United States Patent

[11] **3,572,003**

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[73] Assignee **The Mead Corporation**

[54] **PACKAGING MACHINE AND METHOD**
8 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **53/3,** 53/48
[51] **Int. Cl.** **B65b 11/08**
[50] **Field of Search** 53/26, 32, 48, 49, 207, 3, 209, 218

[56] **References Cited**

UNITED STATES PATENTS

2,817,197	12/1957	Anness	53/209X
3,085,377	4/1963	Ganz	53/48X
3,234,706	2/1966	Arneson	53/48
3,415,033	12/1968	Perry et al.	53/48

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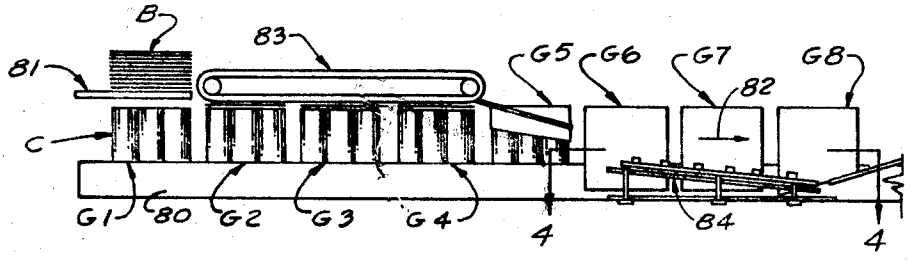
ABSTRACT: A packaging machine for securing a wrapper-type blank about a group of articles is provided with a continuously movable tucking stud mounted on an endless conveyor element whose working reach is disposed alongside the path of movement of a group of articles and an associated blank, said stud being engageable with a pair of article retaining and blank reinforcing flaps so as to fold such flaps inwardly of the blank to positions of enveloping relationship relative to an article. Guides are arranged so as to complete the folding of the blank in such manner as to force the flaps into secure article gripping relationship relative to the article and thereafter the ends of the blank are folded underneath the group of articles and secured together.



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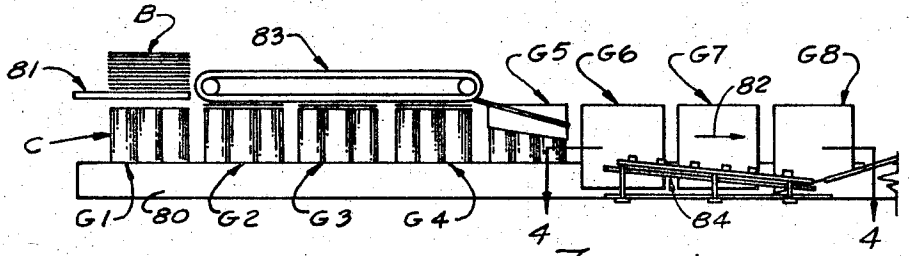

FIG. 1

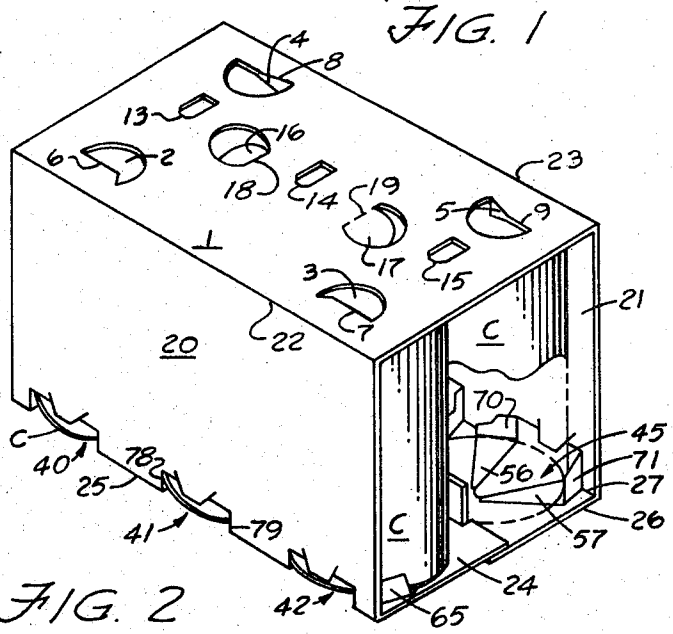

FIG. 2

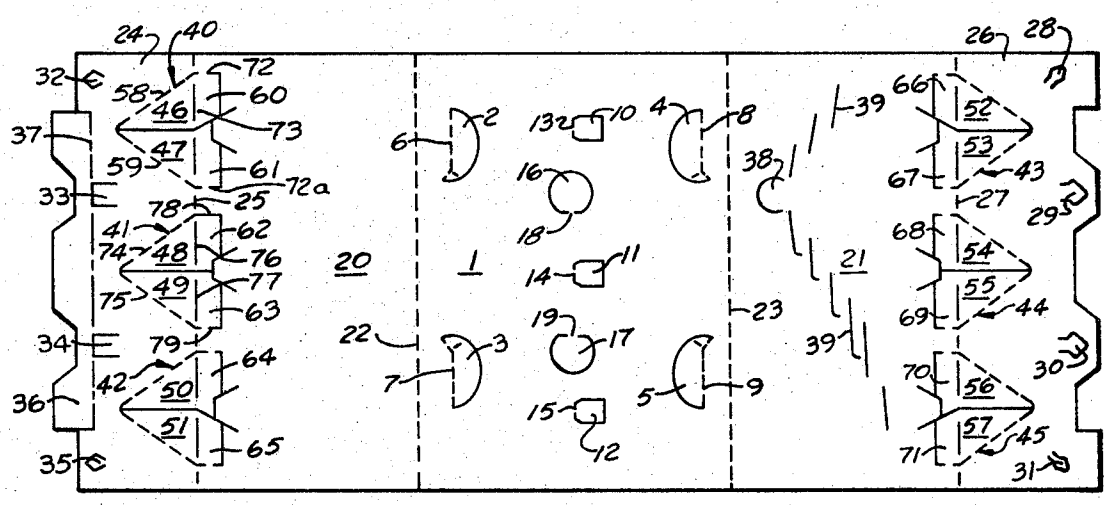

FIG. 3

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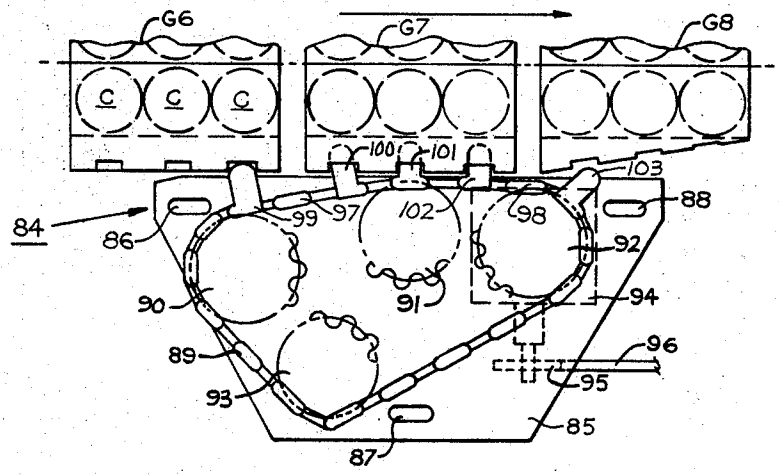

FIG. 4

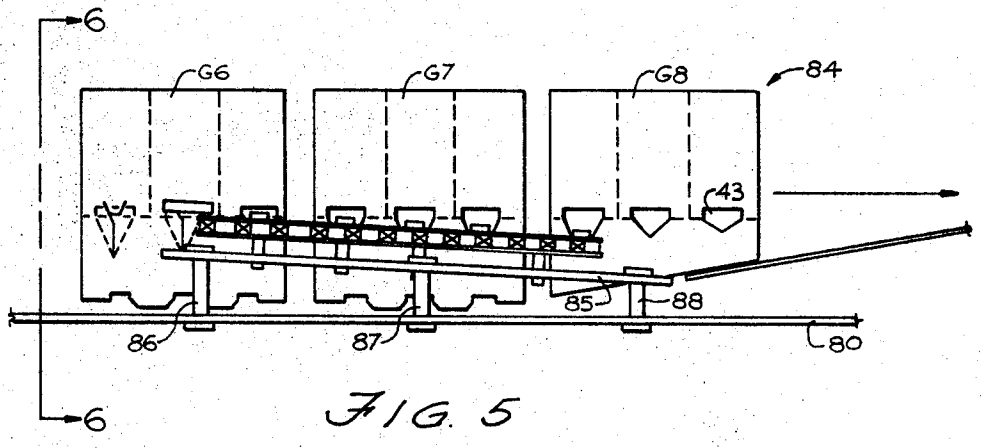

FIG. 5

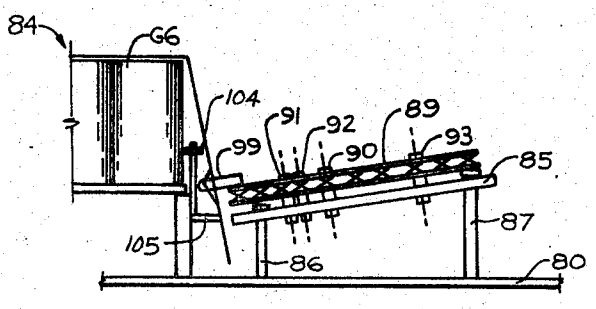

FIG. 6

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PACKAGING MACHINE AND METHOD

The machine and method of this invention are particularly adapted for use in conjunction with the carton disclosed and claimed in U.S. Pat. application Ser. No. 759,583 filed Sept. 13, 1968, now U.S. Pat. No. 3,517,876, although the machine and method are not limited to use in conjunction with such a carton.

The machine and method of this invention are concerned with the inward folding of pairs of flaps cut from the corners of an open-ended tubular wrapper to define article receiving apertures. According to this invention, the two flaps of each pair of flaps are engaged initially and folded inwardly while the adjacent portions of the blank are held against substantial sidewise movement by suitable guide means. After predetermined folding of the flaps, the guide means folds the flaps and the associated portions of the blank inwardly toward the articles comprising the particular article group to positions where the spaced flaps of each pair of flaps engage and receive a part of an article. Thereafter the folding operation is completed so as to force the pairs of flaps into snug article gripping relationship and the end portions of the blank are secured together, all such operations being performed while the article group and its associated blank are moved continuously along a predetermined path.

For a better understanding of the invention reference may be had to the following detailed description taken in conjunction with the accompanying drawings in which FIG. **1** is a schematic side view of a packaging machine of the type to which this invention is applicable; FIG. **2** is a perspective view of a package formed by the machine of FIG. **1**; FIG. **3** is a plan view of a blank from which the package of FIG. **2** is formed; FIG. **4** is an enlarged view taken along the line designated **4–4** in FIG. **1** and constitutes a plan view of the mechanism constructed according to this invention; FIG. **5** is a front view of the mechanism depicted in FIG. **4**, and in which FIG. **6** is an end view taken along the line designated **6–6** in FIG. **5**.

In order fully to understand the details of construction and of operation of the machine and method of this invention, a clear understanding of the special constructional details of a carton which is adapted for use in conjunction with the machine and method of this invention is deemed advisable. Thus a description of the carton which is specially adapted for this machine follows.

In the drawings, the numeral **1** generally designates the top panel of the carrier. It will be understood that this panel is designated as the top panel for the sake of convenience and that this panel could constitute the bottom panel depending on the orientation of the finished package. Formed in the top panel **1** for engaging the recessed ends of the packaged cans are the tabs **2**, **3**, **4** and **5**. These tabs are foldably secured to the top panel by fold lines designated respectively at **6**, **7**, **8** and **9**. The tabs **2—5** are simply folded downwardly and inwardly approximately 180° so that an abutment ledge is formed for engaging the upwardly protruding chime of the end cans thereby to secure the cans against dislodgment through the open ends of the package.

For separating the cans in one row from the adjacent cans in the other row, a plurality of separator tabs **10**, **11** and **12** are struck from the top panel **1** and are foldably joined thereto along their respective fold lines **13**, **14** and **15**. Separator tabs **10—12** are simply folded inwardly approximately 90° and are interposed between the cans as is well known.

For the purpose of facilitating carrying of the package, finger gripping tabs **16** and **17** are struck from top panel **1** and are foldably joined thereto along fold lines **18** and **19** respectively.

The sidewalls **20** and **21** are foldably joined to the side edges of top panel **1** along fold lines **22** and **23** respectively. Bottom panel **24** is foldably joined along fold line **25** to the bottom edge of sidewall **20** while bottom panel **26** is foldably joined along fold line **27** to the bottom edge of sidewall **21**.

In order to interconnect the bottom panels **24** and **26** and thereby to form a composite bottom panel for the carrier, the locking tabs **28—31** are driven through the openings defined by retaining tabs **32—35** respectively in a manner well known in the art.

When in assembled condition with the articles C disposed within the wrapper, the bottom portions of the packaged cans in one row are separated from the bottom portions of the cans in the other row by the medial separator panel **36** which is foldably joined to bottom panel **24** along fold line **37** in a manner well known in the art.

In order to facilitate opening of the package, a pull tab **38** is formed in one of the sidewalls such as **21** and cooperates with a plurality of cuts generally designated by the numeral **39** so that a pull exerted on tab **38** effectively tears the sidewall **21** and renders the packaged items C readily accessible to the ultimate user.

For the purpose of tightening the wrapper about the packaged articles immediately prior to driving the locking tabs **28—31** into the openings defined by retaining tabs **32—35**, tightening apertures are formed in the bottom panels **24** and **26**. These tightening apertures receive machine elements which are manipulated so as to perform the desired tightening operation in a manner well known in the art.

The tightening apertures designated generally by the numerals **40—42** in the bottom panel **24** and the apertures designated by the numerals **43—45** in bottom panel **26** are provided with reinforcing flaps. These flaps are designated by the numerals **46—57** in FIG. **4**. Reinforcing flap **46** is struck from the bottom panel **24** and is foldably joined thereto along fold line **58** while reinforcing flap **47** is struck from bottom panel **24** and is foldably joined thereto along the fold line **59**. In like fashion, the remaining reinforcing flaps **48—57** are foldably joined to their associated bottom panels. Thus when machine elements enter the tightening apertures the reinforcing flaps such as **46** and **47** are swung inwardly and serve as strengthening means along the edges of the tightening apertures.

The tightening apertures are extended across the fold lines **25** and **27** and into the lower portions of the sidewalls. Thus, supplementary flaps **60—65** are formed in the lower portion of sidewall **20** and similar supplementary flaps **66—71** are formed in the lower portion of sidewall **21**. Supplementary flap such as **60** is foldably joined to sidewall **20** along fold line **72** and to the adjacent end edge of main reinforcing flap **46** by fold line **73** which is aligned with fold line **25**.

In like fashion, the supplementary flaps **61—65** are foldably joined to the sidewall **20** and to their associated main reinforcing flaps while supplementary reinforcing flaps **66—71** are foldably joined to sidewall **21** and to their associated main reinforcing flaps.

When the carrier is assembled from the blank as depicted in FIG. **4** into the completed setup condition depicted in FIG. **1**, the main and supplementary flaps are folded inwardly so that the flaps appear as indicated for example at **45** in FIG. **2**.

Thus the tightening aperture generally designated by the numeral **41** is defined by hinge lines **74** and **75** by which the main reinforcing flaps **48** and **49** are adjoined to the bottom panel **24**. As is apparent particularly from FIG. **3** these hinge lines **74** and **75** converge in the direction of tightening movement of the tightening element, i.e., away from the sidewall **20** and toward the medial line of the carrier. Stated otherwise, fold lines **74** and **75** are disposed in diverging relation in the direction of sidewall **20**. Of course the can C rests atop the main reinforcing flaps **48** and **49** as will be readily understood particularly from FIG. **2**.

The supplementary reinforcing flaps such as **62** and **63** are struck from the lower portion of sidewall **20** and are foldably joined to the main reinforcing flaps **48** and **49** respectively by fold lines **76** and **77** as can best be seen from FIG. **3**. Supplementary reinforcing flap **62** is foldably joined to sidewall **20** along fold line **78** while reinforcing flap **63** is foldably joined to sidewall **20** along fold line **79** as is best shown in FIG. **3**.

From FIG. **3** it is apparent that fold lines **76** and **77** which interconnect the main and supplementary reinforcing flaps **48**, **62**, and **49**, **63** are aligned both with each other and with the fold line **25** interconnecting sidewall **20** and bottom panel **24**.

The machine and method of this invention are designed for manipulating the flaps 46—57 and 60—71 into positions of enveloping relationship relative to the packaged articles. As can best be seen in FIG. 1 the machine comprises a schematically represented base designated by the numeral 80, schematically represented hopper 81 in which a stack of blanks B is disposed. Articles to be packaged are designated at C and move along through the machine in the direction by the arrow 82 from left to right and during movement through the machine, blanks disposed atop article groups such as are indicated at G1—G4 are held above the associated article group by suitable conventional holddown mechanism generally designated by the numeral 83. As is well known, movement of the groups of articles through the positions designated G1—G8 is accompanied by downward folding of end portions of the blanks alongside the associated group of articles and subsequent folding of the blank ends underneath an article group following which these inwardly folded end portions are secured together.

In order to manipulate the article retaining and blank reinforcing flaps described above into proper positions of cooperation relative to the articles C, the mechanism 84 schematically represented in FIG. 1 is mounted alongside the machine frame 80.

Of course the mechanism 84 as shown in FIG. 1 is for the purpose of manipulating the flaps on one side only of the carrier. It will be understood of course that similar mechanism is mounted on the opposite side of the machine and serves to manipulate the flaps on the opposite side of the carton.

While the invention as disclosed herein and the associated carton contemplate arranging the article retaining and blank reinforcing flaps at the bottom corners of the carton, it will be understood that such flaps could be mounted both at the top and bottom corners or if desired could be mounted at the top corners only.

As is apparent from FIGS. 4, 5 and 6, the flap manipulating mechanism 84 comprises a base plate 85 mounted on adjustable support elements 86, 87 and 88. An endless conveyor chain 89 is trained about a plurality of sprockets 90, 91, 92 and 93. Endless element 89 is driven through gearbox 94 which in turn is driven by a sprocket 95 and driving chain 96 from a driving element not shown in the drawing but which is conventional and synchronized with the operations of the packaging machine itself.

Sprocket 93 is a laterally adjustable idler sprocket which may be employed to control the tension of endless element 89. Sprocket 91 is utilized to dispose the trailing portion 97 of the working reach of endless element 89 disposed between sprockets 90 and 91 in a converging relationship relative to the path of movement of the articles C as they move from left to right.

Furthermore, adjustment of sprocket 91 laterally relative to the path of movement of the articles C affects the diverging path of movement of the leading portion 98 of the working reach of conveyor 89, such portion being that which is disposed between sprockets 91 and 92.

The flaps of the carton are manipulated by tucking studs mounted on endless element 89 and designated by the numerals 99, 100, 101, 102 and 103. In the drawings the tucking studs are shown along the working reach only of endless element 89 for the sake of clarity and convenience although it will be understood that these studs are disposed about the entire length of the endless element 89 and that the studs are spaced apart by a distance which corresponds to the spacing between the pairs of flaps in the carton and also in such manner as to accommodate the particular spacing between article groups.

The aperture such as 43 which is defined by the flaps 52, 66 and 53, 67 is generally triangular in shape as is apparent from FIGS. 3 and 5. Thus once the tucking stud such as 99 enters the aperture 43 and swings the flaps inwardly, these flaps are folded through angles greater than 90° to positions of partial envelopment of the associated article due to downward movement of the tucking stud. Thus as is apparent in FIG. 5, the base plate 85 is adjusted through adjustable studs 86, 87 and 88 so as to tilt downwardly from left to right. Thus the tucking stud enters the top portion of an opening such as 43 and moves downwardly somewhat to complete the inward folding of the associated flaps.

The manipulation of the portions of the carton is partially effected by means of suitable guides which are disposed alongside the carton sidewalls during manipulation of the article retaining and blank reinforcing flaps. In the drawings, these guides are designated by the numerals 104 and 105.

After the tucking studs such as 99—102 complete their flap folding operations it is necessary to disengage each tucking stud from its associated carton aperture toward this end the guides such as 104 and 105 are arranged to swing the carton sidewall and associated bottom panel away from the apparatus 84. Furthermore, the leading portion 98 of the working reach of the endless element 89 is disposed in diverging relationship with respect to the path of movement of the article groups as is best shown in FIG. 4 to facilitate withdrawal of the adjacent tucking stud.

Best results are achieved according to the invention if the base plate 85 the endless element 89 and their associated sprockets and tucking studs are tilted inwardly toward the path of movement of the article groups as is best shown in FIG. 6. It is apparent that the tucking studs do not complete the folding of the flaps to the final positions which they occupy in the set up carrier as depicted at 70 and 71 in FIG. 2, it being obvious that folding of lap panels 24 and 26 from positions in the planes of the sidewalls 20 and 21 to normal positions with respect thereto inherently results in completion of the folding of the flaps.

While the machine described above is employed to deposit the blanks atop the article groups and to fold the blank sidewalls downwardly, it will be understood that the blank could be disposed initially underneath its article group and the carton sidewalls folded upwardly. The lap panels in such instance would be folded over the articles. In such an instance the base plate 85 would probably be tilted in a direction opposite from that shown in FIG. 5 to aid in movement of the studs upwardly toward the apex of the openings such as 43. Tilting opposite to that shown in FIG. 6 would be employed so that studs such as 91 would be disposed in a normal relationship to the carton sidewall and associated lap panel.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

We claim:

1. A machine for packaging articles in a tubular wraparound carrier formed from a blank having a pair of walls adjoined together along a fold line and having a pair of article retaining and blank reinforcing flaps disposed astride said fold line, said machine comprising means for advancing a blank and its associated articles along a predetermined path, means for folding portions of the blank including at least one of said walls alongside the associated articles, and a tucking stud movable in synchronism with the articles and with the blank and disposed alongside the path of movement thereof and in generally normal relation to said walls, said tucking stud being arranged to move in a laterally convergent direction relative to said path of movement of the blank and articles to engage said pair of flaps and to fold such flaps inwardly of the carrier and said tucking stud being movable in a divergent direction in a substantially vertical plane relative to the path of movement of the blank and articles, and guide means engageable with the carrier walls for holding such walls against substantial sidewise displacement during folding of said flaps.

2. A machine according to claim 1 wherein said tucking stud is movably mounted on a base element and wherein said base element is adjustably mounted to vary the degree of divergence of the path of movement of said stud in a substantially vertical direction relative to said predetermined path of movement of the blank and articles during flap folding movement of said stud.

3. A machine for packaging a plurality of articles arranged in at least one row in rectilinear relation in a wraparound-type carrier having a top portion, spaced sidewalls, a pair of bottom lap panels and a plurality of pairs of flaps struck from certain portions of the carrier and constituting article retaining and carrier reinforcing means, said machine comprising means for advancing a group of articles along a predetermined path, means for advancing a wrapper blank along said path and immediately above a group of articles to be packaged, means for folding said sidewalls and said lap panels downwardly alongside the group of articles, and a tucking stud movable in synchronism with the group of articles and with the blank and disposed generally alongside the path of movement thereof and in generally normal relation to said sidewalls and lap panels, said tucking stud being arranged to move generally parallel with and in a transversely converging direction relative to said predetermined path and said stud being disposed to engage a pair of said flaps following downward folding of said sidewalls and of said lap panels to fold said flaps inwardly of the carrier, and guide means engageable with the carrier sidewall and lap panel which are associated with said pair of flaps for holding such sidewall and panel against substantial sidewise displacement during folding of said flaps by said stud.

4. A machine according to claim 3 wherein said guide means is effective to complete the folding of said flaps by imparting transverse movement to said sidewall and lap panel relative to said stud.

5. A machine according to claim 3 wherein said stud is mounted on an endless element movably mounted on a base element disposed in a generally horizontal plane.

6. A machine according to claim 5 wherein said base element is tilted downwardly somewhat in the direction of movement of a group of articles and the associated blank so that the working reach of said endless element moves in a downward direction relative to said path of movement.

7. A machine according to claim 5 wherein said base element is tilted inwardly toward a group of articles and its blank by a slight angle of tilt.

8. A method of enveloping at least one article within a wrapper-type blank having a pair of walls adjoined together and having a pair of article retaining and blank reinforcing flaps disposed astride the junction between said walls, the method comprising continuously moving the article along a predetermined path, placing a blank in transverse relation to the path of movement of the article and moving it in synchronism therewith, folding the ends of the blank alongside the article, folding said article retaining and blank reinforcing flaps through angles greater than 90° to positions wherein the flaps of said pair of flaps are disposed in spaced angular relation to each other so as to receive therebetween a part of the article, moving said walls in a direction toward said article to cause said flaps to move into engagement with said article thereby to cause said flaps to swing through additional increments of angular movement so as securely to grip the article while the blank and article are moving along said predetermined path, and folding the ends of the blank including one of said walls in a transverse direction relative to the predetermined path of movement of the article.