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[21] Appl. No. 855,630
[22] Filed Sept. 5, 1969
[45] Patented June 29, 1971
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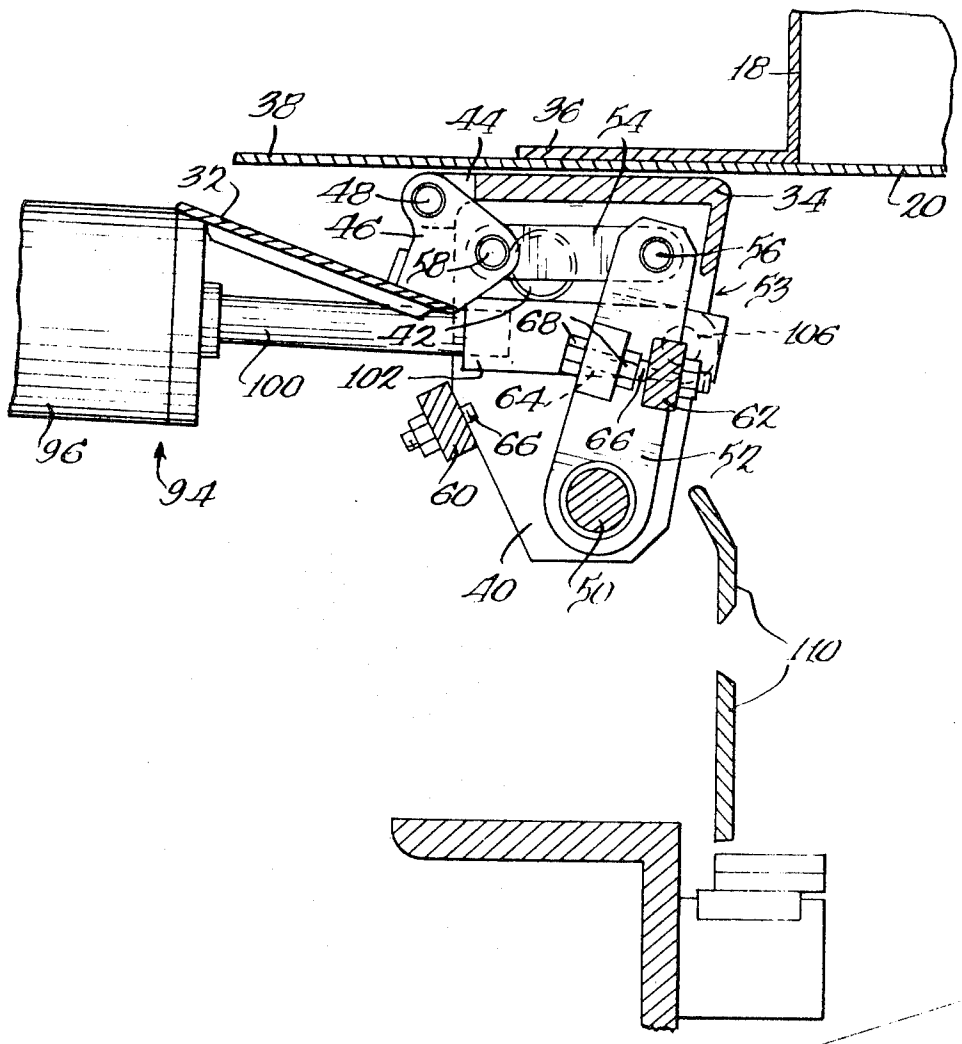
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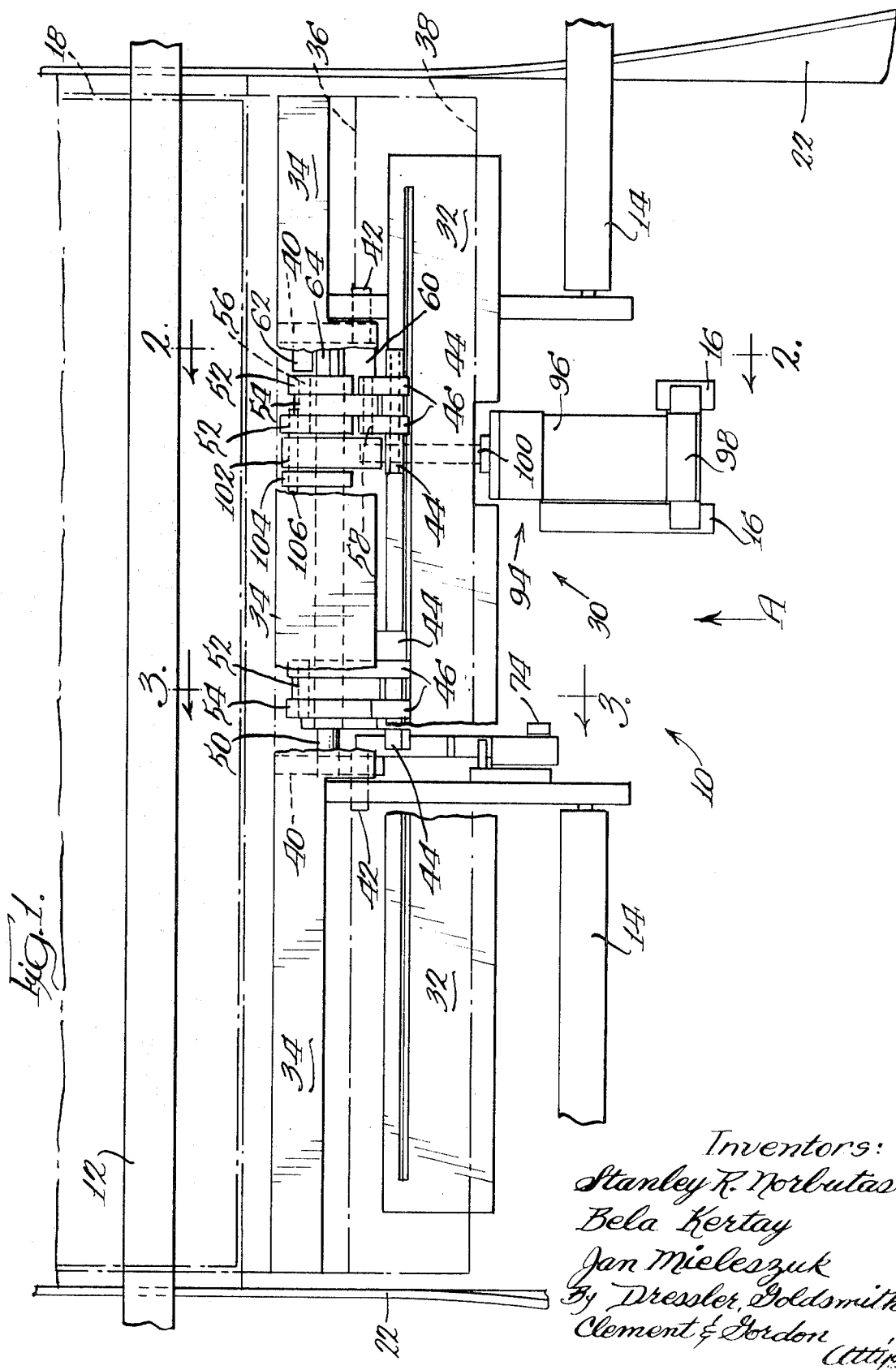
ABSTRACT: A folding mechanism for folding adjacent flat flanges respectively connected to a container tube and a container end cap and in which the tube flange has a portion spaced from and extending parallel to the surface of the tube. The end cap flange portion has a substantially U-shaped cross-sectional configuration and substantially encompasses the parallel extending portion of the tube flange. The folding mechanism for folding flat flanges to the configuration described includes first and second members adapted to engage space portions of the end cap flange and respectively pivoted about spaced parallel pivot axes. Linkage means interconnect the two members and cooperate with drive means to pivot the first member about its pivot axis from a first substantially side-by-side relation with respect to the second member to an overlapping relation to fold the cap flange around the tube flange. The folding mechanism further includes latch means maintaining the second member in a fixed position until the first member is pivoted to the overlapping position and which is released in response to the second member moving to the second position to allow pivotal movement of both members about the second pivot axis whereby to further fold the flanges from a position extending perpendicular to the axis of the tube to a position extending substantially parallel to the tube.

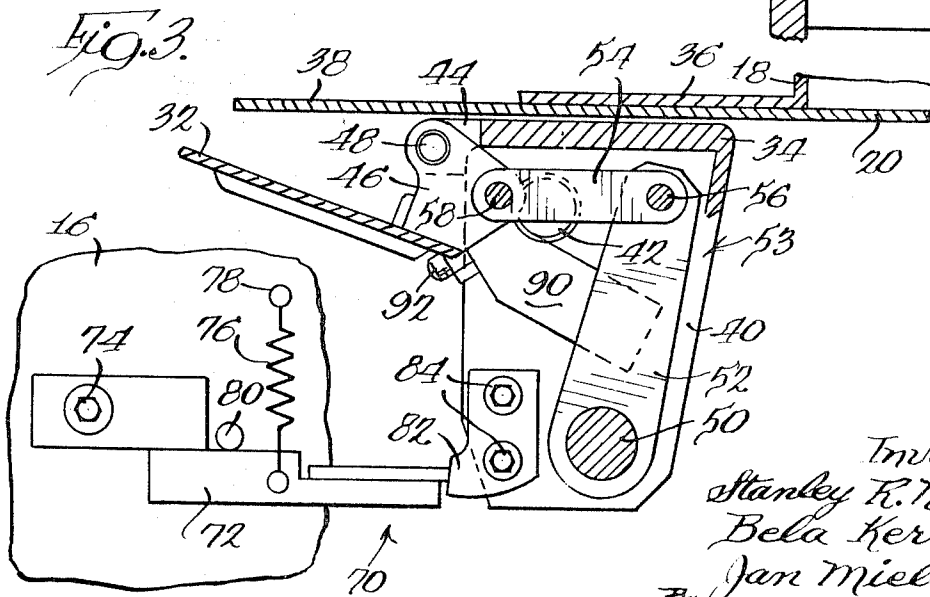
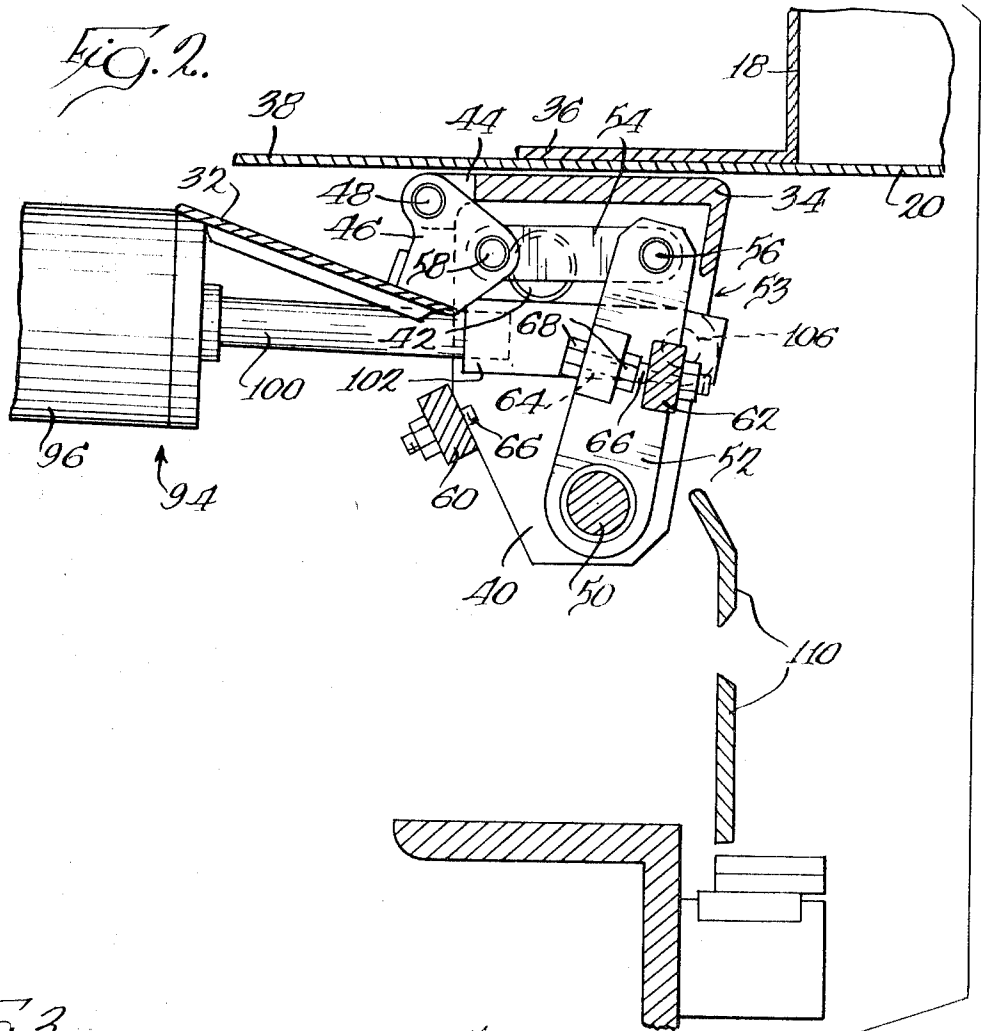
[54] **END FLAP FOLDING MECHANISM**
10 Claims, 5 Drawing Figs.

[52] U.S. Cl. 93/55.1,
53/284, 53/287, 93/49
[51] Int. Cl. B31b 17/00
[50] Field of Search 93/55.1,
55.1 P, 49, 49 M, 55.1 M; 53/287, 284

[56] **References Cited**
UNITED STATES PATENTS
2,905,066 9/1959 Winkler..... 93/55.1
3,031,935 5/1962 Levkoff..... 93/49

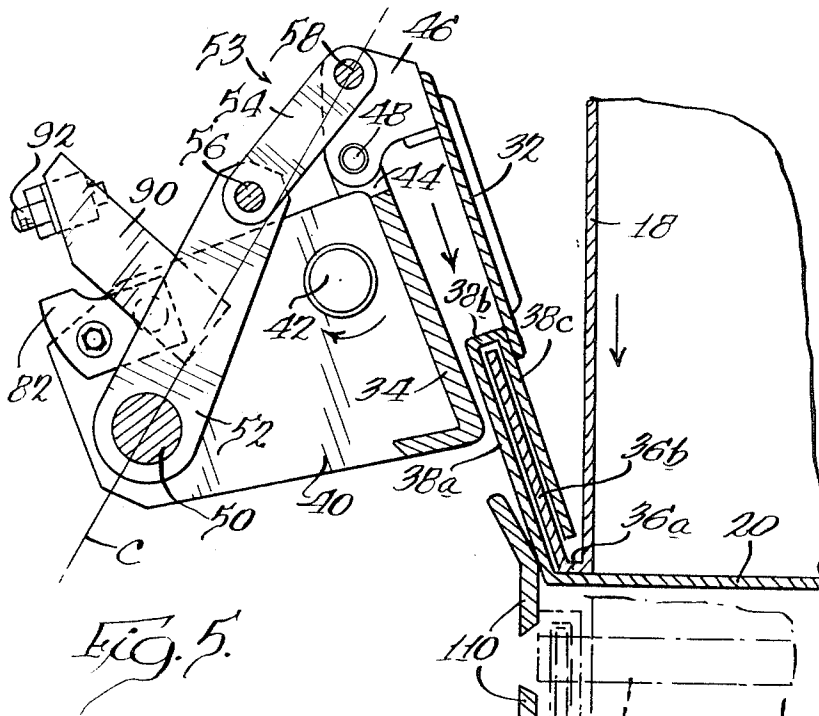
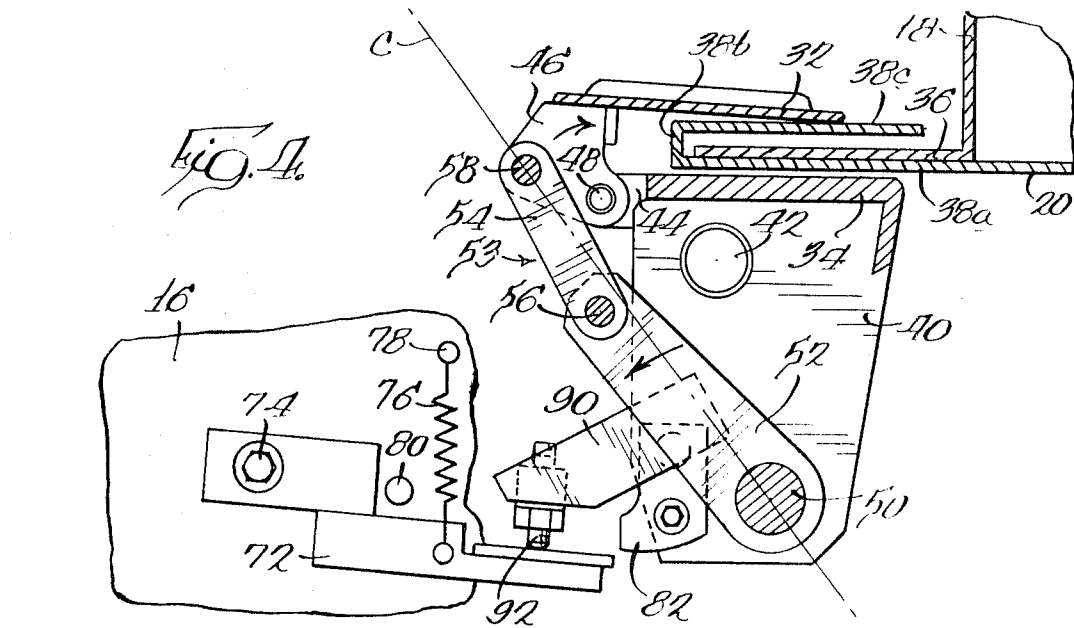






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END FLAP FOLDING MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates generally to apparatus for connecting an end closure to a container and more particularly to an improved flange folding mechanism for folding flanges extending from the container closure and the body of the container.

In packaging large items, such as refrigerators, stoves, etc., it has become customary to place a container tube, closed at one end by a suitable closure, over the article and to connect an end cap or closure to the tube after the tube has been placed over the article. In connecting the container cap to the container tube, it has long been customary to provide at least one flange extending from the container cap in juxtaposed relation to the container tube and subsequently securing a ligature or other suitable fastening means to interconnect the cap and the tube.

More recently it has been found desirable to provide a more positive interconnection between the cap and the container prior to the securing of the ligature thereto. Thus, in more recent packaging of articles of the above type, the container tube has a flange which includes a first portion extending substantially perpendicular from the container tube and a second portion extending upwardly from the first portion in a slightly spaced relation to the wall of the tube. The container cap includes a flange having a first portion which extends upwardly outside of the second portion of the tube flange, a second portion which extends inwardly from the end of the first portion and a third portion which extends downwardly from the end of the second portion and between the second portion of the tube flange and the wall of the container. Such an arrangement has been very satisfactory in that it virtually eliminates the possibility of the cap or end closure being separated from the container tube without the complete destruction of one or both of the above-mentioned flanges.

However, it has heretofore been difficult to produce the proper folding of the respective flanges on automated equipment.

SUMMARY OF THE INVENTION

The present invention provides an automatic folding mechanism which is capable of being incorporated into a packaging assembly line and which is simple and inexpensive to incorporate into existing packaging assembly lines. The folding mechanism of the present invention includes first and second folding members adapted to engage spaced portions of an end cap flange with the container tube flange superposed on the second portion of the cap flange.

The two members are pivoted about spaced parallel pivot axes and are interconnected with linkage means which has drive means connected thereto so as to pivot the first member from a side-by-side position to an overlapping position with respect to the second member. The folding mechanism further includes latch means which maintains the second member in a fixed position during the above-mentioned pivotal movement of the first member and which is released upon movement of the first member to the overlapping position so that the drive means subsequently pivots both members about a single pivot axis.

During such pivotal movement of the two members, the first portion of the cap flange is folded over the container tube flange and substantially encompasses the tube flange and, during the second portion of pivotal movement, the two folding members cooperate to maintain the folded relation of the respective flanges and to further fold the flange portions from a position substantially perpendicular to the tubular axis to a position substantially parallel thereto for subsequent attachment of a ligature thereto.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a plan view of an assembly line having the present invention incorporated therein;

FIG. 2 is a vertical sectional view taken generally along lines 2-2 of FIG. 1;

FIG. 3 is a FIG. sectional view taken generally along lines 3-3 of FIG. 1;

FIG. 4 is a view similar to FIG. 3 showing the folding mechanism in its intermediate operative position; and

FIG. 5 is a view similar to FIG. 4 showing the folding mechanism in its final operative position as the flange portions are moving away from the folding mechanism.

DETAILED DESCRIPTION

While this invention is susceptible of embodiment in many different forms, the following detailed description and the attached drawings disclose one specific embodiment with the understanding that the present disclosure is to be considered as exemplary and is not intended to limit the invention to the embodiment illustrated.

FIG. 1 of the drawings discloses a fragmentary plan view of a packaging assembly line 10 having conveyor rolls 12 and 14 suitably journaled in support structure, only a portion of which is shown at 16. A container tube 18 and an end closure 20 are adapted to be moved in the direction indicated by the arrow "A" with the article contained herein to a final station at which the end closure or cap 20 is secured to the open end of the container tube 18. Prior to reaching the final station, side flaps 22 are folded from a flat position parallel to the main body of the end cap to a position perpendicular to the cap and substantially parallel to the wall of the container tube. Since the side flap folding mechanism forms no part of the present invention, no detailed description thereof is necessary.

According to the present invention, a folding mechanism is incorporated into the assembly line at the final station and includes mechanism for folding end flanges or flaps of the container cap and the container tube from a position shown in FIG. 2 to that shown in FIG. 5, as will become apparent hereinafter. Since the folding mechanism for each end is substantially identical, only one of the mechanisms is shown in the drawings and will be described in detail. However, it is to be understood that a folding mechanism identical to that described will be located at the opposite end of the container tube to fold the flanges or flaps of the opposite end. The folding of both end caps preferably takes place simultaneously.

The folding mechanism of the present invention (FIG. 2) includes first and second folding members or plates 32 and 34 which are respectively pivoted on spaced parallel pivot axes and which are manipulated in a manner to fold flanges 36 and 38, respectively extending from container tube 18 and end cap 20, from the position shown in FIG. 2 to that shown in FIG. 5. For purposes of description, the flat flange 36 (FIG. 5) may be considered to have a first portion 36a extending outwardly of the bottom or free end of the tube 18 and a second portion 36b extending upwardly from the free end of the first portion while the cap flange 38 has a first portion 38a extending upwardly from the end of the cap 20, a second portion 38b extending inwardly from the end of the first portion 38a and a third portion 38c extending downwardly between the tube wall and the flange portion 36b. Thus, the tube flange is folded from a flat condition to a generally L-shaped condition and the container cap flange 38 is folded from a flat condition to a substantially U-shaped condition encompassing the L-shaped flange.

The mechanism for folding the flanges from the flat condition to the final configuration includes interconnecting means between the members 32 and 34 which are operative to move the members from a substantially side-by-side relationship shown in FIG. 2 to an overlapping relationship shown in FIG. 4 while maintaining the member 34 in a fixed position and subsequently moving the two members as a unit from the posi-

tion shown in FIG. 4 to that shown in FIG. 5, all of which is accomplished by a single drive means, such as a fluid motor cooperating with the interconnecting means, as will be described in more detail hereinafter.

The mechanism for interconnecting the two members or plates and pivoting the plates about spaced parallel axes includes spaced arms or links 40 fixedly secured and depending from the plate 34. The depending arms or links 40 are located adjacent spaced members which form part of the support structure 16 and are pivotally supported thereon by stub shafts 42 which defines a pivot axis for the folding member 34.

The folding member 34 also has spaced ears 44, which may be considered part of the links 40, while the plate 32 has spaced ears or links 46 extending from a lower surface thereof and received between the spaced ears 44 on member 34. The ears or links 44 and 46 are pivotally interconnected by a pin 48 which defines the pivot axis for the folding member or plate 32.

The flange folding mechanism 30 further includes linkage means interconnecting the two members and drive means connected to the linkage means for sequentially pivoting the member 32 about the pivot axis 48 from a substantially side-by-side position to an overlapping position with respect to member 34 and subsequently moving the members as a unit about pivot axis 42. For this purpose, a shaft or pivot member 50 extends between the links or arms 40 on the plate 32 and is pivoted in openings defined in the respective arms 40. The shaft 50 has spaced pairs of arms 52 fixedly secured thereto and extending upwardly therefrom, as more clearly shown in FIGS. 2 and 3. Each spaced pair of arms 52 defines a first link of a compound linkage means 53 interconnecting the two members. The second link 54 of the compound linkage means 53 has one end pivoted on pivot pin 56 extending between spaced arms 52 with the opposite end thereof received between spaced links or ears 46 and pivoted thereon by a further pivot pin 58. Thus, it can be seen that the links 52 and 54 have adjacent ends interconnected and respective free ends pivotally connected to respective ones of the links 40 and 46 which are defined on the respective members 34 and 32.

According to one aspect of the invention, the compound linkage 53 has first and second positions which respectively define the side-by-side relationship and the overlapping relationship of the two members 32 and 34. These positions are defined by stop means extending from one of the depending links 40 and cooperating with stop means defined on one of the links 52 and 54. In the illustrated embodiment, the stop means defining the first and second positions for the compound linkage includes first and second lugs 60 and 62 respectively extending transversely from the link 40 and disposed in the path of a lug 64 carried on one of the arms 52. The respective lugs 60 and 62 may have adjustable stop members 66 extending therefrom while the lug 64 has stop member 68 disposed thereon and adapted to engage the stop members 66. Thus, it can be seen that the stop members 66 cooperating with stop members 68 define first and second positions for the compound linkage 53.

The folding mechanism of the present invention further includes latch means 70 cooperating with the support 16 and with one of the arms 40 for maintaining the member 34 in a relatively fixed position while the member 32 is pivoted about its pivot axis 48. The latch means or mechanism 70 includes an arm 72 pivoted at one end on a pin or bolt 74 extending from the support 16. The arm 72 is pivoted to a first position about bolt 74 by a spring 76 having one end fixedly secured to a pin 78 extending from the support 16 with the opposite end of the spring 76 connected to the arm at a point spaced from the pivot axis 74. The first position for the latch means or arm 72 is defined by a rod or stop 80 extending from the support 16 and engaging the arm 72 so that the free end of the arm 72 is disposed in the path of a lug 82 fixedly secured by bolts 84 to the lower end of the arm 40. In the position shown in FIG. 3, the arm 72 blocks pivotal movement of the link or arm 40 extending from the plate or member 34 so as to maintain the

member 34 in a fixed position, for a purpose which will become apparent hereinafter.

As was indicated above, the latch means is designed to be released when the plate or member 32 has been moved to an overlapping position with respect to the member 34, the latter position being defined by the second position of the compound linkage 53. For this purpose, one of the links, link 52, has an arm 90 extending therefrom with an adjustable stop member 92 carried on the free end of the arm 90. The adjustable stop member 92 is disposed in the path of the arm 72 so as to move the arm 72 about pivot axis 74 against the action of spring 76 when the compound linkage is moved to its second position (shown in FIG. 4). At the end position of the first fold motion, link 54 and arm 52 are in a substantially straight line, extended position and pivot 56 is moved past the centerline "C" extending between pivots 50 and 58. The above relative position of link 54 and arm 52 is a rigid link between 50 and 58 and, therefore, locks plate 32 in place at the end of first fold motion so that neither spring action of the closure cap flange nor any external force will open plate 32 and prevent proper interlocking of the cap and closure flanges. By the continuous motion of the fluid motor rod, the above condition is maintained all through the second fold motion. Unlocking of the plate 32 is accomplished by the reverse motion of the fluid motor rod. In the second position of arm 72, the free end thereof is disposed below the lug 82 to allow relative movement of the lug with respect to the arm, as will be described in more detail hereinafter.

As was indicated above, the folding mechanism includes a single drive means which is capable of pivoting the member 32 about its pivot axis 48 from a substantially side-by-side to an overlapping relation with respect to member 34 and subsequently pivoting the two members as a unit about pivot axis 42. In the illustrated embodiment, the drive means includes a fluid motor 94 (FIGS. 1 and 2) having a cylinder 96 pivotally supported on the support 16 by a trunnion 98. The fluid motor 94 further includes a piston rod 100 having on its free end thereof a connecting member 102 which extends between one of the links 52 and a further link 104 respectively extending upwardly from shaft 50. The links 52 and 104 and connecting member 102 are pivotally interconnected by a pin 206 so that extension and retraction of the fluid motor 94 will cause movement of the link 52 in a manner which will become apparent hereinafter.

OPERATION

The operation of the present folding mechanism will be described in connection with the folding of one pair of flanges or flaps 36 or 38. However, it is to be understood that during the operation to be described, a second folding mechanism identical to that disclosed herein will fold a second pair of flanges or flaps 36 and 38 disposed on the opposite side of the tube 18 and end cap 20.

The package including container tube 18 and cap 20 having the article contained therein is first moved along the packaging assembly line in the direction indicated by the arrow in FIG. 1 to a final closing and securing station, a portion of which is disclosed in the drawings. At this final station, the flanges or flaps 36 and 38 which are originally in the flat condition shown in FIGS. 2 and 3 are folded to the position shown in FIG. 5.

During the first portion of the folding operation, the first means of the folding mechanism folds the flange 38 from the position shown in FIG. 2 to that shown in FIG. 4 so as to substantially encompass the flange 36. This is accomplished by supplying pressured fluid to the rod end of the cylinder 96 (through suitable conduits, not shown) thereby retracting the piston rod 100 causing a simultaneous movement of the arms 52 and a rotation of shaft 50 in a counterclockwise direction as viewed in FIG. 2. Such counterclockwise rotation of the shaft will move the compound linkage 53 from the position shown in FIG. 2 to that disclosed in FIG. 4. During the move-

ment of the compound linkage, the link 40 is maintained in a fixed position by the latch means 70 so as to cause a pivotal movement of the member or plate 32 from the position shown in FIG. 2 to that shown in FIG. 4.

When the members 32 and 34 are in an overlapping relation, the compound linkage will be in its second position and the stop member 92 carried on arm 90 will have moved the latch means from the first position shown in FIG. 2 to the second position shown in FIG. 4 to accommodate pivotal movement of the second member about its pivot axis. Since the two folding members or plates 32, 34 are now in an overlapping relationship with the flanges 36 and 38 filling the space therebetween, any subsequent retraction of the piston rod 100 with respect to cylinder 96 will move the entire linkage interconnecting means and the members 32 and 34 as a unit about pivot axis 42. Thus, subsequent retraction of the piston rod 100 will cause the members 32 and 34 as well as links 40, 46, 52 and 54 to move as a unit about pivot axis 42 from a position shown in FIG. 4 to that shown in FIG. 5.

Simultaneous to the pivotal movement of the folding members 32 and 34 about pivot axis 42, the entire packaging unit including container tube 18, the end cap 20 and the article is lowered from the position shown in FIG. 4 to that shown in FIG. 5 (by mechanism not shown) to cause the end of the container tube 18 having end cap 20 thereon to move between spaced guide members 110 (only one of which is shown in the drawings) and to finally assume the dotted line position shown in FIG. 5. In the final position (shown in the dotted line of FIG. 5), the flanges 36 and 38 will be in a position where flange 38 substantially encompasses the greater portion of flange 36 and the two flanges have been moved from a position substantially perpendicular to the axis of the tube to a position parallel thereto. In such final position, suitable securing means, such as a ligature 112, may be utilized for further securing the container cap to the container tube. Alternatively, suitable pressure sensitive adhesive or other securing means may be utilized for maintaining the flanges 36, 38 in a final fixed position with respect to the tube and the end cap.

As can be appreciated from the above description, the present invention provides a simple and effective manner of interrelating a pair of flanges forming part of a packaging unit and in which the entire operation is performed by a single uninterrupted unidirectional movement of the drive means associated with the folding mechanism. Furthermore, the simplicity and the relatively minor costs of the various elements forming part of the present folding mechanisms will allow such mechanism to be incorporated in substantially any type of commercial packaging unit with only minor modifications to the entire unit.

What we claim is:

1. A folding mechanism for folding adjacent flat portions of a container tube and a container cap into an L-shaped portion extending from the container and a U-shaped portion substantially encompassing the L-shaped portion and with the flat tube portion overlying the cap portion and the cap portion extending beyond the tube portion comprising a support, first and second members pivoted about spaced pivot axes, said first member adapted to engage the cap portion extending beyond the container portion and said second member adapted to cooperate with the overlapping portions, interconnecting means between said members and operative to (1) move said members from a substantially side-by-side relation to a substantially overlapping relation by pivoting said first member about said first pivot axis while maintaining said second member in fixed position and (2) pivoting said second member and said first pivot axis about said second pivot axis to move said members as a unit, and drive means cooperating with said interconnecting means for moving said members about said pivot axes whereby to fold the cap portion extending beyond the tube portion in overlying relation to the overlying portions and to fold the overlying portions relative to the tube and the cap.

2. A folding mechanism as defined in claim 1, in which said interconnecting means comprises linkage means interconnecting said members with said drive means connected to said linkage means, latch means cooperating with said linkage means for maintaining said second member in fixed position while said first member is pivoted about said first pivot axis and means for releasing said latch means when said second member is in overlapping relation with said first member.

3. A folding mechanism as defined in claim 1, in which said interconnecting means includes compound linkage means having opposite ends respectively pivoted on said first and second members with said drive means connected thereto, means defining first and second positions for said compound linkage means, said first position positioning said members in side-by-side relation and said second position positioning said members in overlapping relation.

4. A folding mechanism as defined in claim 3, including the further improvement of said interconnecting means comprising latch means cooperating between said second member and said support for maintaining the second member in fixed position while said compound linkage means moves from said first to said second position, and means for releasing said latch means when said compound linkage is in said second position to allow said members to pivot as a unit about said second pivot axis.

5. A folding mechanism as defined in claim 1, including the further improvement of said interconnecting means comprising first and second links fixed to respective one of said members with said first link pivoted on said second link to define said pivot axis for said first member and said second link pivoted on a pivot axis on said support and defining the pivot axis for said second member, third and fourth links pivotally interconnected and having respective free ends connected to respective ones of said first and second links with said drive means cooperating with said third and fourth links to move said members to said overlapping relation, and means normally maintaining said second link in fixed position and responsive to movement of said members to said overlapping relation to allow pivotal movement of said second link about said pivot axis on said support.

6. For use in combination with apparatus for securing a ligature about a container which includes an inner container tube and a bottom container cap; said tube having a flange including a first portion adapted to extend outwardly of the bottom of the tube and a second portion adapted to extend upwardly from the end of the first portion; said cap having a flange including a first portion adapted to extend upwardly outside of the second portion of said tube flange, a second portion adapted to extend inwardly from the end of said first portion, and a third portion adapted to extend downwardly from the end of said second portion inwardly of the second portion of said first flange; a flange folding mechanism comprising, a support, a first flange folding member adapted to engage said first portion of said cap flange, means defining a first pivot axis on said support for said first member, a second flange folding member pivoted about a pivot axis defined on said first member and adapted to engage said third portion of said cap flange, linkage means interconnecting said members, and means cooperating with said linkage means for sequentially (1) pivoting said second member about said second pivot axis to locate first and third portions of said cap flange in superposed relation with said second portion of said tube flange interposed therebetween, and (2) pivoting said members as a unit about said first pivot axis and folding said first and third portions of said cap flange and said second portion of said tube flange to a position substantially perpendicular to said first portion of said tube flange.

7. Mechanism as defined in claim 6, including the further improvement of said linkage means comprising first, second, third and fourth links with said first link carried by said first member and pivoted about said first pivot axis, said fourth link carried by said second member and pivoted

about said second pivot axis, and said second and third links pivotally interconnected and having free ends pivoted on respective ones of said first and fourth links, and

said last means comprising first means defining first and second positions for said second and third links, latch means defining a first position for said first link and responsive to movement of said second and third links to the second position to accommodate pivotal movement of said first link about said first pivot axis, and drive means connected to said support and one of said second and third links for pivoting said members.

8 Mechanism as defined in claim 7, including the further improvement of said drive means comprising a fluid motor having relatively movable elements and pivoting said members by unidirectional movement of said elements.

9. A flange folding mechanism for folding a pair of flanges, respectively extending from the main body of a container and a container cap, from a first flat position to a second position with the cap flange substantially encompassing the main body flange and said flanges angularly related to said main body and cap, comprising

first and second transversely spaced members adapted to engage spaced portions of the cap flange;

first means operatively interconnecting said members for moving said members from a substantially transverse spaced relation to substantially superposed relation and including linkage means having a plurality of links opera-

tively connecting said members and drive means cooperating with said linkage means;

second means maintaining one of said members in fixed relation while the other of said members is moved from the transversely spaced relation to said superposed relation relative to the other of said members and allowing movement of said members as a unit in said superposed relation;

said second means comprising latch means maintaining a first link of said linkage means in a fixed position, and means responsive to movement of said members to superposed relation for releasing said first link and allowing said members to move as a unit whereby one portion of said cap flange is folded to an overlapping relation to said other portion of said cap flange with said container flange interposed therebetween while said members are moved to superposed relation and said flanges are folded as a unit relative to said cap and main body of said container during movement of said members as a unit.

10. A flange folding mechanism as defined in claim 9, including the further improvement of said drive means comprising a fluid motor having a piston rod slidable in a cylinder and connected to a second of said links for moving said members to superposed relation and subsequently moving said members as a unit during unidirectional movement of said piston rod relative to said cylinder.

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