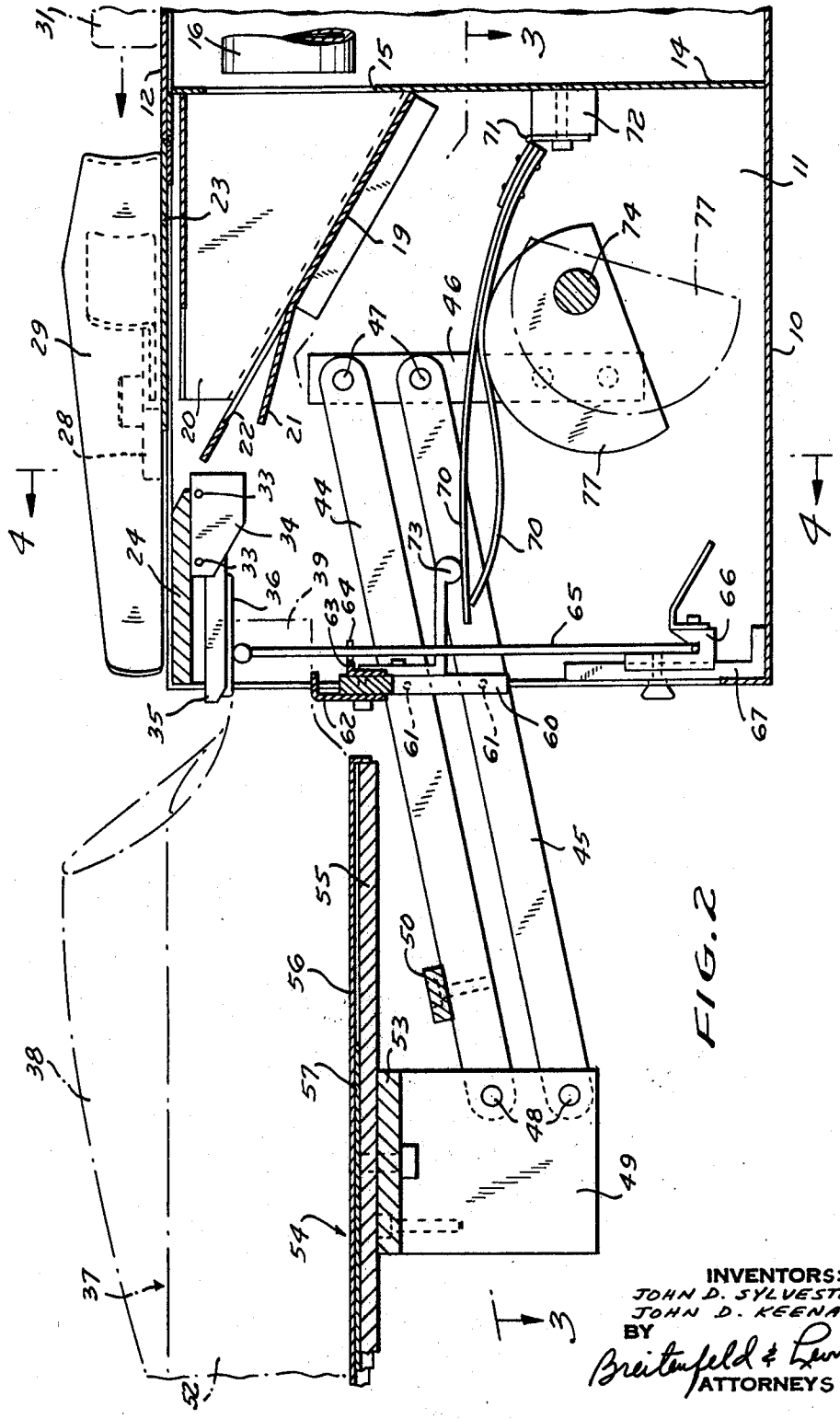

FIG. 2

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Filed Nov. 17, 1967 4 Sheets-Sheet 3

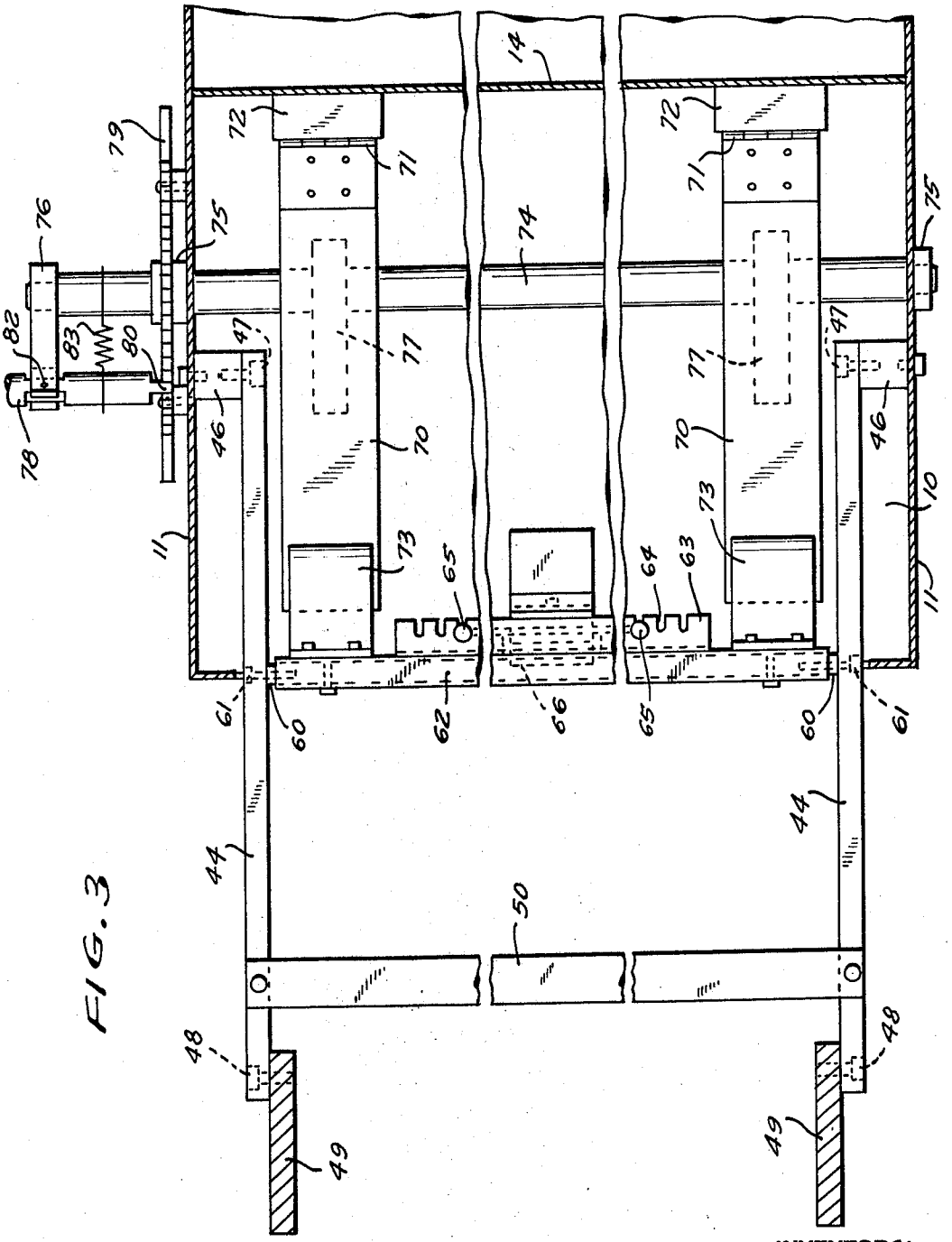

FIG. 3

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BAG LOADING DEVICE HAVING TWO-PART BAG SUPPORT MEANS

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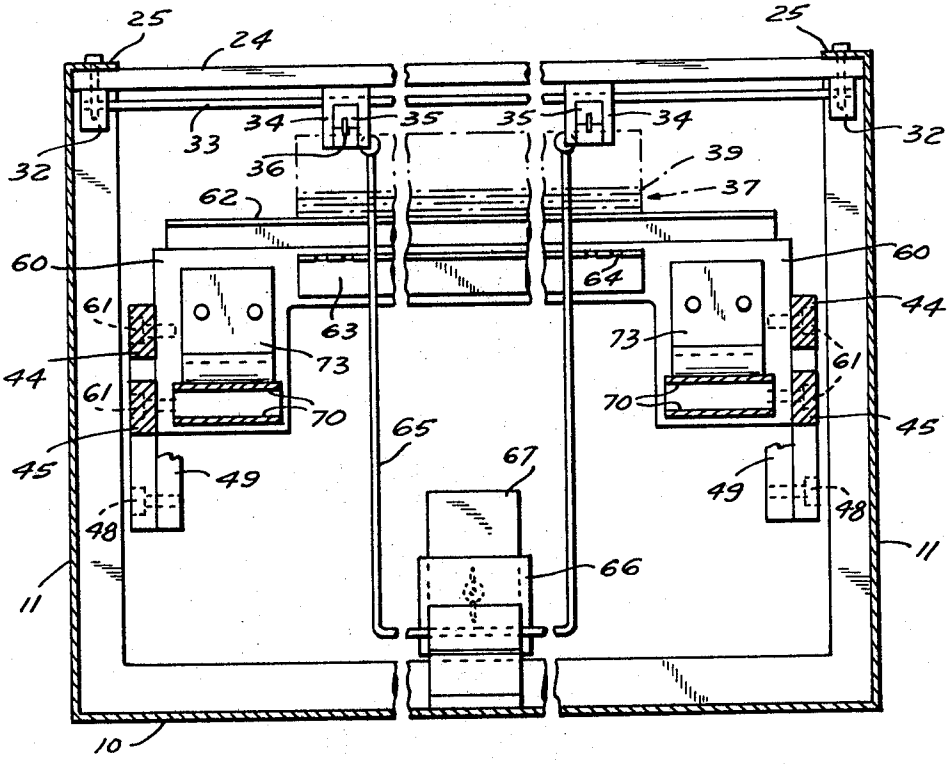
FIG. 4



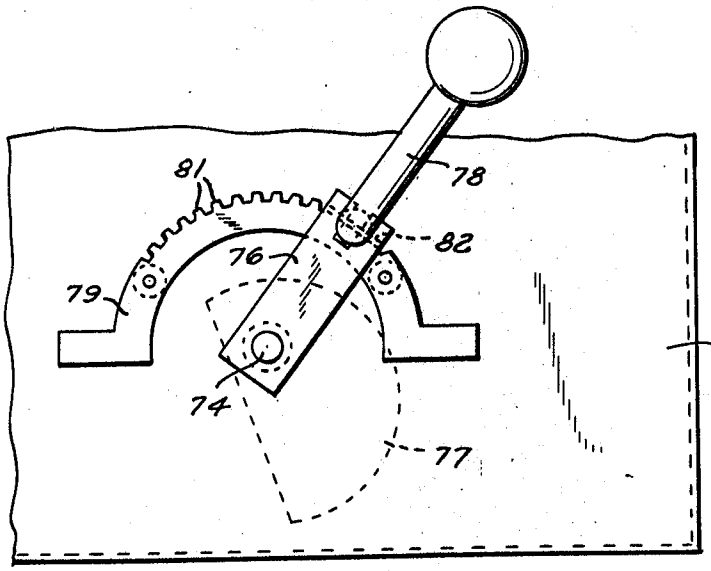


FIG. 5

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BAG LOADING DEVICE HAVING TWO-PART BAG SUPPORT MEANS

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U.S. Cl. 53—189 7 Claims

ABSTRACT OF THE DISCLOSURE

Platform supporting bag bodies and table supporting bag lips are urged upwardly by a spring. Platform and table mounted on parallelogram mechanism so that platform moves upwardly at faster rate than table. Spring may be leaf spring adapted to be selectively deformed by a manually controlled eccentric cam.

This invention relates to a bag loading device of the type in which bags arranged in a stack are individually filled, through a filling opening, with merchandise which an operator manually slides along a support surface toward the bag. More particularly, the invention relates to the portion of the device which supports the stack of bags in flat condition with the uppermost bag in the stack in position to be filled with merchandise, and for lifting the stack as the bags are consumed to bring successive uppermost bags to the filling position.

The bags with which the present invention is concerned are the type having a pair of opposed walls joined together along three sides and unconnected along the fourth side to define a filling opening or bag mouth. One of the walls is longer than the other to provide a lip extending from the bag mouth, the lip serving to facilitate opening of the mouth preparatory to the insertion of merchandise into the bag. When the bags are stacked, it will be appreciated that the height of the stack of bag lips is less than the height of the bag bodies inasmuch as each lip includes only a single ply of material whereas each bag body includes two plies of material. As a result, in any stack comprising a substantial number of bags, a hump is formed at the top of the stack in the region of the bag mouth of the uppermost bag. This hump is desirable since it aids in opening the bag by causing the lip and lower wall of the bag to be bent downwardly away from the free edge of the upper wall. Consequently, the adhesion between the walls is broken, and the edge of the upper wall is exposed so that a blast of air can be directed beneath it and lift the entire upper wall off the lower wall of the bag.

The stack dwindles as bags are filled and removed from it, and the hump diminishes as well until it is almost imperceptible even though a relatively large number of bags still remain on the stack. The reason is that the bag walls are so thin, particularly the walls of so-called "plastic" bags, that a great number of bags are required to produce a hump which is of any help in opening the bag. To overcome this difficulty, it has been suggested to support the single-ply portions of the bags, i.e., the bag lips, and the two-ply portions of the bags, i.e., the bag bodies, on two separate carriers which rise at different rates of speed as the bags are used. Specifically, the carrier supporting the bag bodies moves upwardly at a faster rate than the other carrier. In this way, the top level of the bag bodies is maintained substantially higher than the top level of the lips throughout the life of the stack of bags, and a hump is provided at the bag mouth of every bag, even the last bag in the stack.

In the past, the two-part support has been mounted on a relatively complex mechanism suitable for use in automatic packaging machines.

It is an object of the present invention to provide a simple mechanism, for carrying the two-part support for a stack of bags, admirably suited for use in a manually operated bag loading device.

It is another object of the invention to provide such a mechanism including spring means for urging the bag support upwardly, and manually operable means for readily adjusting the force applied to the support by the spring means.

To accomplish these and other objectives, the invention includes a table structure for supporting the bag lips, and a platform structure for supporting the bag bodies. The table and platform structures are carried by a parallelogram mechanism, the table structure being located closer to the fixed pivot points than the platform structure so that as the mechanism rotates the platform structure rises faster than the table structure. The force for urging the table and platform upwardly is preferably supplied by a leaf spring extending between a fixed point on the frame of the device and an element which moves with the parallelogram mechanism. The force exerted by the spring is a function of the degree to which the spring is bent or deformed. A cam eccentrically mounted on a rotatable shaft is located adjacent to the spring, so that the degree of spring deformation is variable by adjusting the angular position of the shaft by means of a handle. The handle may be latched in any of a plurality of such angular positions.

Additional features and advantages of the invention will be apparent from the following description in which reference is made to the acompanying drawings.

In the drawings:

FIG. 1 is a top plan view of a bag loading device incorporating the features of this invention;

FIG. 2 is a longitudinal cross-sectional view, on an enlarged scale, taken along line 2—2 of FIG. 1;

FIG. 3 is a longitudinal cross-sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a vertical cross-sectional view taken along line 4—4 of FIG. 2; and

FIG. 5 is a fragmentary side elevational view showing the cam shaft operating handle.

The bag loading device chosen to illustrate this invention includes a frame or housing having a bottom wall **10** and side walls **11** formed as an integral U-shaped element, and a top wall **12** terminating short of the front of the housing. All the edges of the bottom and side walls, **10** and **11**, are provided with narrow in-turned flanges arranged at a 90° angle to the walls which carry them. The side edges of the top wall **12** are provided with narrow turned-down flanges which overlie the outer surfaces of the side walls **11**, but the front edge **13** (FIG. 1) of the top wall carries no flange.

At about the longitudinal center of the housing is a vertical partition **14** having an opening **15** (FIG. 2) near its upper edge, the opening being located along the vertical center-line of the partition. Behind the partition **14** is an air blower (not shown) which continuously blows air, such as through a tube **16**, in a forward direction through the opening **15**. The air, of course, is used to open the uppermost bag in the stack, preparatory to entry of the usual horns into the bag, as will be described in more detail below. For the purpose of directing the air toward the bags, a wall **19** arranged at an angle to the horizontal extends between the side walls **11**, the rear edge of the wall **19** meeting the partition **14** a little below the opening **15**. An inverted channel-shaped tunnel **20**, having a horizontal top wall and trapazoid-shaped side walls, is mounted on the angled

wall 19, and together with the wall 19 forms a tapered air duct. In the region directly below the tunnel 20, a portion 21 of the wall 19 is bent downwardly leaving an opening 22 in the angled wall, for a purpose to be described below.

Extending forwardly from the edge 13 of top wall 12, directly over the tunnel 20, is a trapazoid-shaped plate 23. Spaced forwardly of the plate 23 is a rectangular plate 24 extending between the front ends of the side walls 11, the plate 24 being secured to the undersides of the flanges 25 (FIGS. 1 and 3) projecting from the top edges of the side walls. Pivotally mounted on the side walls 11 are arms 28, each supporting a channel-shaped horn 29 on its inner end. The arms 28 are spring biased toward the positions shown in FIG. 1, wherein they abut stops 30 secured to the flanges 25, and may be swung about their vertical pivot axes as indicated by the double headed arrows. Mounted on the lower face of the plate 24, near its ends, are two members 32 (FIG. 4) supporting a pair of horizontal rods 33 between them. Four brackets 34 are carried by the rods, and an arm 35 carrying a downwardly facing razor blade 36 is mounted in each bracket. The razor blades 36 serve as abutments against which the top of the bag stack 37 is pressed, as will be explained further below.

When an item of merchandise 31 is to be packaged, it is placed on the top wall 12 and pushed by the operator in the direction of the arrows in FIGS. 1 and 2. As the merchandise 31 passes over the plate 23, it contacts the inner faces of the horns 29 and continued movement of the merchandise causes the horns to swing outwardly so that they enter the mouth of the upper most bag 38 in the stack of bags 37. The uppermost bag 38 has, previous to the entry of the horns 29, been blown open by air flowing through the openings 15 and 22. The horns 29 support the bag mouth open and guide the merchandise into the top bag 38. When the merchandise reaches the bottom (i.e., the left end in FIG. 1) of the bag, continued pushing of the merchandise causes the lip 39 (FIG. 1) of the top bag to move out from beneath the razor blades 36, thus freeing the bag from the stack. The filled bag is then ready for sealing in the usual way.

The stack of bags 37 is carried on a two-part support so arranged that the part carrying the bag bodies moves upwardly faster than the part carrying the bag lips. The arrangement includes a parallelogram mechanism comprising a pair of parallel links 44 and 45 at each side of the housing, the links of each pair being arranged the same vertical plane. Secured to the inner face of each side wall 11 is a block 46, and the rearward ends of each pair of links 44 and 45 are pivotally mounted at points 47 on one of the blocks 46, each pair of pivot points 47 being vertically spaced apart. Each pair of links 44 and 45 extend forwardly through the open front of the housing, and their forward ends are pivotally secured at points 48 to a vertical plate 49. The vertical spacing between the pivot points 47 is identical to the vertical spacing between the pivot points 48, and the lengths of the links 44 and 45 are equal. Hence, each pair of links and the members to which they are pivoted constitute a parallelogram mechanism. A brace 50 extends between, and is secured at its ends to, the upper link 44 of each pair.

Extending between, and secured at its ends to, the upper faces of the plates 49 is a bridge member 53 (FIGS. 1 and 2) to the upper face of which a platform 54 is secured. The platform, which supports the bag bodies 52 in the stack 37, comprises a base plate 55, a top plate 56, and an intermediate plate 57 slidable in a longitudinal (i.e., left and right in FIGS. 1 and 2) direction between the top and base plates. Thus, the longitudinal dimension of the platform can be adjusted to accommodate bags of different lengths.

Extending transversely between the two pairs of links 44 and 45, at a point between their ends, is an inverted U-shaped member 60 (FIGS. 2 and 4). The ends of the member 60 are pivotally secured to the links 44 and 45 at points 61. The three pairs of pivot points 47, 48, and 61 are arranged in three parallel planes, these planes in the present example being vertical. Secured to the front face of the member 60 is a table 62 formed of a strip bent to have an L-shaped cross-section (see FIG. 2). The horizontal leg of table 62 serves to support the lips 39 of the bags in the stack 37. An inspection of FIG. 2 will reveal that as the links 44 and 45 rotate in a clockwise direction about their pivots 47, the platform 54 connected to the ends of the links will rise faster than the table 62 connected to a point between the ends of the links. Furthermore, the three pairs of pivot points 47, 48, and 61 always remain vertical, so that the platform and table do not rotate about their own axes, but always remain horizontal.

Mounted on the rear face of the member 60 is another L-shaped strip 63, the horizontal leg of the strip being provided with a series of notches 64 (FIGS. 2, 3, and 4). The notches 64 are adapted to accommodate the vertical arms of the usual U-shaped wire wicket 65 which pass through two rows of aligned holes in the bag lips and thereby maintain the bags in registry. Since a plurality of notches 64 are provided, wickets of different widths can be accommodated. A J-shaped holder 66 supports the cross-bar of the wicket 65, the holder 66 being mounted for vertical adjustment on a bracket 67 secured to the housing. Consequently, wickets of different lengths can be accommodated.

The means for urging the platform 54 and table 62 upwardly include two pairs of leaf springs 70 (FIGS. 2–4). The rearward ends of the springs of each pair are fastened together and are hinged at 71 to a block 72 fixed to the partition 14. Near its forward end, the upper spring 70 of each pair slidably engages a follower 73 fixed to the member 60. Spaced below the springs 70 is a shaft 74 passing transversly through the housing, and journaled in bearings 75 fixed to the side walls 11. Fixed to the shaft 74 directly beneath each spring pair 70 is a cam 77 having the shape of a circle segment, the shaft 74 being eccentrically located with respect to the cam.

When the shaft 74 is rotated to bring the cams 77 to a position such as that shown in full lines in FIG. 2, the springs 70 are arched upwardly. Since the rear ends of the springs cannot move upwardly and the springs have a tendency to straighten out the forward ends of the springs 70 tend to move upwardly. This upward force is transmitted via the followers 73 and member 60 to the table 62, and via the links 44 and 45, plates 49, and bridge 53 to the platform 54. This upward movement of the table and platform is limited by the abutment of the top of stack of bag lips 39 against the razor blades 36. When the shaft 74 is rotated to locate the cams in the broken line position of FIG. 2, wherein the narrowest part of each cam is between its respective spring and the shaft 74, the springs are allowed to assume an unstressed condition, and the table 62 and platform 54 can drop by gravity to a lowermost position preparatory to placing a fresh stack of bags on them.

For the purpose of rotating the shaft 74 to a desired position of adjustment, one end of the shaft extends beyond its respective bearing, and an arm 76 (FIGS. 1, 3, and 5) is fixed to this end. The free end of the arm 76 is yoke-shaped, and a substantially L-shaped handle 78 is pivotally secured at about its center between the fingers of the yoke, the pivot axis 82 being parallel to the side wall 11. Mounted on the side wall 11 is a toothed segment 79, and the inner end of the haindle 78 has a latch section 80 (FIG. 3) adapted to fit between any two adjacent teeth 81 (FIG. 5). A tension spring 83 normally maintains the latch 80 of the handle 78 in engagement with the segment 79. When the shaft 74 is to be rotated, the handle 78 is rotated about the axis 82 and against the force of spring

83 to lift the latch 80 away from the segment 79. The handle 78 and arm 76 can then be moved to rotate the shaft 74. At the desired location, the handle 78 is released, and the spring 83 causes the latch 80 to enter between two of the teeth 81 and prevent rotation of the shaft 74.

When a stack of bags 37 is to be placed on the table 62 and platform 54, the shaft is rotated to its extreme counterclockwise position as viewed in FIG. 2 (clockwise as viewed in FIG. 5). After the stack is in place, the shaft is rotated clockwise in FIG. 2 until the springs 70 are deformed sufficiently to produce an appropriate pressure between the top of the bag stack and the razor blades 36. The pressure should be such as to allow the uppermost bag to be removed from beneath the razor blades without dragging the next bag with it. The particular position of the shaft will depend upon the weight of the bag stack (the larger the bags, the heavier the stack). After a portion of the stack has been consumed, it may be desirable to adjust the position of the shaft 74, and hence the stress of the springs 70, so as to reduce the pressure between the bags and the razor blades 36.

The invention has been shown and described in preferred form only, and by way of example, and many variations may be made in the invention which will still be comprised within its spirit. It is understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are included in the appended claims.

What is claimed is:

1. In a bag loading device for filling bags of the type having a pair of opposed walls, one wall being longer than the other to provide a lip extending from the mouth of the bag:

(a) a stationary frame,

(b) means for supporting a stack of bags in flat condition with the uppermost bag in the stack in position to be filled with merchandise and for lifting the stack as the bags are consumed to bring successive uppermost bags to the filling position, said means comprising:

(I) a table structure for supporting the single-ply lip portions of the bags, and

(II) a platform structure for supporting the two-ply portions of the bags,

(c) means for urging said stack-supporting means upwardly, and

(d) means for correlating the movements of said table structure and platform structure so that said platform rises at a faster rate than said table, said means comprising a parallelogram mechanism carrying said table and platform structures, one end of said mechanism being pivotally secured to points fixed with respect to said frame, the other end of said mechanism being pivotally secured to said platform structure, and said table structure being pivotally secured to said mechanism at points intermediate the ends of said mechanism.

2. In a bag loading device, the elements defined in claim 1 wherein said parallelogram structure comprises a pair of parallel links, said links being connected at one end to a pair of pivot points fixed with respect to said frame, said links being connected at the other end to a pair of pivot points fixed with respect to said platform structure, and said links being connected between their ends to a pair of pivot points fixed with respect to said table structure, all of said pairs of pivot points being located in parallel planes.

3. In a bag loading device, the elements defined in claim 1 wherein said urging means is a spring, and including:

(f) means for selectively

(I) deforming said spring to render it effective to urge said stack-supporting means upwardly, or

(II) allowing said spring to assume its normal condition to permit a supply of bags to be placed on said stack-supporting means.

4. In a bag loading device, the elements defined in claim 3 wherein said spring is a leaf spring secured at one end to a fixed point on said frame, the other end of said spring engaging an element secured to said parallelogram mechanism, and wherein said selective means includes a cam adjacent to said spring, said cam being eccentrically and rotatably mounted on said frame.

5. In a bag loading device, the elements defined in claim 4 wherein said element is a follower fixed with respect to said table structure, and said other end of said spring is located beneath and slidably engages said follower.

6. In a bag loading device, the elements defined in claim 4 including a rotatable shaft supporting said cam, and an operating handle secured to said shaft.

7. In a bag loading device, the elements defined in claim 6 including means for latching said handle, and hence said shaft and cam, in any one of a plurality of arcuated-arranged positions of adjustment so as to vary the spring force on said stack-supporting means.

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U.S. Cl. X.R.

53—385, 391