CONTRACT ERECTING AND FILLING APPARATUS

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CONTAINER ERECTING AND FILLING APPARATUS
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The present invention relates to a container erecting and filling apparatus, and more particularly to a novel container erecting apparatus which positions the erected container in a predetermined position for the reception of material to be packaged.

Conventionally, containers are shipped to their destinations in a collapsed or knocked-down condition. Obviously, it is uneconomical and impractical to transport empty containers in an erected condition because of the excessive volume they would occupy. Furthermore, erected, but empty, containers are more difficult to handle than stacked arrays of collapsed cartons.

There are various types of apparatus available for erecting such collapsed containers, but in general, the existing machinery is complex and costly. Usually, the apparatus comprises numerous gears, belts, moving arms and holding devices. Such complex apparatus is expensive and subject to high maintenance cost to keep it in repair. Reliability of performance is comparatively poor.

After the container is properly erected, it must be positioned so that it can be easily filled with the material to be inserted therein. This positioning should be done by the same apparatus which erects the container.

It is an object of the present invention to provide a novel container erecting apparatus which is simple to manufacture, economical to maintain, and highly reliable. It is another object of the present invention to provide a novel container erecting apparatus which has a minimum number of parts.

It is yet another object of the present invention to provide a novel container erecting apparatus which not only erects a collapsed container but also positions the erected container for simplified filling with contents.

These and other objects and advantages of the present invention will become more apparent to those skilled in the art from a consideration of the specification and the attached drawings, in which like numerals indicate like elements and wherein:

FIGURE 1 is a perspective, schematic view of the apparatus of the invention;

FIGURES 2, 3, 4 and 5 are perspective views, similar to FIGURE 1, showing the the apparatus of FIGURE 1 in successive stages of operation;

FIGURE 6 is a side elevational view of the apparatus, similar to FIGURE 1, but having a portion thereof shown in cross-section and the various frame members 20, 40 and 51 are herein shown schematically and may take various forms of wood members or steel beams being connected together as desired. Those skilled in the art will be aware of the most convenient forms.

Having described certain of the main features of the container erecting apparatus, reference may now be had to FIGURES 6, 7 and 8 for additional details.

FIGURE 6 is a side elevational view, partly in cross-section, similar to FIGURE 1, and shows the stacked array of 10, the flap engaging fingers 35-38, retraction springs 43-46, upright retaining means 50, platform 14, and the details of the suction system for pipes 22 and suction cups 23. A source of suction or vacuum 70, which may be an evacuated tank or suction pump means, is connected through a valve 72 and a pipe 74 to a coupling joint 30. Joint 30 is sealed against leakage but permits rotation of pipes 22 from an upright position to a position in which they are retracted into slots 25. A conveyor 54 is positioned adjacent platform 14 to receive the erected container when it is removed from the platform. Upright retaining means 50 may be swung out of the way using hinges 52.

FIGURE 7 shows in partial cross-section the rear portion of the apparatus behind FIGURE 1. A conveyor mechanism 80 is used to bring a stack 82 of material to be inserted into the erected container 11. A plunger 85, schematically shown, is used to push the stacked material into the container. In the present instance, the material comprises a stack of acoustical tile in a size of about 12" x 12" x 1". The rear container 11 has four flaps 90-93 hingedly attached to the main shell portion and
extending rearwardly toward the stack of material. Fingers 35–38 are hingedly mounted on frame member 40 and are held retracted against stack 82. Flap 93 and finger 36 are not shown because of the partial cross-sectional nature of FIGURES 7 and 8.

As shown in FIGURE 8, when plunger 85 forces the stack 82 toward the erected container, the fingers are extended to engage flaps 90–93 and hold them out of the way until the material has entered the container.

Spring clips 43–46 are mounted on frame member 40 and urge fingers 35–38 away from flaps 90–93 until movement of the stack 82 forces them outwardly.

Having described the mechanism of the container erecting apparatus of the present invention, the operation is as follows:

A stacked array 10 of collapsed containers is placed in position behind clips 16 and 18. Handle 28 is moved to the left to bring suction cups 23 against the bottom side 100 of the container. Suction is applied through pipes 22 and suction cups 23 to grasp side 100. Handle 28 is then rotated clockwise and the container is pulled away from the array and outwardly of clips 16 and 18. The remaining containers move slightly forward in a position so that the next container in the array is presented.

As the handle 28 continues its clockwise movement, container 11 is pulled toward retaining means 50, and because of the rotation of pipes 22, it tends to fall with its top approaching retaining means 50 rather than moving in a straight line.

As collapsed container 11 moves twothird wall 50, restraining means 57 strikes flap 61 and prevents both flap 61 and flap 62 from moving downward until after the container has been partially erected. It should be realized that container 11 may act in two different ways when it is being urged toward upright means 50. The container may open to become erected, or it may merely continue to move downwardly in a collapsed condition. Which of the two ways the container will act depends upon whether the sides 108 and 110 change to the right, so that the hinged portion 111 precedes the sides 108 and 110, the container will remain in a collapsed condition upon further rotation of suction pipes 22.

The function of restraining means 57 is to insure the proper breaking action of the container. It has been found that without restraining means 57, some containers have been erected properly and some not erected at all in an unpredictable manner. With restraining means 57 in place, each container is erected properly.

FIGURES 2, 3 and 4 show the manner in which the container 11 is erected in sequential steps. Thus, in FIGURE 2, handle 28 has been moved clockwise urging pipes 22 in partial clockwise rotation. The container 11, being grasped by suction cups 23, is moved away from the array 10 and its upper edge approaches retaining means 50.

Simultaneously, as previously explained, restraining means 57 provides for the proper "break" of the container so that upon further movement it will be erected.

As shown in FIGURE 3, which shows further rotation of handle 28, the container has been further erected and its upper portion is adjacent retaining member 50. Retaining member 57 has slips off flap 61 but continues to bear against flap 62.

In FIGURE 4 the container has been completely erected and one side 115 lies against retaining member 50. In the erection of the container, side 115 rides downwardly against member 50, and thus the container is properly positioned with its bottom section 109 against the platform 14 and side 115 against retaining member 50. At this time the pipes 22 have been retracted into slots 25.

The container having been properly erected and positioned, reference may be had to FIGURES 5, 7 and 8 which show details of that portion of the apparatus for properly inserting material into the container. FIGURE 5 illustrates an end view of the erected container with a stack of acoustical tiles 82 partially filling the container.

With reference to FIGURES 7 and 8, plunger 85 is urged forwardly in the direction of the arrow to push stack 82 of acoustical tiles toward the container. As the stack 82 moves to the left, fingers 35, 37 and 38 are urged forwardly and outwardly against the action of spring members 43, 45 and 46, respectively. Fingers 35, 37 and 38 engage the flaps 90, 91 and 93 at the rear of container 11 and force them outwardly so as to provide a clear path for the stack 82 of acoustical tiles. The suction is maintained through pipes 22 so that the container is held in position against being displaced by the insertion of stack 82. After the plunger 85 has inserted the stack 82 completely into the erected container, plunger 85 is then retracted. Simultaneously, fingers 35, 37 and 38 are returned to their original positions, clear of the container.

The bottom portion of retaining means 50 is swung out of the way and the container with its contents is removed to conveyer 54, after the suction has been removed from pipes 22.

The entire process is then repeated to pack a second stack of acoustical tiles which are brought into position on conveyer 80.

It should be realized that the application of suction is controlled by valve 72 which is here shown as a hand valve. However, without departing from the scope of the invention, other means, such as a foot pedal operated valve may be utilized. The specific size and configuration of the fingers 35–38 may be adjusted depending upon the size of the stacks and the container and may be positioned depending upon the size of the container itself.

In summary, the present invention relates to a novel container erecting and filling apparatus which not only provides for positive erection of containers, but also positions the container so that its contents may be easily introduced therein.

For the sake of clarity, certain minor details have been shown schematically. However, the specific construction of these details will be obvious to those skilled in the art and may be provided for with conventional apparatus.

While a specific embodiment of the present invention has been shown and described, other changes and modifications will occur to those skilled in the art, and it is intended to cover all such changes and modifications within the scope of the appended claims.

I claim:
1. Container forming and filling apparatus for erecting a collapsed container having a four-sided main shell, each of said sides being hingedly secured to two adjacent sides to form a hollow parallelepiped in an erected condition, comprising:
means including a platform and frame for holding a plurality of collapsed containers in a stacked array, said platform having an upper surface for supporting the lower edges of said containers in said array, means connected to said holding means for removing a first one of said containers from said array and initiating erection thereof, restraining means connected to said frame for inhibiting forward movement of one of said sides of said container, and
upright retaining means fixedly mounted on said upper surface of said platform and spaced from said array by a distance less than the sum of the widths of two adjacent sides of said container to effect erection of said container in cooperation with said removing means and to place said erected container in a predetermined position.
2. Container forming and filling apparatus for erecting a collapsed container having a four-sided main shell, each of said sides being hingedly secured to two adjacent sides to form a hollow parallelepipied in an erected condition, comprising:

- means including a platform and frame for holding a plurality of collapsed containers in a stacked array, said means also comprising clip means mounted at the top and bottom of one end of said array, said platform having an upper surface for supporting the lower edges of said containers in said array, pivotal suction means associated with said platform and arranged to rotatably emerge from and be retracted into said platform for removing a first one of said containers from said array and initiating erection thereof, restraining means connected to said frame and disposed at an acute angle with respect to one outer edge of said container for inhibiting forward movement of one of said sides of said container, and upright retaining means fixedly mounted on said upper surface of said platform and spaced from said array by a distance less than the sum of the widths of two adjacent sides of said container to effect erection of said container in cooperation with said removing means and to place said erected container in a predetermined position.

3. Container forming and filling apparatus for erecting a collapsed container having a four-sided main shell, each of said sides being hingedly secured to two adjacent sides to form a hollow parallelepipied in an erected condition, comprising:

- means including a platform and frame for holding a plurality of collapsed containers in a stacked array, said means also comprising clip means mounted at the top and bottom of one end of said array, said platform having an upper surface for supporting the lower edges of said containers in said array, pivotal suction means associated with said platform and arranged to rotatably emerge from and be retracted into said platform for grasping one of said sides of a first one of said containers and removing said container from said array and initiating erection thereof, restraining means connected to said frame and disposed at an acute angle with respect to one outer edge of said container for inhibiting forward movement of one of said sides of said container, and upright retaining means fixedly mounted on said upper surface of said platform and spaced from said array by a distance less than the sum of the widths of two adjacent sides of said container to effect erection of said container in cooperation with said removing means and to place said erected container in a predetermined position.

- means connected to said holding means for removing a first one of said containers from said array and initiating erection thereof, restraining means connected to said frame and disposed at an acute angle with respect to one edge of said container for inhibiting forward movement of one of said sides of said container, upright retaining means fixedly mounted on said upper surface of said platform and spaced from said array by a distance less than the sum of the widths of two adjacent sides of said container to effect erection of said container in cooperation with said removing means and to place said erected container in a predetermined position, and

- flap opening means mounted on said frame adjacent one end of said container for engaging and holding said flaps at one end of said container out of the way during the insertion of contents into said container.

4. Container forming and filling apparatus for erecting a collapsed container having a four-sided main shell, each of said sides being hingedly secured to two adjacent sides to form a hollow parallelepipied in an erected condition, comprising:

- means including a platform and frame for holding a plurality of collapsed containers in a stacked array, said platform having an upper surface for supporting the lower edges of said containers in said array, means connected to said holding means for removing a first one of said containers from said array and initiating erection thereof, restraining means connected to said frame for inhibiting forward movement of one of said sides of said container, upright retaining means fixedly mounted on said upper surface of said platform and spaced from said array by a distance less than the sum of the widths of two adjacent sides of said container to effect erection of said container in cooperation with said removing means and to place said erected container in a predetermined position, flap opening means mounted on said frame adjacent one end of said container for engaging and holding said flaps at one end of said container out of the way during the insertion of contents into said container, and

- spring members cooperatively associated with said flap opening means for holding said flap engaging means in a retracted position.

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