June 12, 1962 R. A. PEARSON 3,038,387

CARTON SETTING UP MACHINE

Filed Oct. 24, 1960 6 Sheets-Sheet 1

Fig. 1

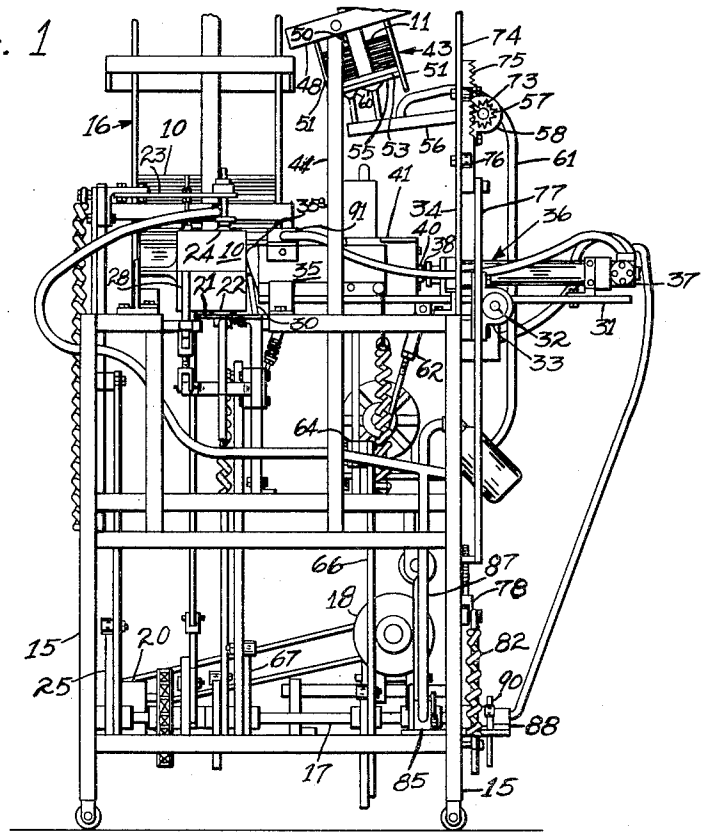
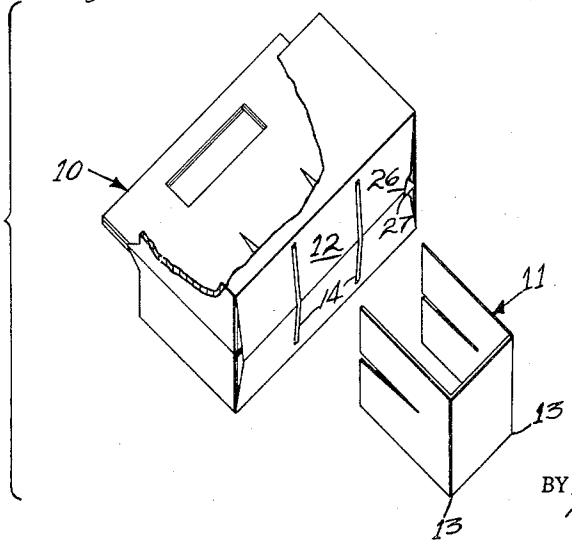



Fig. 2




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CARTON SETTING UP MACHINE

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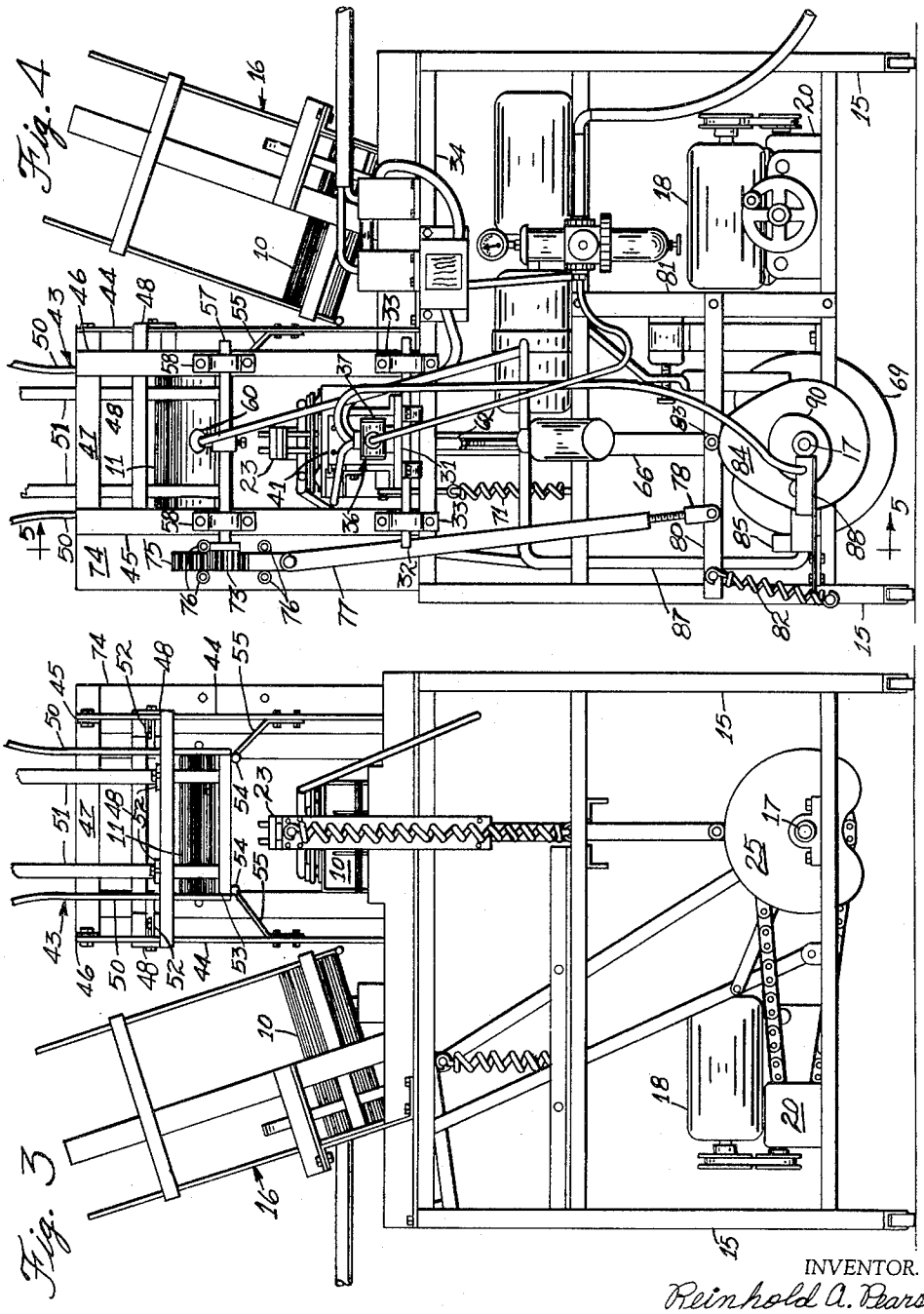


Fig. 4



Fig. 3

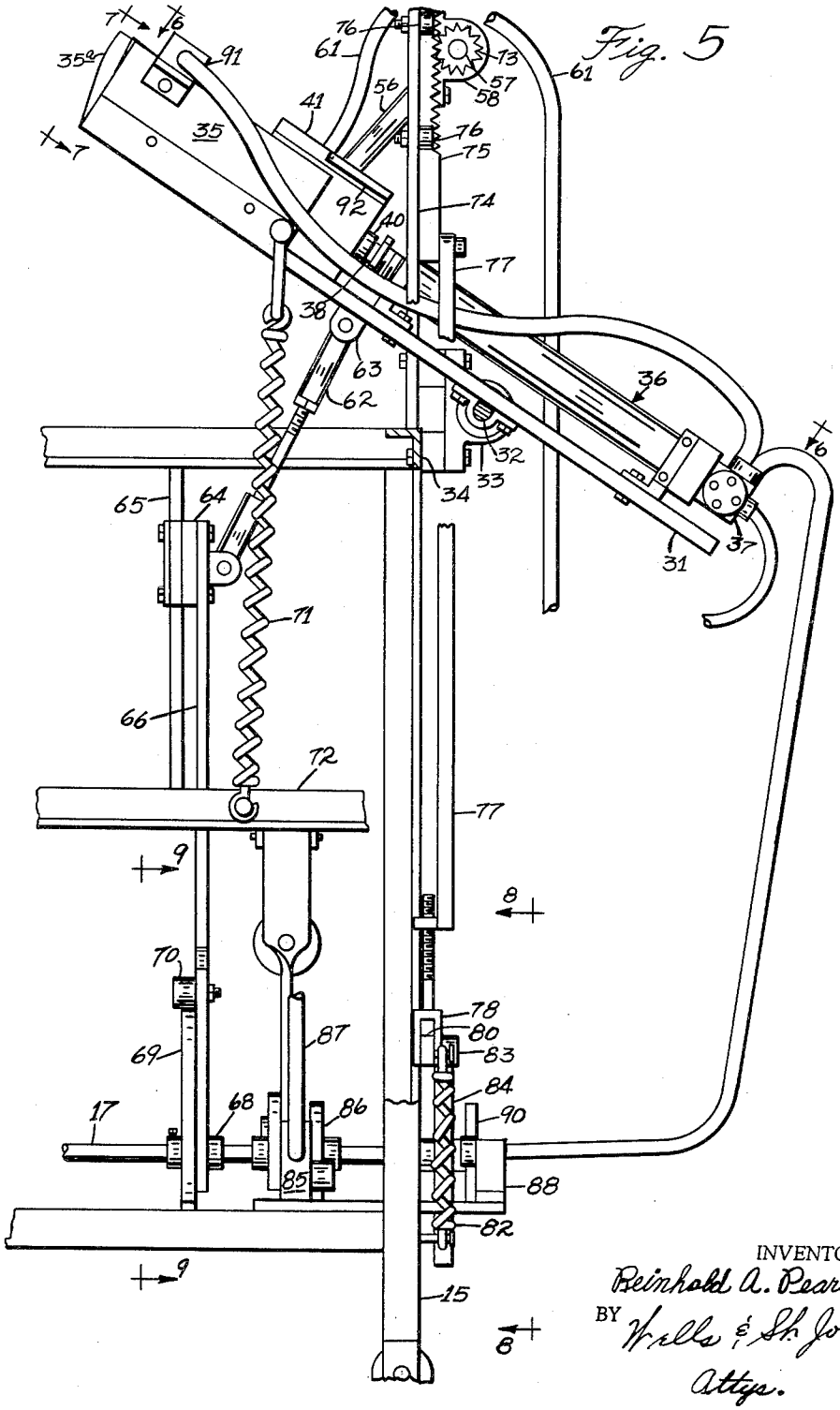
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CARTON SETTING UP MACHINE

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Fig. 5




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CARTON SETTING UP MACHINE

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Fig. 6

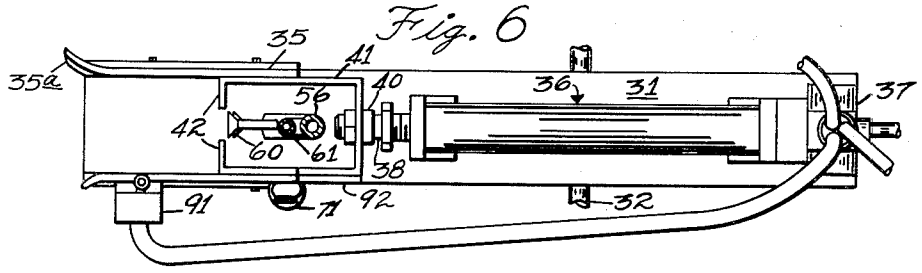



Fig. 7

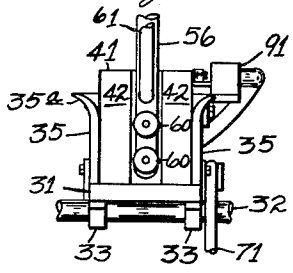



Fig. 8

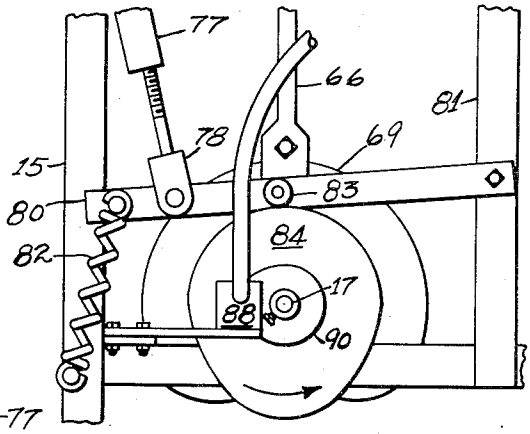



Fig. 9

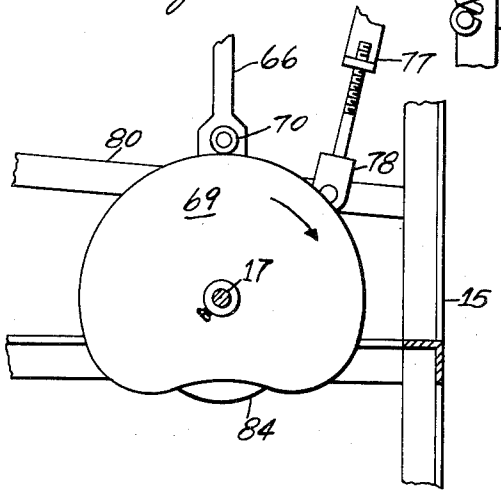
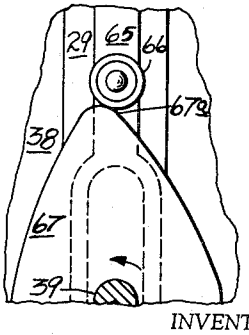



Fig. 10




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CARTON SETTING UP MACHINE

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Fig. 11

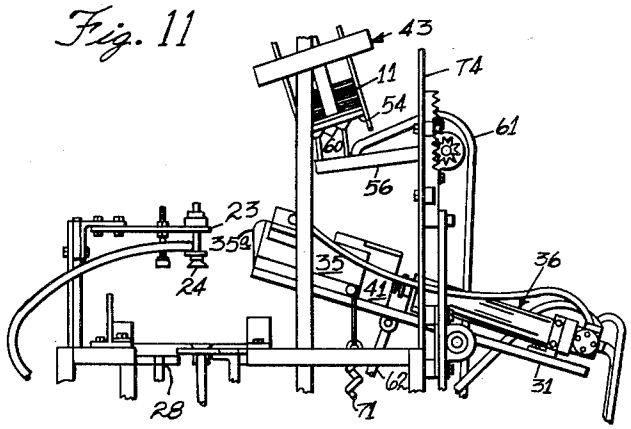



Fig. 12

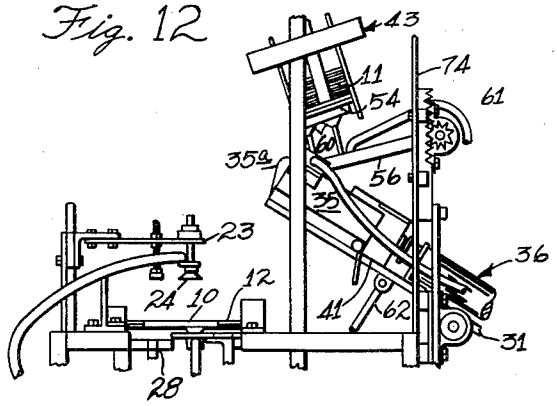
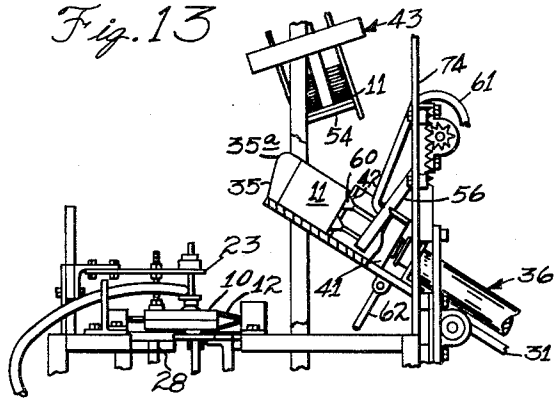



Fig. 13




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CARTON SETTING UP MACHINE

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Fig. 14

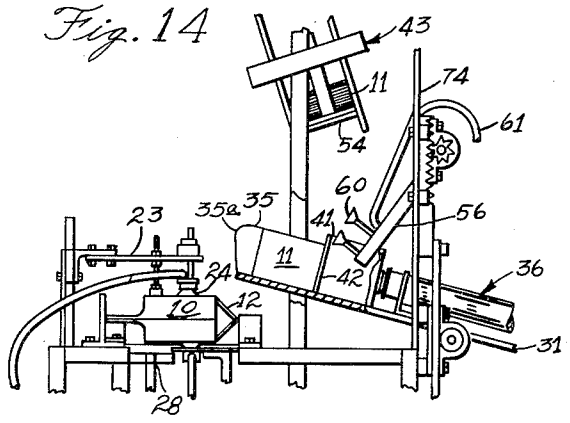



Fig. 15

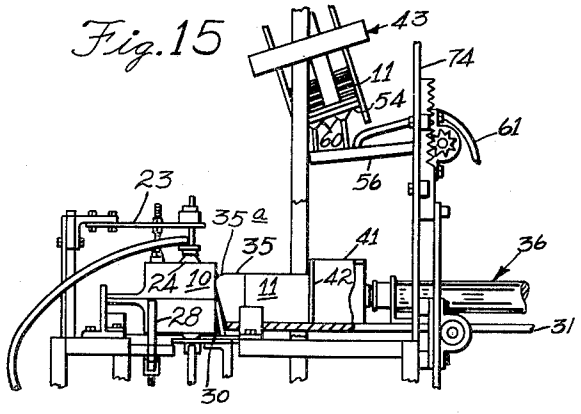
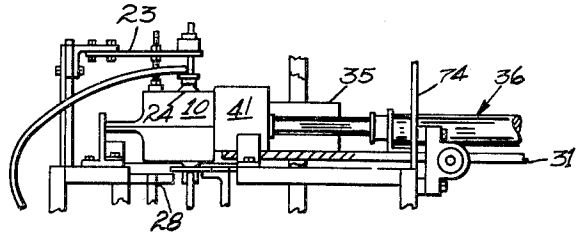



Fig. 16




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United States Patent Office

3,038,387

Patented June 12, 1962



3,038,387

# CARTON SETTING UP MACHINE

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Filed Oct. 24, 1960, Ser. No. 64,608
4 Claims. (Cl. 93—37)

This invention relates to a box setting up machine for use with cardboard cartons wherein an independent spacer is inserted through the bottom of the carton to complete its assembly.

The carton set up by this machine is commonly termed a "six pack." It is used to merchandise canned or bottled goods in a consumer package. The particular form of carton is disclosed in U.S. Patent No. 2,576,179, issued November 27, 1951, to M. E. Holy for Collapsible Carrier. This carton has important fabrication advantages due to economical gluing, but requires additional handling during the setting up of the carton for filling.

It is a first object of this invention to provide an improved box setting up machine designed to automatically assemble this type of two piece carton. No manual steps are contemplated other than the maintenance of a supply of body blanks and spacers in the machine racks. The machine is designed for high speed operation commensurate with normal production speeds at a canning or bottling plant.

It is a second object of this invention to utilize earlier box setting up machines, making a minimum of changes in order to adapt it to the setting up of this new carton. The instant invention is not an attachment, but merely utilizes existing mechanisms to set up the body blank. The total machine is quite simple and can be readily repaired when necessary.

Further objects of this machine will be obvious from the following disclosure. The accompanying drawings show an exemplary form of the invention. This specific form is for illustration only and is not intended to limit the invention as defined.

In the drawings:

FIGURE 1 is a front view of the machine;

FIGURE 2 is an exploded perspective view of the carton;

FIGURE 3 is a side view taken from the left of FIGURE 1;

FIGURE 4 is a second side view taken from the right of FIGURE 1;

FIGURE 5 is an enlarged sectional view taken substantially along line 5—5 in FIGURE 4 with some parts broken away;

FIGURE 6 is a sectional view of the cylinder assembly taken along line 6—6 in FIGURE 5;

FIGURE 7 is a view of cylinder assembly taken along line 7—7 in FIGURE 5;

FIGURE 8 is a sectional view taken substantially along line 8—8 in FIGURE 5;

FIGURE 9 is a sectional view taken substantially along line 9—9 in FIGURE 5;

FIGURE 10 is a fragmentary view showing the modified cam 67 for the locking fingers of the machine;

FIGURES 11–16 show the operation of the spacer inserting apparatus wherein—

FIGURE 11 shows the supporting bed moving upward;

FIGURE 12 shows uppermost position of the supporting bed;

FIGURE 13 shows the placement of the spacer;

FIGURE 14 shows the clearance of the spacer in its downward motion;

FIGURE 15 shows the supporting bed in horizontal position; and

FIGURE 16 shows a spacer fully inserted in the carton.



The present invention is designed to set up cartons of the type shown in U.S. Patent No. 2,576,179. The general form of that carton is shown in FIGURE 2 for reference purposes. The complete carton consists of a body blank 10 and a spacer 11 which interlock to form an exceptionally rigid carton. The body blank 10 is shipped in collapsed condition with the bottom wall 12 folded outwardly along its center line. The spacers 11 are shipped in flat condition and are scored at 13 for bending before insertion into a body blank 10 which has two parallel slots 14 cut through bottom wall 12 to receive the legs of spacer 11.

The general arrangement of the apparatus for setting up the body blank 10 is fully disclosed in U.S. Patent No. 2,780,148, issued February 5, 1957, for Box Setting Up Machine and filed by the instant inventor and Benny Weremiczyk. Only one structural change has been made in this apparatus. This is illustrated in FIGURE 10, which corresponds to the lower portion of FIGURE 2 in the last-named patent. The time of hesitation of cam 67 has been shortened by shortening land 67*a* to the extent that it is almost a point. This added time is utilized by the instant machine to insert spacers 11 into body blanks 10. Since the present invention cannot be correctly understood without relating it to the existing mechanisms, a general description of the entire machine and the functions of each mechanism is deemed essential. The overall relationships of the parts can be seen best in FIGURES 1, 3 and 4.

The machine is supported on four legs 15 which are part of a rigid framework consisting of horizontal angle irons and plates welded to one another to present a stable rectangular structure. Collapsed body blanks 10 are supplied in a stack to a storage rack 16 fixed to the framework. Body blanks 10 are fed singly from the bottom of rack 16. The feed mechanism and all other operations of this machine are controlled by a common transverse operating shaft 17 mounted on the framework and operatively driven by a motor 18 and transmission 20 in common fashion. As the body blanks 10 are fed from rack 16, they intermittently are pushed to the front of the machine in a row. When a blank 10 is above table 21 on the machine, lower vacuum cups 22 in table 21 grip the lower side of the blank 10. At the same time plate 23 descends and vacuum cups 24 on the plate 23 grip the upper side of the blanks 10. The plate 23 is then elevated by cam 25. This vertically expands the carton body blank 10 and places the bottom wall 12 in a vertical plane. The particular carton has a locking arrangement by which a notch 26 in bottom wall 12 is gripped by an adjacent notch 27 in the adjacent end wall so as to counteract the tendency of body blank 10 to revert to its original collapsed condition. The mechanism for locking the carton is fully described in the above-mentioned patent, No. 2,780,148. As seen in FIGURE 1, the end wall is moved inward by a pivoted finger 28 under the action of cam 67. The bottom wall 12 is simultaneously spring biased inwardly by finger 30. In the modified version of this mechanism, cam 67 forces finger 28 inwardly and out in quick succession, eliminating the short delay used in the earlier version of this mechanism. Immediately after finger 28 is released, the spacer 11 is inserted into body blank 10 by the new mechanism described below. At the conclusion of this step, the body blank feed apparatus moves a new blank forward and ejects the complete carton, which has then been released by vacuum cups 22 and 24 and the entire cycle is repeated for the next carton. Each revolution of operating shaft 17 produces one complete carton.

The new apparatus by which spacers 11 are inserted into carton body blanks 10 in timed relation with the remaining parts of this machine can best be seen in

FIGURES 5–10. Mounted transversely to table 21, at the center of the area where the expanded body blanks 10 are positioned, is a pivoted supporting bed 31. Bed 31 is rectangular in shape and is slightly wider than the central part of a spacer 11. It is pivotally mounted on the framework of the machine by a shaft 32 fixed to its underside between its ends and a pair of bearings 33 which are fixed to a longitudinal angle iron 34 on the framework. Thus the pivotal axis of bed 31 is parallel to the lower edge of an expanded carton bottom 12 positioned at the work station on table 21. The end of bed 31 adjacent table 21 is slightly elevated above the top surface of table 21 when bed 31 is horizontal. This distance equals the spacing of slots 14 from the carton sides. Fixed to bed 31 at this end are two vertical plates 35 which extend along bed 31 a distance greater than the length of the two legs of a spacer 11. The plates 35 may be identical. However, it has been found advisable to extend one plate 35 a shorter distance beyond bed 31 as designated by numeral 35*a*. The extension 35*a* is slightly curved and has an outwardly bent upper corner, as does the remaining plate 35.

A pneumatic cylinder assembly 36 is mounted along the center of bed 31. Assembly 36 is a conventional high speed cylinder which is double acting and controlled by an attached solenoid valve 37. Since this assembly can readily be purchased in several designs and need not be modified, it will not be further described in detail. The reciprocating piston rod 38 of assembly 36 is fastened by conventional connectors 40 to a ram 41. Ram 41 is simply a U-shaped plate terminating in a pair of inwardly facing abutments 42. The sides of ram 41 are directly adjacent the inner surfaces of plate 35. Thus ram 41 is slidably guided by the plates 35 and bed 31, as well as by the rod 38 which powers it.

The spacers 11 are stored in a stack within a rack 43 which is fixed to the framework by a pair of inboard vertical struts 44 and a rectangular extension to the main framework consisting of two plates 45, 46 fixed to angle iron 34 and connected at their upper ends by a cross-plate 47. The upper ends of struts 44 and plates 45, 46 are connected by an adjustable frame 48 which is utilized to vary the angle of rack 43. Frame 48 is rectangular and consists of four welded angle irons. Mounted on the top surfaces of frame 48 are two end guides 50 and four side guides 51. These guides 50, 51 are flared outwardly to a slight degree so as to facilitate placement of a stock of spacers 11 within the rack 43. Each guide 50, 51 is adjustably mounted on frame 48 by means of a slotted bracket 52. The lower ends of the relatively wide end guides 50 have fixed thereon inner stop bars 53 which are placed so as to vertically support the stack of spacers 11. A pair of rods 54 are placed under the side guides 51 and are mounted by straps 55 fixed to struts 44. Rods 54 serve to break the initial fold on spacers 11 as they are removed from the bottom of rack 43.

The spacers 11 are fed from the bottom of rack 43 by an arm 56 which is a sealed tubular rod fixed at one end to a pivot shaft 57. Shaft 57 is rotatably mounted about a horizontal axis by a pair of bearings 58 fixed to plates 45, 46. The remaining end of arm 56 is provided with a pair of vacuum cups 60 on adjustable mountings. The vacuum cups 60 are supplied with vacuum pressure through the sealed arm 56 and a hose 61. The arm 56 is of such a length that it extends almost to bed 31 when bed 31 and arm 56 are perpendicular to one another. Rack 43 is positioned so that the vacuum cups 60 are flush with the center of the lowermost spacer 11 when arm 56 is at its highest position about pivot shaft 57.

Bed 31 is pivoted about the axis of shaft 32 by an adjustable rod 62 pivotally mounted between ears 63 on the lower surface of bed 31. The remaining end of rod 62 is pivoted to a slide bearing 64 which is slidably mounted about a vertical strut 65 fixed within the machine framework. Bearing 64 is secured to a slide arm 66 which is bifurcated at its lower end so as to slide over operating shaft 17. The lower end of arm 66 slides between cam 69 and a guide collar 68. Rotatably mounted on arm 66 is a cam follower 70 which rides on the periphery of cam 69 and vertically positions the bed 31. Bed 31 is biased downwardly by a compression spring 71 fixed between bed 31 and a cross angle iron 72 in the framework. Spring 71 maintains the cam follower 70 in engagement with cam 69.

Arm 56 is pivoted by shaft 57, which includes a pinion 73 fixed thereto adjacent plate 45. A vertical backing plate 74 adjacent plate 45 serves to support a rack 75 which is in meshing engagement with pinion 73 and is guided by four rollers 76. The lower end of rack 75 is pivoted to an arm 77 which is threadably connected at its lower end to a yoke 78. Yoke 78 is pivoted to a link 80 which is pivoted to the framework at 81. The remaining end of link 80 is biased downwardly by a spring 82. Link 80 mounts a cam follower 83 which rests on a cam 84 fixed to shaft 17.

The vacuum for vacuum cups 60 is controlled by a conventional vacuum release valve 85 which is controlled by a cam 86 on shaft 17. Valve 85 is connected by a supply hose 87 to a suitable source of vacuum pressure.

The pneumatic cylinder assembly 36 normally holds ram 41 in the back position shown in FIGURE 5. The control valve 37 is wired to a first control switch 88 on the framework. Switch 88 is operated by a cam 90 on shaft 17. A second control switch 91 to reverse valve 37 is mounted on plate 35 and is adapted to be actuated by a projection 92 on the upper edge of ram 41. Cam 90 is almost pointed and merely trips switch 88. When ram 41 is extended as desired, switch 91 will be tripped to reverse cylinder assembly 36 to return it to the position shown in FIGURE 5.

The contours of cams 69 and 84 are shown in FIGURES 9 and 8 respectively, in aligned positions with the direction of rotation of shaft 17 being illustrated by arrows.

The operation of this apparatus is keyed to each of its functions. See FIGURES 11 to 16. As a carton body blank 10 is being moved over table 21, the bed 31 is moved upward and arm 56 is maintained stationary against the lowest spacer 11 in rack 43, suction being applied to vacuum cups 60. Just before bed 31 reaches its highest position, arm 56 begins its downward swing. After bed 31 comes to rest, the spacer 11 held by vacuum cups 60 is first bent by rods 54 and then by the bent corners of plates 35 which bend the legs perpendicular to the gripped center portion as the spacer enters between plates 35. The lower vacuum cup 60 is preferably slightly closer to arm 56 than is the upper vacuum cup 60. In this way, proper positioning of the lower edge of spacer 11 against bed 31 is insured. As soon as the spacer 11 is placed against abutments 42, the vacuum of cups 60 is opened by vacuum release valve 85 which is actuated by the cam 86. At this instant, bed 31 begins its downward swing, while the body blank 10 is being expanded by plate 23. In this manner, bed 31 clears the bottom wall 12. The extension 35*a* actually abuts the bottom wall 12 as it is being locked by fingers 28, 30. As soon as spacer 11 has been cleared arm 56 is started upward to pick up the next spacer 11. The switch 88 is actuated by cam 90 immediately after release of finger 28 by cam 67. This results in the spacer 11 being pushed into body blank 10 by ram 41. As soon as ram 41 is retracted, the bed 31 begins its upward motion to receive the next spacer 11. As soon as plates 35 clear the bottom wall 12, the completed carton is ejected under pressure from the next body blank 10.

In this manner, two piece cartons can be easily assembled. The actual insertion of the spacer 11 takes only a small fraction of one second and does not delay the normal operation of the machine components. The positioning of the spacers is timed so as to coincide with the remaining procedures, so that no altering of the machine timing is required.

The instant machine is exemplary, but is not intended to limit the details of the invention. Only the following claims are intended to limit the invention as defined therein.

Having thus described my invention, I claim:

1. In a machine for setting up partitioned cartons of the type wherein an independent folded spacer is adapted to be inserted through a pair of parallel slots in the bottom wall of an expanded carton, the combination comprising:

a carton supporting framework adapted to support an expanded carton with the bottom wall in a vertical plane, the lower edge of the bottom wall in a horizontal plane and said slots in parallel vertical planes;

means mounted on said framework adapted to maintain said carton in this expanded stationary position;

a spacer inserting apparatus comprising a flat bed pivotally mounted on said framework about a horizontal axis parallel to the lower edge of the bottom wall of an expanded carton;

ram means slidably mounted on said bed for motion in a straight line perpendicular to a plane containing the bottom wall of an expanded carton;

means operatively connected between said framework and said bed adapted to move said bed from a horizontal position wherein the outer end of said bed is situated adjacent the bottom wall of an expanded carton to an elevated position wherein the outer end of said bed is located above said axis;

spacer delivery means mounted on said framework adapted to individually feed folded spacers to said ram means when said bed attains said elevated position;

reciprocating power means mounted on said bed operatively connected to said ram means adapted to selectively effect the straight line motion of said ram means relative to said bed;

and control means operatively connected to said reciprocating power means adapted to selectively actuate said reciprocating power means while said bed is in said horizontal position to thereby insert a spacer through the bottom wall slots of each expanded carton.

2. In a machine for setting up partitioned cartons of the type wherein an independent folded spacer is adapted to be inserted through a pair of parallel slots in the bottom wall of an expanded carton, the combination comprising:

a carton supporting framework adapted to support an expanded carton with the bottom wall in a vertical plane, the lower edge of the bottom wall in a horizontal plane and said slots in parallel vertical planes;

means mounted on said framework adapted to maintain said carton in this expanded stationary position;

a spacer inserting apparatus comprising a flat bed pivotally mounted on said framework about a horizontal axis parallel to the lower edge of the bottom wall of an expanded carton;

ram means slidably mounted on said bed for motion in a straight line perpendicular to a plane containing the bottom wall of an expanded carton;

a fixed storage rack for spacers mounted on said framework above said bed;

spacer delivery means comprising a delivery arm pivoted to said framework about a pivotal axis parallel to the axis of the bed;

gripping means on said delivery arm adapted to selectively grasp the lowermost spacer in said rack;

guide means fixed to said framework immediately below said rack adapted to contact the lower surface of a spacer as it is being moved about the axis of said delivery arm while grasped by said gripping means, said guide means being adapted to initially bend the inserts along prescored lines;



means operatively connected between said framework and said bed adapted to move said bed from a horizontal position wherein the outer end of said bed is situated adjacent the bottom wall of an expanded carton to an elevated position wherein the outer end of said bed is located above the axis of said bed and wherein said delivery arm intersects said ram means;

upwardly extending side walls fixed to said bed adjacent said ram means adapted to contact the spacers during movement to said ram means to thereby fold the spacers perpendicularly along the prescored lines;

power means operatively connected to said delivery arm and said bed in timed relation adapted to position the central portion of each spacer flush against said ram means with clearance after said placement for motion of said bed about its axis to said horizontal position;

reciprocating power means mounted on said bed operatively connected to said ram means adapted to selectively effect the straight line motion of said ram means relative to said bed;

and control means operatively connected to said reciprocating power means adapted to selectively actuate said reciprocating power means while said bed is in said horizontal position to thereby insert a spacer through the bottom wall slots of each expanded carton.

3. In a machine for setting up partitioned cartons of the type wherein an independent folded spacer is adapted to be inserted through a pair of parallel slots in the bottom wall of an expanded carton, the combination comprising:

a rigid carton supporting framework adapted to support an expanded carton with the bottom wall in a vertical plane, the lower edge of the bottom wall in a horizontal plane and the slots in parallel vertical planes;

an operating shaft rotatably journalled on said framework;

drive means on said framework operatively connected to said operating shaft;

means mounted on said framework operatively connected to said operating shaft adapted to expand a single carton and to maintain it in a stationary expanded position;

a spacer inserting apparatus comprising a flat bed pivotally mounted on said framework about a horizontal axis parallel to the lower edge of the bottom wall of an expanded carton;

first cam means operatively connected between said shaft and said bed adapted to move said bed from a horizontal position wherein the outer end of said bed is situated adjacent the bottom wall of an expanded carton to an elevated position wherein the outer end of said bed is located above said axis;

ram means slidably mounted on said bed for reciprocating motion perpendicular to the pivotal axis of said bed;

spacer storage means mounted on said framework;

spacer delivery means mounted on said framework adapted to individually feed folded spacers from said spacer storage means to said ram means when said bed is in its elevated position;

power means mounted on said bed operatively connected to said ram means;

and control means operatively connected to said power means and to said operating shaft adapted to effect reciprocation of said ram means while said bed is in said horizontal position to thereby insert a spacer into each expanded carton.

4. In a machine for setting up partitioned cartons of the type wherein an independent folded spacer is adapted to be inserted through a pair of parallel slots in the bottom wall of an expanded carton, the combination comprising:

a rigid carton supporting framework adapted to support an expanded carton with the bottom wall in a verti-

cal plane, the lower edge of the bottom wall in a horizontal plane and the slots in parallel vertical planes;

an operating shaft rotatably journaled on said framework;

drive means on said framework operatively connected to said operating shaft;

means mounted on said framework operatively connected to said operating shaft adapted to expand a single carton and to maintain it in a stationary expanded position;

a spacer inserting apparatus comprising a flat bed pivotally mounted on said framework about a horizontal axis parallel to the lower edge of the bottom wall of an expanded carton;

first cam means operatively connected between said shaft and said bed adapted to move said bed from a horizontal position wherein the outer end of said bed is situated adjacent the bottom wall of an expanded carton to an elevated position wherein the outer end of said bed is located above said axis;

ram means slidably mounted on said bed for reciprocating motion perpendicular to the pivotal axis of said bed;

a storage rack mounted on said framework vertcially above said bed adapted to hold a stack of scored spacers for delivery from the bottom of the rack;

an arm pivotally mounted on said framework about an axis parallel to the pivotal axis of said bed;



a pinion fixed relative to said arm, the central pinion axis being coaxial with the pivotal axis of said arm;

a rack slidably mounted on said framework in meshing engagement with said pinion;

second cam means operatively connecting said operating shaft and said rack;

said arm including vacuum means mounted thereon adapted to grip the lowermost spacer in said storage rack;

fixed guide means mounted on said framework on each side of said arm adapted to initially bend the spacers when removed from the storage rack by said arm;

said first and second cam means being indexed so as to bring said bed and said arm to simultaneous positions wherein the central portion of the spacer being delivered is positioned flush against said ram means;

power means mounted on said bed operatively connected to said ram means;

and control means operatively connected to said power means and to said operating shaft adapted to effect reciprocation of said ram means while said bed is in said horizontal position to thereby insert a spacer into each expanded carton.

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