Jan. 17, 1967 T. SZABO 3,298,289

APPARATUS FOR HANDLING CONTAINER BLANKS

Filed May 6, 1964

FIG. 4

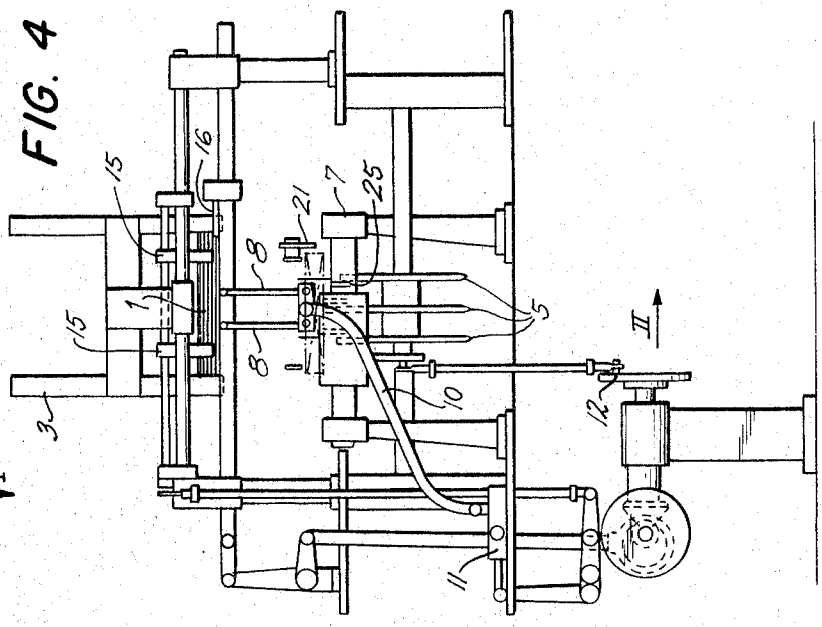


FIG. 2

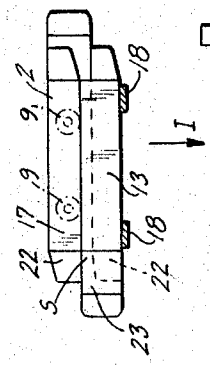


FIG. 1

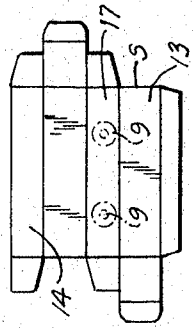
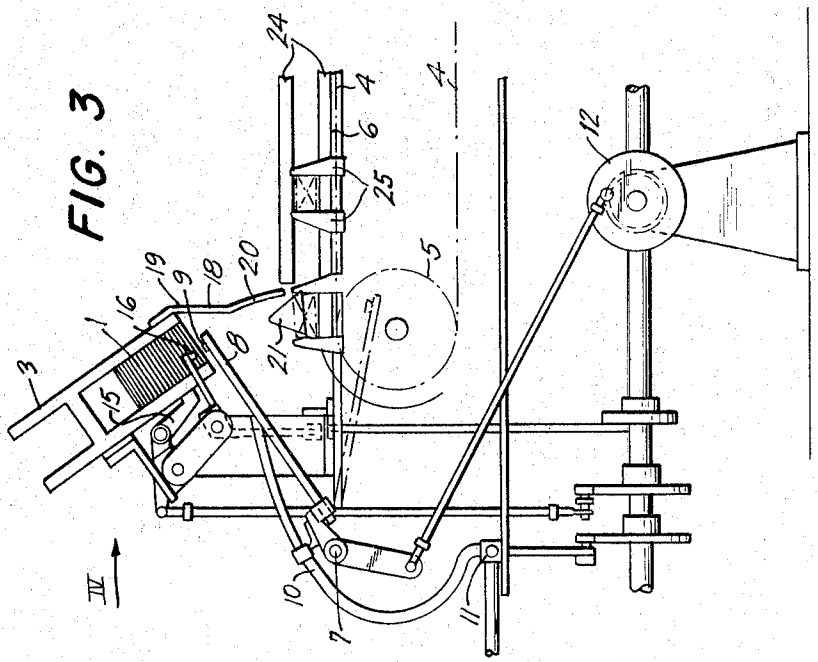


FIG. 3



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APPARATUS FOR HANDLING CONTAINER BLANKS

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6 Claims. (Cl. 93—53)

The present invention relates to apparatus for handling container blanks.

One of the objects of the present invention is to provide a structure capable of successively removing folded container blanks from a stack of automatically opening the successively removed folded blanks and automatically conveying them to a location where, for example, they are adapted to be filled.

A further object of the present invention is to provide an apparatus of this type which will reliably hold end flaps of the container bent away from the end thereof so that the container can conveniently be filled through the latter end thereof.

Yet another object of the present invention is to provide an apparatus in which a number of components all operate in synchronism to successively feed containers from a stack in which they are folded in flat condition to a conveyor while opening up the folded containers as they are successively delivered to the conveyor.

In addition, the objects of the present invention include the provision of a structure capable of accomplishing all of the above objects while at the same time being composed of simple rugged elements which will operate reliably with a minimum of maintenance.

With these objects in view, the invention includes, in an apparatus for handling containers blanks, a suction means for displacing the lowermost blank of a stack of folded container blanks downwardly away from the stack while a releasable holding means holds the remainder of the blanks in the stack. An elongated bar means engages the downwardly moving blank to open it by unfolding it as it is displaced downwardly, and when the blank is displaced beyond the elongated bar means a conveyor means receives the open blank and suitable guide rails and the like engage the blank to maintain it open while it is conveyed to a location where, for example, it is filled.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 illustrates the structure of a container blank in flat unfolded condition so that all four sides of the container and end flaps thereof are visible in FIG. 1;

FIG. 2 shows the blank of FIG. 1 in its flat folded condition as it is arranged in a stack, and the blank is illustrated in FIG. 2 as it appears from below;

FIG. 3 is a schematic side elevation of an apparatus according to the invention; and

FIG. 4 is an end elevation of the structure of FIG. 3 as seen in the direction of arrow IV.

Referring to FIG. 1, a blank of the type which is capable of being handled with the apparatus of the invention is illustrated therein in its unfolded condition. As is apparent from FIG. 1 the blank has four sides and end flaps capable of being folded to close the ends of a container formed from the blank of FIG. 1. The blank includes

sides 13 and 14 at the ends of the blank, respectively, and the longitudinal flap extending from the side 13 is joined with the free edge of the side 14 when the blank is folded along the edge of the side 17 distant from the side 13. The blank is illustrated in this folded condition in FIG. 2 where the sides 13 and 17 are visible, and these sides 13 and 17 are directed downwardly when a plurality of the thus-folded blanks 2 are arranged in flat condition in a stack 1 shown at the upper portion of FIG. 3. A guide means 3 guides the stack 1 for generally downward movement so that the guide means 3 forms a magazine for the stack of blanks.

The elongated blanks 2 extend transversely with respect to the direction in which the blanks, after they are unfolded, are moved by the conveyor means, this conveyor means including three continuously running (as long as the apparatus operates) endless conveyor chains 4 guided over sets of coaxial sprocket wheels 5 located at the ends of the endless conveyor chains, and one of the ends of the chains, together with one set of three sprocket wheels 5 is arranged substantially below the stack 1, as is apparent from FIG. 3.

At the elevation of the upper runs 6 of the endless conveyors 4 the machine frame of the apparatus supports for rotary movement a shaft 7 which fixedly carries a pair of elongated arms 8 which respectively carry at their outer ends suction devices 9, these suction devices communicating through flexible conduits 10 with a source of suction controlled by a valve assembly 11, so that the assembly 7–11 forms a suction means which is adapted in a manner described below to engage the lowermost blank 2 of the stack 1 and displace it downwardly from the stack. In the illustrated example the machine includes a rotary crank disc 12 connected through a suitable connecting rod with the arms 8 so that the latter swing back and forth with the shaft 7 about the axis thereof. The suction devices 9 are adapted to engage the side 17 of the blank as shown in dotted lines in FIGS. 1 and 2. A releasable holding device 15 is provided to releasably hold all of the blanks except the lowermost blank in the stack 1 while the lowermost blank is displaced downwardly away from the stack, and the releasable holding means 15 is of a known structure and operates in synchronism with the swinging of the arms 8 of the suction means to prevent the blanks in the stack above the lowermost blank from sliding after the lowermost blank and falling out of the magazine 3. Thus, when the lowermost blank commences its downward movement as a result of the downward swinging of the arms 8 the holding means 15 operates to hold the remainder of the blanks in the stack. At the same time a separating blade 16 moves in the direction of the arrow I shown in FIG. 2 into a downwardly moving blank from one end thereof to become situated between the upper and lower walls of the folded blank, and the blade 16 moves into the blank simultaneously with the downward movement thereof to an extent sufficient to guarantee that the blank will unfold and open properly in a manner described below. This laterally moving blade 16 also is known. After the blank has started to open properly as a result of its downward movement relative to the blade 16 this blade is automatically withdrawn.

In order to unfold and open the blank an elongated bar means 18 is fixed to and extends downwardly from the guide means 3. The guide means includes a pair of bars 18 which engage the edge of the blank distant from the sides 17 thereof which is engaged by the suction devices 9. Thus, as may be seen from FIG. 2 which illustrates the blank as it appears from below, the suction devices 9 engage the lower side 17 to displace the blank downwardly while the joined sides 13 and 14 press at

their joined edges against the pair of bars 18. The number of bars 18 will be determined by the length of the blank, and one or more bars 18 will suffice depending upon the length of the blank. The bars 18 have upper portions 19, respectively, which extend substantially straight down from the guide means 3, as indicated in FIG. 3, so that as the arms 8 swing downwardly with the lowermost blank the adjoining edges of the sides 13 and 14 of the blank are pressed against the upper portions 19 with the free ends of the arms 8 initially approaching gradually closer to the upper portions 19 of the bars 18 so that at this time, in cooperation with the blade 16, the downwardly moving blank will be pushed at its folded edge distant from the arms 8 against the portions 19 of the bars 18 to force the blanks to become unfolded and to open up to the condition where the opposed sides of the blank are parallel to each other and the blank has a rectangular cross section. The bars 18 have lower elongated portions 20 which are slightly curved and extend along a circle whose center is in the axis of the shaft 7, so that while the blank slides along the lower bar portions 20 the blank is maintained in its open condition where its cross section is rectangular.

A spreading means 21 is located in the path of downward movement of the blank at an end thereof, and this spreading means 21 is in the form of a stationary rigid member of triangular configuration fixedly carried by a suitable part of the machine frame, and the position of the triangular spreading member 21 with respect to the downwardly moving blank is such that it will engage the flaps 22 and 23 (FIG. 2) and bend them outwardly so as to maintain the end of the unfolded container open. During the downward movement of the unfolded container the triangular spreading member 21 will first engage the flaps 22 and then the flap 23 and will bend these flaps outwardly through approximately 90° during the continued downward movement of the unfolded blank, and these outwardly folded flaps are engaged, during subsequent movement of the unfolded blank, by the conveyor means. The elongated rails 24 extend longitudinally of the conveyor over the upper runs thereof, as indicated in FIG. 3, so that in this way the rails 24 serve to maintain the flaps 22 and 23 in their outwardly folded condition leaving the left end of the container, as viewed in FIG. 2, open so that any desired article may be introduced into the container before it is closed, or so that any desired material may fill the container.

However, before the outwardly folded flaps engage the rails 24, the unfolded container is received by the conveyor means. The chains 4 fixedly carry members 25 which extend straight up from the upper run of the conveyor, as shown for the right pair of members 25 in FIG. 3, and the speed of movement of the parts and their sequential operation is such that the successive unfolded blanks will be successively received between the successive pairs of upstanding members 25 at the upper runs of the endless chains 4. It is to be noted that the arms 8 after releasing the container, as a result of the action of the valve 11, continue to move downwardly beyond the container, as is apparent from the lowermost dot-dash line position of the arms 8 shown in FIG. 3, so that the blank which has been delivered to the conveyor can move beyond the free ends of the arms 8 before they move back up to the lowermost blank of the stack, and in this way the arms 8 will not strike against a container which has already been deposited on the conveyor.

It is particularly to be noted that the blanks are delivered to the conveyor at the end of the upper runs 6 which is just coming up around the sprocket wheels 5 to move over the top of the sprocket wheels. The portions of the chains 4 in engagement with the sprocket wheels 5 position the members 25 substantially along radial lines passing through the axis of the sprocket wheels so that the members 25 directly next to the sprocket wheels diverge away from each other and are

furthest apart from each other at their outer tips, and each pair of upstanding members 25 is in this diverging condition when it receives an unfolded blank so that in effect the space between each pair of upstanding members 25 is increased at the moment when it receives a container to facilitate displacement of a container into the space between the members 25. The flaps at the end of the container distant from the triangular member 21 can be closed so that the container is open only at one end, and after the contents of the container are introduced into the container through its open end, the flaps at this open end are then closed in a known way.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of apparatus for handling containers differing from the types described above.

While the invention has been illustrated and described as embodied in apparatus for continuously handling containers, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In an apparatus for handling container blanks, in combination, guide means for guiding a stack of folded container blanks for generally downward movement; suction means for engaging the lowermost blank of the stack and withdrawing the lowermost blank from said guide means; releasable holding means located adjacent said guide means and operating in synchronism with said suction means for holding all except the lowermost blank in said guide means during withdrawal of said lowermost blank by said suction means; blade means movable first into and then out of said lowermost blank during downward displacement thereof by said suction means; elongated bar means having an inclination approaching gradually closer to said suction means as the latter displaces a blank downwardly for pressing against and thus unfolding and opening a blank as it is displaced downwardly by said suction means, said bar means having a lower portion which remains at a substantially unchanging distance from said suction means during continued downward displacement of an open blank thereby, so that said lower portion of said bar means maintains the blank open as its downward displacement by said suction means continues; conveyor means receiving the open blank from said suction means after the blank moves downwardly beyond said bar means, for conveying the thus-opened container blank to a location where the open container can be filled; spreading means located in the path of movement of an end of said blank as it moves beyond said bar means and is received by said conveyor means for spreading outwardly away from the end of a blank flaps which subsequently can be folded to close the end of the blank; and guide rail means engaged by the outwardly spread flaps as said blank is conveyed by said conveyor means to maintain said end of said blank open.

2. In an apparatus as recited in claim 1, said suction means including at least two rotary arms having at their ends, respectively, suction elements for engaging the lowermost blank at a part thereof which is relatively distant from said bar means.

3. In an apparatus as recited in claim 1, said conveyor means including an endless member having upstanding container-engaging elements at an upper run of

said endless member, said upstanding elements diverging away from each other during rotary movement at an end of said endless member while approaching said upper run thereof and then extending upwardly from said upper run substantially parallel to each other, and said suction means delivering the open container to said upstanding members while they diverge from each other at the starting end of said upper run.

4. In an apparatus as recited in claim 1, said spreading means being in the form of a rigid member of triangular configuration along which said flaps slide to be bent by said rigid member through approximately 90°.

5. In an apparatus as recited in claim 1, said suction means moving downwardly beyond the open blank after it is received by said conveying means.

6. In an apparatus as recited in claim 1, said suction means being turnable about a predetermined axis and said conveyor means including an endless conveyor member having an upper run located substantially at the same elevation as said axis.

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BERNARD STICKNEY, *Primary Examiner.*