Dec. 25, 1962 D. H. CHARLES ETAL 3,069,979

MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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6 Sheets-Sheet 1

FIG. 1

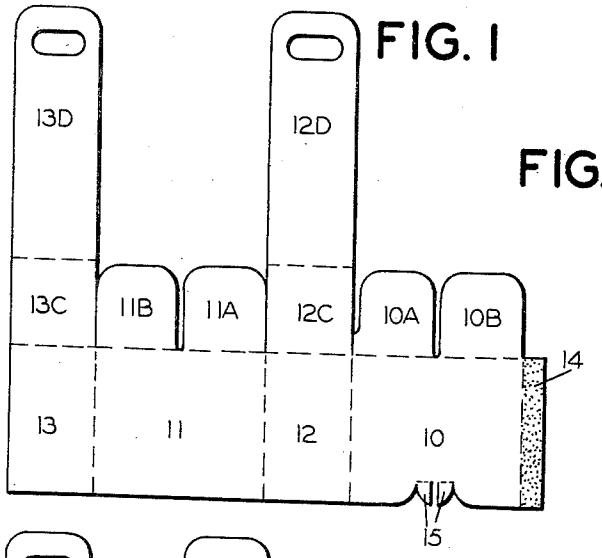


FIG. 3A

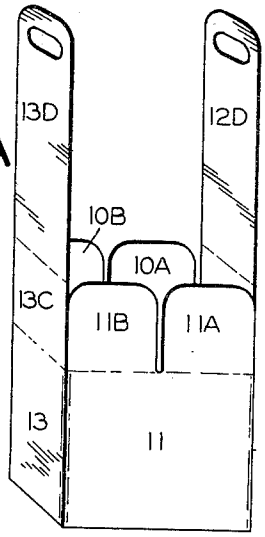


FIG. 3B

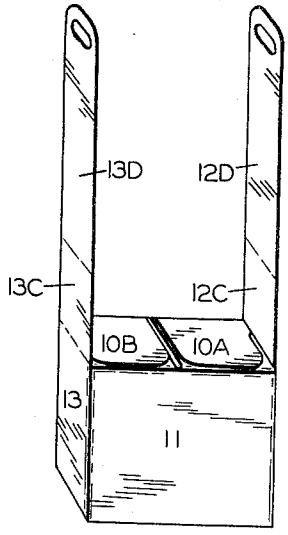
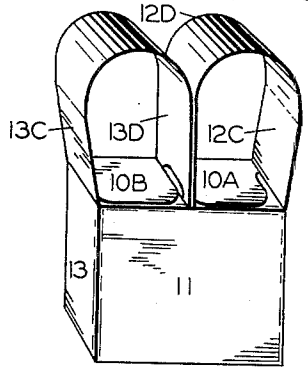


FIG. 3C



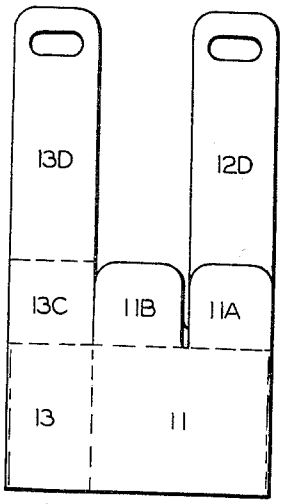


FIG. 2

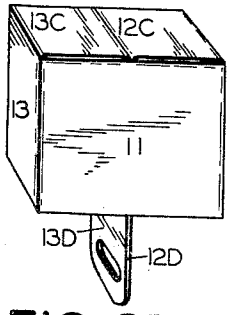


FIG. 3D

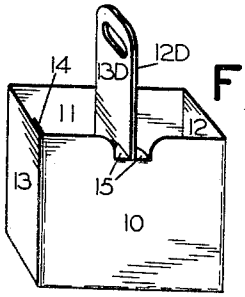


FIG. 3E

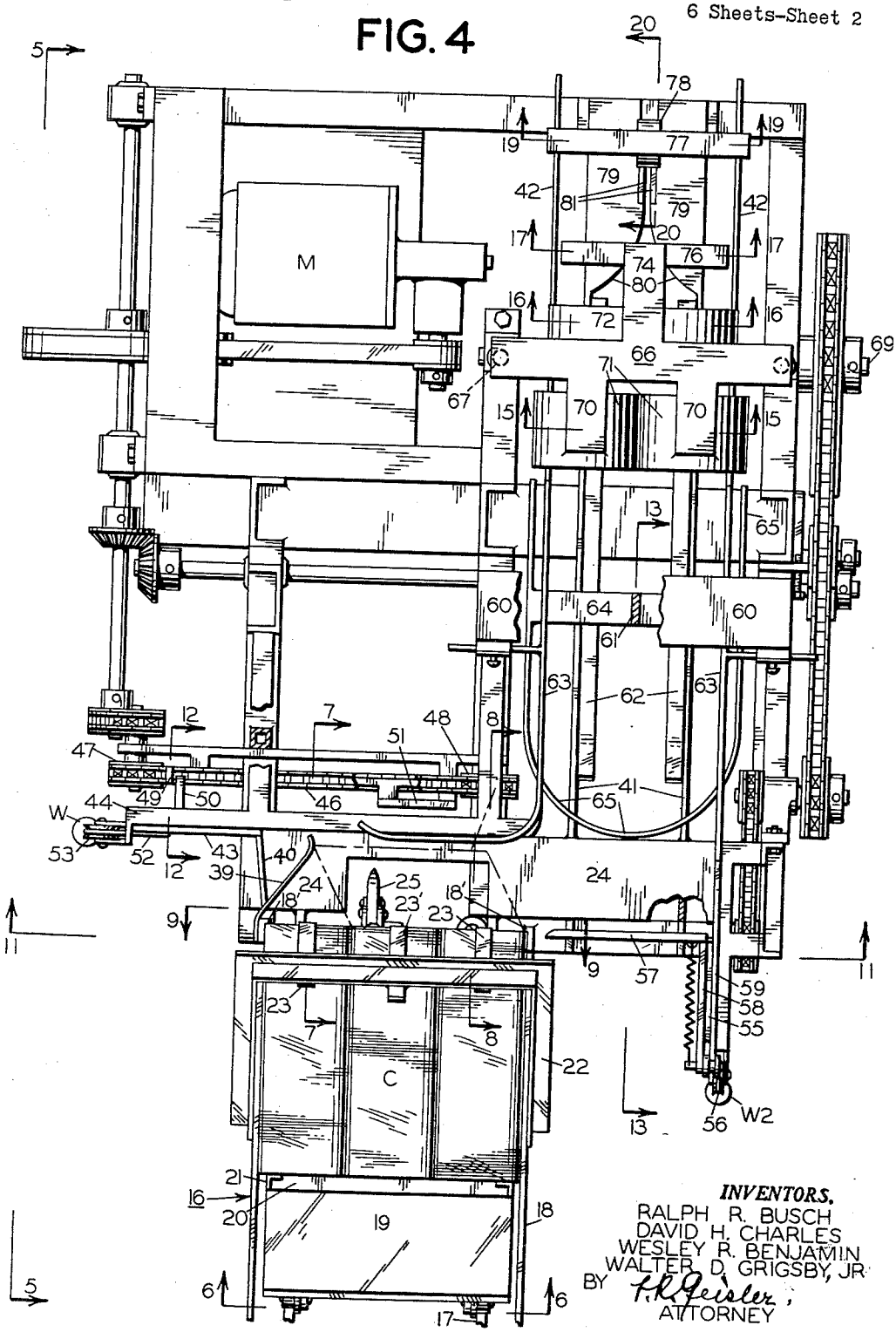
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MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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FIG. 4



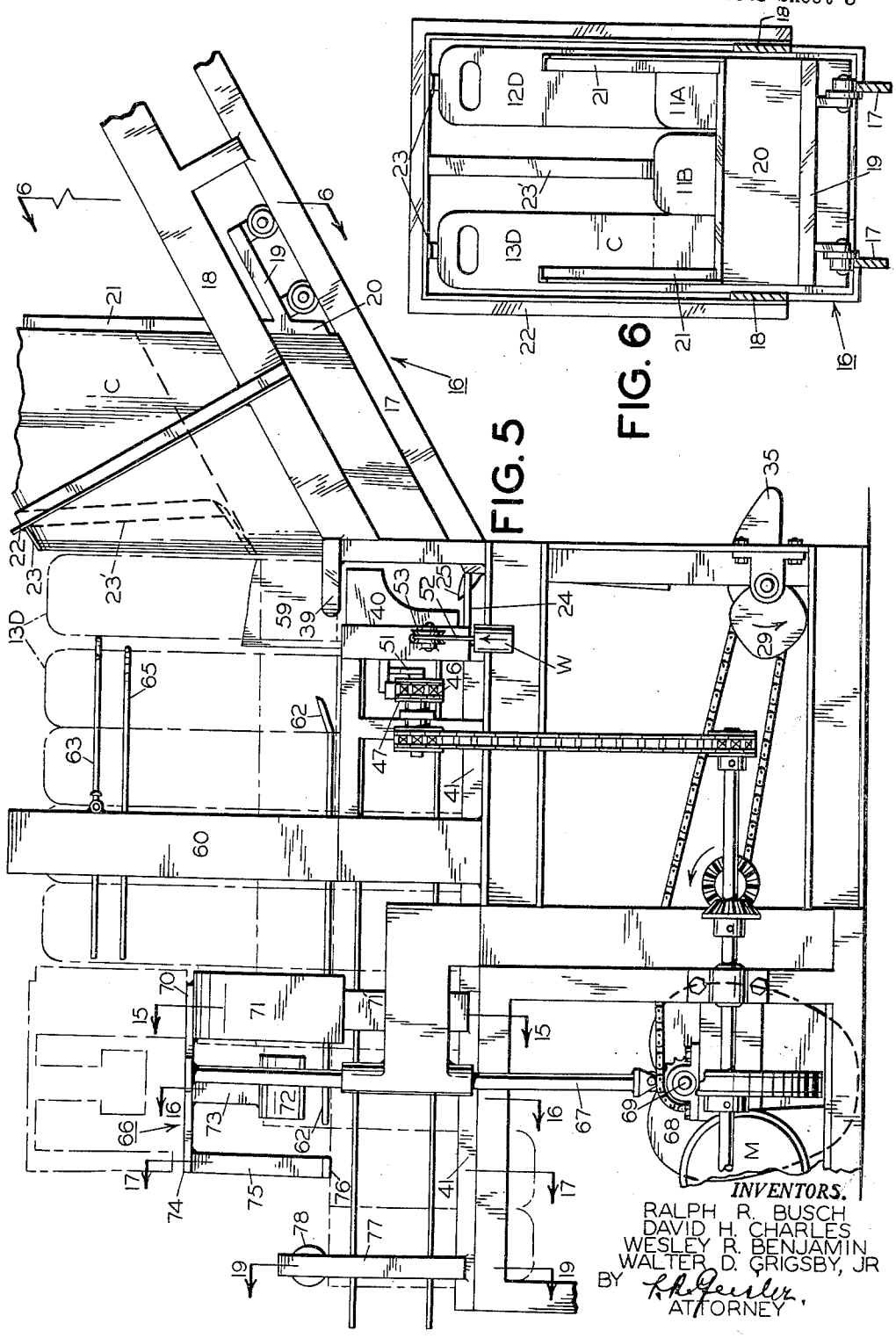
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MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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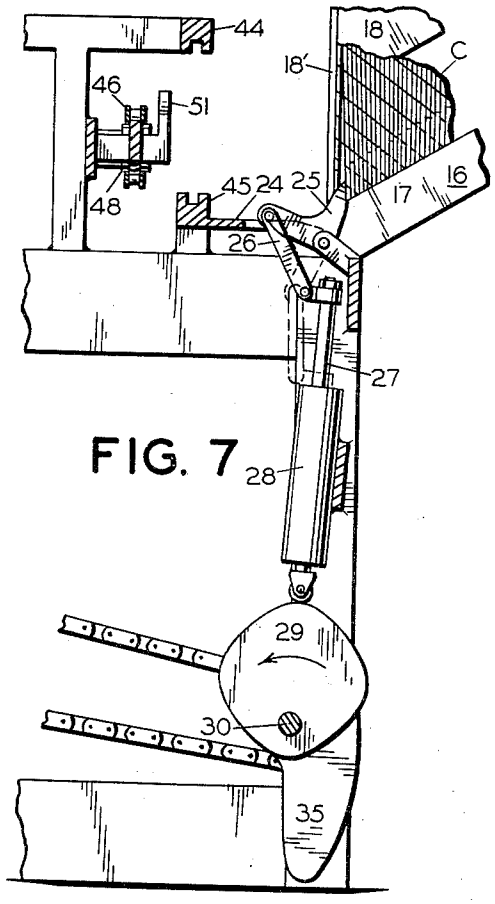


FIG. 7

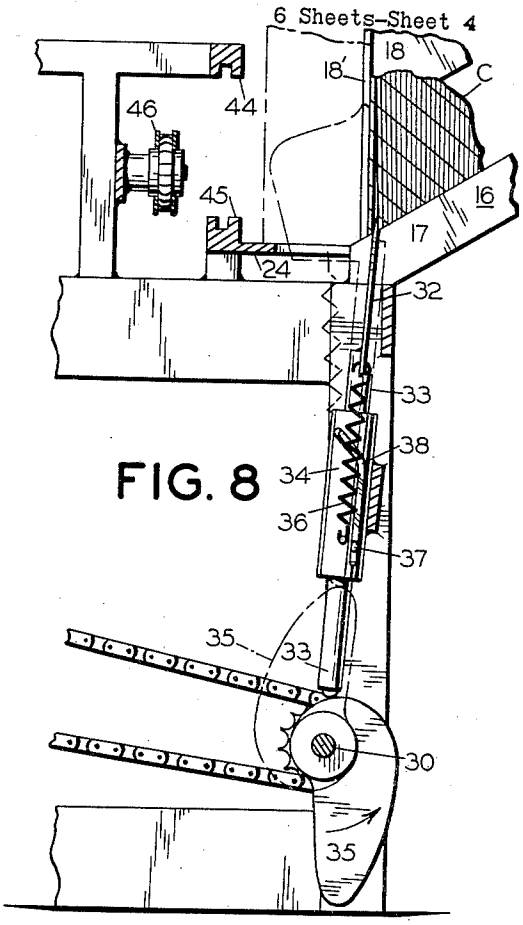


FIG. 8

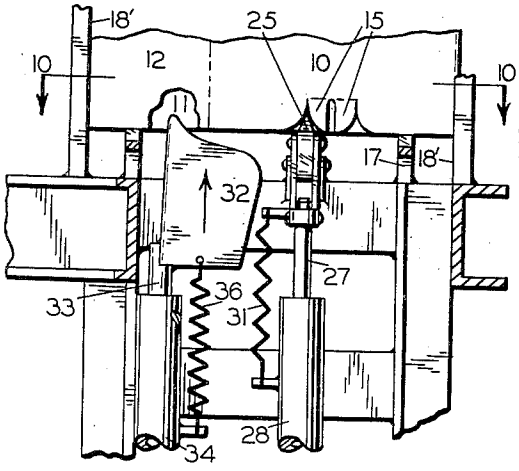


FIG. 9

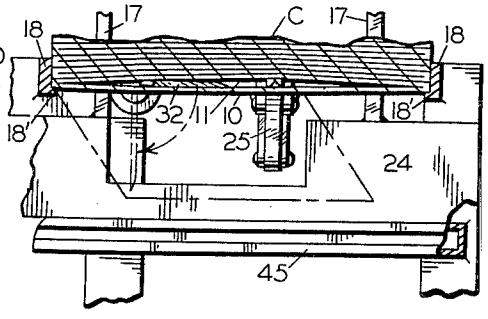


FIG. 10

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MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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FIG. 12

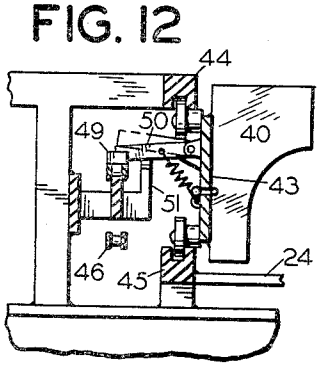


FIG. 11

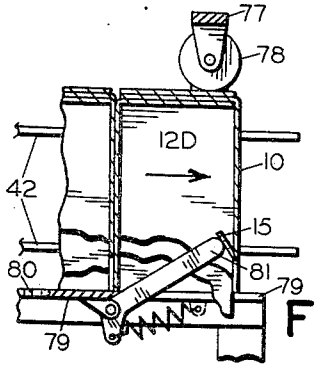


FIG. 20

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MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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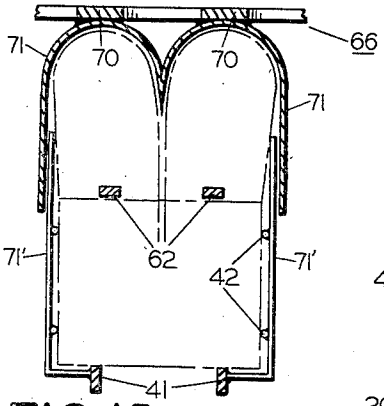


FIG. 15

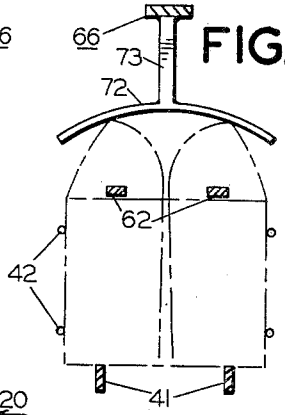


FIG. 16

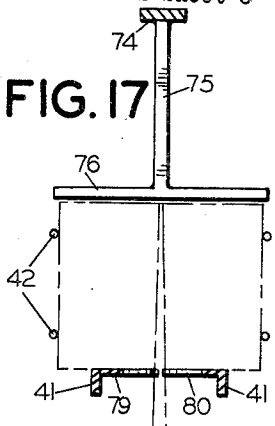


FIG. 17

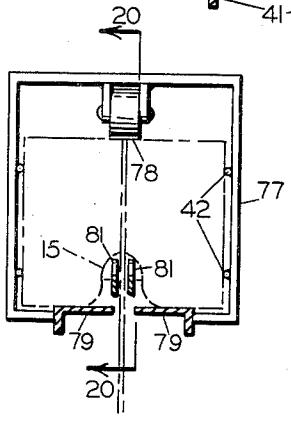


FIG. 19

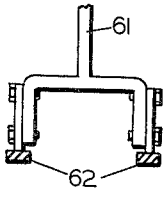


FIG. 14

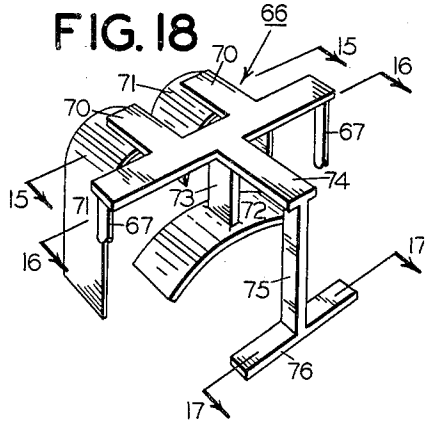


FIG. 18

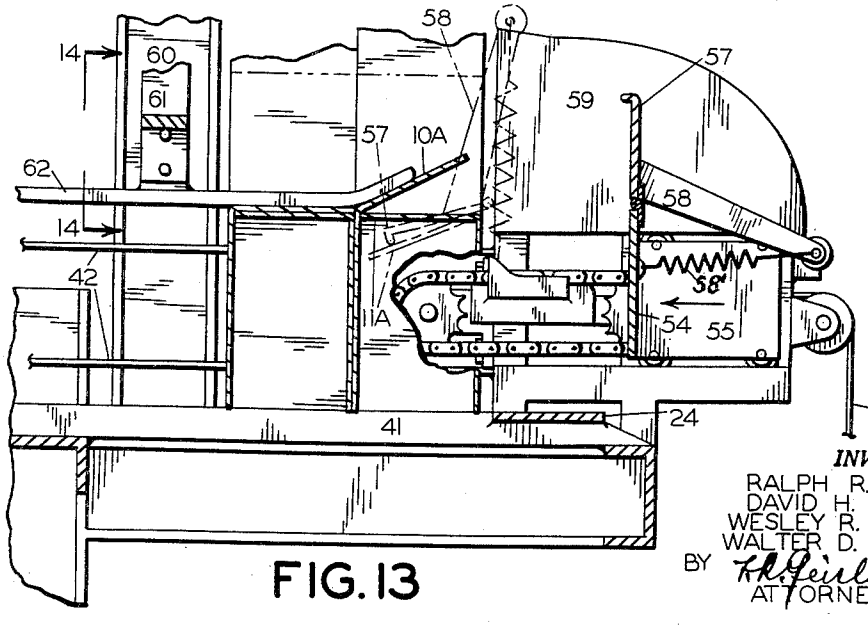


FIG. 13

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United States Patent Office 3,069,979 Patented Dec. 25, 1962

3,069,979
MACHINE FOR SETTING UP COLLAPSED CARRIER CARTONS

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Filed Apr. 10, 1961, Ser. No. 101,713
7 Claims. (Cl. 93—37)

This invention relates to mechanical means for the setting up of a foldable collapsed carton preparatory to use.

More specifically, this invention relates to a machine by which folded integral carrier cartons, of a certain type, can be quickly set up and placed in condition for immediate use without the necessity of having such carrier cartons manually and separately set up.

The invention relates in particular to a carrier carton of special form and construction, made from a single scored blank of such material as cardboard, designed to serve as a carrier for a pair of bottles or other filled containers of the size for which the carrier carton is intended. The special carrier carton with which this invention is especially concerned is described in detail in the pending application Serial No. 38,886, filed June 27, 1960, entitled "Carrier for Bottles and the Like," now abandoned, but this carrier carton will also be described herein very briefly.

This carrier carton is manufactured in flat folded condition for convenience in shipping or storing and, when a considerable number of these carrier cartons are required for use in an assembly line, so that the filled bottles or other filled containers for which they are designed may be placed in them, the unfolding and setting up of the cartons require considerable time and labor when this is done manually as heretofore. The object in the present invention is to provide a suitable practical machine for performing this work.

A further object of the present invention is to provide a machine which will operate continuously and rapidly for unfolding and setting up this particular type of carrier carton as long as the folded cartons are being fed to the machine.

An additional object is to provide such a machine which will be practical from the operation standpoint and not require an excessive amount of skilled supervision or maintenance.

The manner in which, and the means by which, the machine of the present invention functions and accomplishes the objects above indicated will be explained with reference to the accompanying drawings wherein:

FIG. 1 is a plan view of the cut and scored blank from which the special carrier carton is formed, showing the cut and scored blank before the opposite lateral edges are secured together to complete the carton;

FIG. 2 shows the carton in the flat folded condition in which the carton is shipped or stored prior to use;

FIGS. 3A, 3B, 3C, and 3D show the carton in different stages in the process of being set up, illustrating the work required to be done by the machine of the present invention;

FIG. 3E, for further purposes of illustration, shows the carton right side up and ready for use;

FIG. 4 is a top plan view of the machine;

FIG. 5 is a side elevation of the machine taken on line 5—5 of FIG. 4;

FIG. 6 is a fragmentary sectional elevation on line 6—6 of FIGS. 4 and 5;

FIG. 7 is a fragmentary section on line 7—7 of FIG. 4 and line 7—7 of FIG. 11, drawn to a larger scale;

FIG. 8 is a fragmentary section on line 8—8 of FIGS. 4 and 11, drawn to the same scale as FIG. 7;

FIG. 9 is a fragmentary section on line 9—9 of FIG. 4, drawn to the same scale as FIGS. 7 and 8;

FIG. 10 is a fragmentary section on the line indicated at 10—10 in FIG. 9;

FIG. 11 is a sectional elevation on line 11—11 of FIG. 4;

FIG. 12 is a fragmentary section on line 12—12 of FIG. 4, drawn to a larger scale;

FIG. 13 is a fragmentary section on line 13—13 of FIG. 4, drawn to a larger scale;

FIG. 14 is a fragmentary section on line 14—14 of FIG. 13;

FIG. 15 is a fragmentary section on line 15—15 of FIGS. 4, 5 and 18;

FIG. 16 is a similar fragmentary section on line 16—16 of FIGS. 4, 5 and 18;

FIG. 17 is a similar fragmentary section on line 17—17 of FIGS. 4, 5 and 18;

FIG. 18 is a fragmentary perspective view of the crosshead assembly operating to fold down the side end extensions of the carton;

FIG. 19 is a fragmentary section on line 19—19 of FIGS. 4 and 5; and

FIG. 20 is a fragmentary section on line 20—20 of FIGS. 4 and 19.

Referring first to the cut and scored blank of FIG. 1, from which the carrier carton is made, the portions **10** and **11** form the main side walls of the carton and the portions **12** and **13** form the end side walls. The carton, when entirely set up, has two compartments. The flaps **10A** and **10B** and **11A** and **11B**, connected with the main side walls, form part of the composite bottoms of the two compartments, and the portions **12C** and **13C** form the outside bottom walls of the composite bottoms of these two compartments. The extended integral portions **12D** and **13D** together form the center partition separating the two compartments and also combine to form the handle or double carrying strap for the carrier carton. A pair of ears **15** are formed on one main side wall, and, in the final setting up of the carton, these ears are bent inwardly to aid in keeping the double carrying strap in place.

The cut and scored blank of FIG. 1 is first folded over on itself and the marginal tab **14** is secured to the marginal edge of the end side wall **13** by gluing or stapling. The carton, then being in the folded position shown in FIG. 2, is kept in this compact position until it is to be set up for use. In the setting up of the carton from the folded compact position of FIG. 2 to the position illustrated in FIGS. 3D and 3E, the carton passes through the stages illustrated by FIGS. 3A, 3B and 3C. Such setting up of the carton and the moving of the carton along through these different stages are performed automatically and quickly by the machine as now to be described.

The machine frame is provided with an inclined chute **16** (FIGS. 4, 5 and 6) having a pair of bottom rails **17** and side guides **18**, and a supply of the carton in the folded position of FIG. 2, are deposited on the chute as indicated by the reference C. A carriage **19**, mounted on the rails **17**, supports a vertical front wall **20** together with upwardly-extending bars **21**, and these bear against the folded cartons in order to keep them urged downwardly in the chute **16**. An inverted U-shaped frame **22**, mounted on the side guides **18** of the chute **16**, extends over the cartons and carries a pair of flat spring members **23** for engaging the topmost edges of the cartons as they move down the chute, and a central spring member **23'**, for engaging the top edge of a flap of the cartons to aid in keeping the cartons vertical in the chute and momen-

tarily to restrain the bottom-most carton in the chute until the carton is opened up and pulled from the chute as presently described. The lower ends of the side guides **18** are turned inwardly for a slight distance, as shown at **18'** in FIG. 4, also for the purpose of temporarily restraining each folded vertical carton as it reaches the end of the chute. The folded cartons C are placed in the chute **16** with the slotted edge of the main side wall **10** of each carton facing the bottom of the chute. As each carton leaves the chute it is moved onto a horizontal plate **24** (FIG. 4).

A thruster lever **25** (FIGS. 4, 5, 7 and 9), in a form of a bell crank, is pivotally mounted on an arm secured to the machine frame (as shown best in FIG. 7) so as to swing up through an opening provided in the horizontal plate **24**. A link **26** connects the thruster lever with a push rod **27** which slides up and down through a fixed tubular guideway **28**. The lower end of the rod **27** carries a cam follower in the form of a roller which is in engagement with the periphery of a cam **29** mounted on a rotating shaft **30** which is driven by suitable connection with the machine motor M (FIG. 4). The cam follower on the rod **27** is maintained in contact with the cam **29** by means of a spring **31**, shown in FIG. 9.

The thruster lever **25** is so located (see FIGS. 9 and 10) that it will pass through the slot in the bottom of the main side wall **10** of the innermost carton, where the ears **15** (FIGS. 1 and 9) are located, and press against the bottom of the other main side wall **11** of the carton. When this occurs the carton wall **11** is forced back a short distance, causing a slight separation of the carton walls **10** and **11**. The purpose of this is to allow an opening blade **32** to be inserted between the bottom edges of the carton walls **10** and **11**.

The carton opening blade **32**, shaped as shown best in FIG. 9, is secured on the upper end of a rod **33** slidably and rotatably supported in a tubular guideway **34**, secured on the machine frame. The bottom of the rod **33** bears against a cam **35** (FIG. 8) secured on the driven shaft **30**. A spring **36** holds the rod **33** against the cam **35**. The rod **33** carries a pin **37** (FIG. 8) which moves in a curved slot **38** in the tubular guideway **34**. The arrangement is such that, as the cam **35** moves counter-clockwise (referring to FIG. 8), the rod **33**, and with it the blade **32**, will be thrust upwardly and at the same time will be caused to turn 90° in clockwise direction as indicated in FIG. 10. This causes the carton to be opened out in the manner shown by the broken lines in FIG. 10. The thruster lever **25** and the opening blade **32** then return to their original starting positions and allow the open carton to be moved from right to left (as viewed in FIG. 10). A guide bar **39** (FIG. 4) prevents any inadvertent moving of the open carton in the opposite direction. The opening of the carton also causes it to become disengaged from the ends **18'** of the side guides **18** of the chute **16**.

When a carton is opened up in the manner above described and freed from the chute **16**, a pusher arm **40** (FIGS. 4, 5, 11 and 12) thrusts the open carton along the plate **24** until the end side wall **12** of the carton reaches a pair of side rails **42**, the upper one of which is shown in FIG. 4, whereupon the open carton will now be in the form illustrated in FIG. 3A.

The pusher arm **40** is supported on a carriage **43** (FIGS. 11 and 12) having upper and lower pairs of wheels which roll in upper and lower grooved tracks **44** and **45**. An endless sprocket chain **46**, passing around a driven sprocket **47** and an end idler sprocket **48** (FIGS. 4, 11 and 12), carries a lug **49** (FIG. 12) adapted to engage a hinged arm **50** on the carriage **43**. The hinged arm **50** is normally held down in horizontal position by a spring, as indicated in FIG. 12, so as to be engaged by the moving lug **49**. However, when the hinged arm **50** reaches a stationary cam plate **51** (FIG. 11) the arm is momentarily raised, permitting the chain lug **49** to move past

the arm **50**. A cord **52**, attached to the carriage **43**, passes over a pulley **53** and carries a weight W at its other end. When the arm **50** is raised by the cam **51** so as to be disengaged from the chain lug **49**, the cord **52** and weight W immediately return the carriage **43** and pusher arm **40** back to starting position, in preparation for the opening up of the next carton from the chute **16**.

When the carton is pushed by the pusher arm **40** over against the side rails **42** (FIG. 4) it is deposited in front of a pusher plate **54** supported on a carriage **55**. This carriage **55** is not shown separately in the figures inasmuch as it is similar to the carriage **43** previously described and is similarly mounted on a pair of rails and similarly operated by means of a hinged arm engaging a lug on an endless driven sprocket chain, the arm being released from engagement with the chain lug upon reaching a cam plate, and the carriage being returned to starting position by an attached cord and weight W2, the same as in the case of the carriage **43**. As apparent from FIG. 4, the carriage **55** and pusher plate **54** act to move the open carton in a direction at right angles with respect to the direction the carton has previously been moved by the first pusher arm **40**.

The carriage **55** and pusher plate **54** now move the carton a distance slightly more than the width of the carton and then return to starting position in preparation for receiving the next carton. When the next carton is received in front of the carriage **55** and similarly is engaged by the pusher plate **54** the second carton pushes the first carton along further, the cartons sliding on a pair of tracks **41** (FIG. 4).

A blade **57** (FIGS. 4, 11, and 13) is mounted on the top edge of the pusher plate **54**. An arm **58**, rigidly secured to the hinged plate **57**, in the position shown in FIG. 13, carries a roller which acts as a cam follower along the top edge of a vertical cam plate **59**. A spring **58'** holds the roller of the arm **58** in contact with the cam edge. As a result, when the carriage moves from right to left, as viewed in FIG. 13, the hinged blade **57** is swung down into the broken line position shown in this figure. In swinging downwardly the blade **57** engages the pair of flaps **11A** and **11B** of the open carton and bends them down in the carton.

An inverted U-shaped frame **60** (FIGS. 4, 5, 11 and 13), rigidly mounted on the main frame of the machine, in the location shown in FIG. 4, extends up over the path of the cartons as they are pushed along on the tracks **41**. A center bracket **61**, secured at the top to the frame **60** and extending downwardly from the center of the frame, has its lower end forked (FIGS. 13 and 14) to support a pair of parallel flap-bending runners **62**. The front ends of these runners are sloped upwardly, as shown in FIG. 13, and these runners engage the flaps **10A** and **10B** of each advancing carton and bend these flaps down over the flaps **11A** and **11B** respectively which have already been bent down by the hinged blade **57** as previously explained. The runners **62** then continue temporarily to hold the pairs of flaps down in horizontal position as the carton is pushed along in its travel through the final stages in the setting-up operation.

A pair of upper side guides **63** are adjustably supported on opposite sides of the frame **60** and are so arranged as to engage the outer faces of the extending side end portions **12D** and **13D** (FIG. 3B) of each advancing carton and to start bending them inwardly towards each other, as indicated in FIG. 11.

A cross arm **64** on the center bracket **61** supports a curved guide rail **65** (FIG. 4) which engages the inner faces of the extending side end portions **12D** and **13D** of each advancing carton (as indicated in FIG. 11) and acts, in cooperation with the upper side guide **63**, to start bending the upper ends of the carton portions **12D** and **13D** inwardly.

A crosshead assembly, indicated in general by the reference 66 (FIGS. 4, 5, and 18), located beyond the frame 60 above the path of the cartons, is supported at each side of the path of the cartons on a pair of vertical reciprocating rods, one of which is shown at 67 in FIG. 5. These rods 67 are slidable up and down in stationary sleeve bearings mounted on the main frame of the machine. They are connected at their bottom ends by a cross bar (not shown) and a roller mounted below the center of this cross bar rides on a rotating cam 68 (FIG. 5). The cam 68 is secured on the shaft 69 which is driven continuously by suitable connection (not shown) with the machine motor M.

The crosshead assembly 66 includes a pair of branch arms 70 (FIGS. 4, 5, 15 and 18) which support a pair of downwardly curved plates 71. These plates 71 extend down over the outside faces of vertical stationary plates 71' (FIG. 15) and move up and down over the plates 71'. The plates 71 engage the extending side end portions 12D and 13D of each carton as it is moved into position beneath the plates 71 and bend these portions 12D and 13D inwardly and downwardly upon the downward movement of the crosshead assembly 66. The carton will then be in the stage illustrated in FIG. 3C.

A curved plate 72 (FIGS. 5, 16 and 18), positioned at a lower level than the tops of the plates 71 and supported on a bracket 73 extending downwardly from the center of the crosshead assembly 66, is spaced the width of the carton beyond the curved plates 71. When the crosshead assembly 66 returns to raised position the carton, which has been engaged by the plates 71, is pushed ahead by the other cartons behind it until it is in the next position beneath the plate 72. Then the lowering of the crosshead assembly causes this lower curved plate 72 to push the bent over portions 12D and 13D of the carton down still further, as indicated by the broken lines in FIG. 16.

A bracket 75, extending down from a branch arm 74 (FIGS. 5, 17 and 18) of the crosshead assembly 66, supports the horizontal cross plate 76 which is located beyond the plate 72 and mounted at a still lower level. After the carton has been engaged by the plate 72 and the crosshead assembly 66 has again been raised, the pushing of the carton ahead another carton width brings it beneath the plate 76. Thereupon the lowering of the crosshead assembly completes the thrusting of the portions 12D and 13D down into final position, as indicated in FIG. 17.

Upon the next move of the carton, as it is pushed forward another width, it moves through a frame 77 (FIGS. 4, 5, 19 and 20) which frame supports a center pressing roller 78. This roller 78 bears down on the folded-down portions to aid in completing the forming of the composite bottoms of the two compartments of the carton, the carton now being in the form illustrated in FIG. 3D. The carton also slides along a pair of horizontal plates 79 (FIGS. 4, 17, 19 and 20), supported by and extending inwardly from the tracks 41. The curved edges 80 (FIG. 4) of these plates 79 engage the carton portions 12D and 13D and cause them to be brought against each other for the completion of the carton. As this takes place a pair of hinged, spring-controlled arms 81, one of which is shown in FIG. 20, positioned in cut-away portions of the opposed edges of the plates 79, press up against the ears 15 of the moving carton (see also FIGS. 1 and 3E) on the main side wall 10 of the carton so as to bend these inwardly on opposite sides of the double partition wall and carrying strap formed by the portions 12D and 13D. This completes the setting up of the carton, which is now pushed from the machine and may be dropped into a collecting receptacle or onto a conveyor (not shown), and the completed carton, upon being turned right side up, appears as shown in FIG. 3E.

We claim:

1. In a machine for setting up a collapsed carton having a slot in the edge of one main side wall, a thruster lever so positioned as to pass through the slotted edge of the carton to separate the edges of the main side walls of the carton, a carton opening blade for entering between the separated edges of the main side walls of the carton and opening up the carton, a pusher arm for engaging the side of the opened carton and moving the carton laterally, a pusher plate engaging the moved carton and moving it in a direction normal to the direction of movement of said pusher arm, means for intermittently operating said thruster lever, opening blade, pusher arm and pusher plate in succession, a hinged blade on said pusher plate, and means for swinging said blade downwardly forwardly as said plate engages the carton for folding down a pair of flaps of the carton.

2. The combination set forth in claim 1 with the addition of flap-bending runners for engaging and bending down a second pair of flaps of the carton as the carton and hinged blade move towards said runners, and guide rails for bending side end extensions of the carton inwardly.

3. In a machine for setting up a collapsed carton of the character described having a slot in the edge of one main side wall, a thruster lever so positioned as to pass through the slotted edge of the carton to separate the edges of the main side walls of the carton, a carton opening blade for entering between the separated edges of the main side walls of the carton and opening up the carton, a pusher arm for engaging the side of the opened carton and moving the carton laterally, a pusher plate engaging the moved carton and moving it in a direction normal to the direction of movement of said pusher arm, means for intermittently operating said thruster lever, opening blade, pusher arm and pusher plate in succession, means for bending down one pair of flaps on the carton, cooperating means for bending down the second pair of flaps on the carton, guide rails for bending the side end extensions of the carton inwardly, a crosshead assembly having elements for bending and thrusting the side end extensions downwardly to form the double partition wall and carrying strap of the carton, and means for moving said crosshead assembly down on the carton as the carton is pushed into position between said last mentioned elements.

4. In a machine for setting up a collapsed carton of the character described having slots providing a pair of ears in the edge of one main side wall, a thruster lever so positioned as to pass through the slotted edge of the carton to separate the edges of the main side walls of the carton, means for operating said thruster lever, a carton opening blade for entering between the separated edges of the main side walls of the carton and opening up the carton, means for moving said blade upwardly between the separated edges of the carton, related means for partially rotating said blade as said blade moves upwardly causing said carton to be opened out, a pusher arm for engaging the side of the opened carton and moving the carton laterally, an intermittently-operated pusher plate engaging the moved carton and moving it in a direction normal to the direction of movement of said pusher arm, a hinged blade on said pusher plate, means for swinging said blade downwardly forwardly as said plate engages the carton for folding down a pair of flaps of the carton, flap-bending runners for engaging and bending down the second pair of flaps as the carton and hinged blade move towards said runners, guide rails for bending the side end extensions of the carton inwardly, a crosshead assembly having a series of elements for bending and thrusting the side end extensions downwardly to form the double partition wall and carrying strap of the carton, and means for reciprocating said crosshead assembly intermittently in and up and down direction as a carton is pushed into positions between said last mentioned series of elements.

5. The combination set forth in claim 4 with the addition of means for bending the pair of ears on one main

side wall of the carton over the formed double partition wall and carrying strap.

6. In a machine for setting up a collapsed carton of the character described, means for separating the main side walls of the carton for opening up the carton, a hinged blade mounted to swing down on said carton to fold down a pair of flaps of said carton, means for moving the opened carton into position beneath said hinged blade, and means for swinging said blade downwardly on said pair of flaps.

7. In a machine for setting up a collapsed carton of the character described, means for separating the main side walls of the carton for opening up the carton, a hinged blade mounted to swing down on said carton to fold down a pair of flaps of said carton, a pusher for moving

the opened carton into position beneath said hinged blade, a second pusher moving in a direction normal to the direction of movement of said first pusher, said hinged blade mounted on said second pusher, means for moving said second pusher, and cooperating means for swinging said hinged blade downwardly and in the direction of movement of said second pusher during the forward stroke of said second pusher.

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