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FLAP FOLDING MEANS FOR PACKAGING APPARATUS

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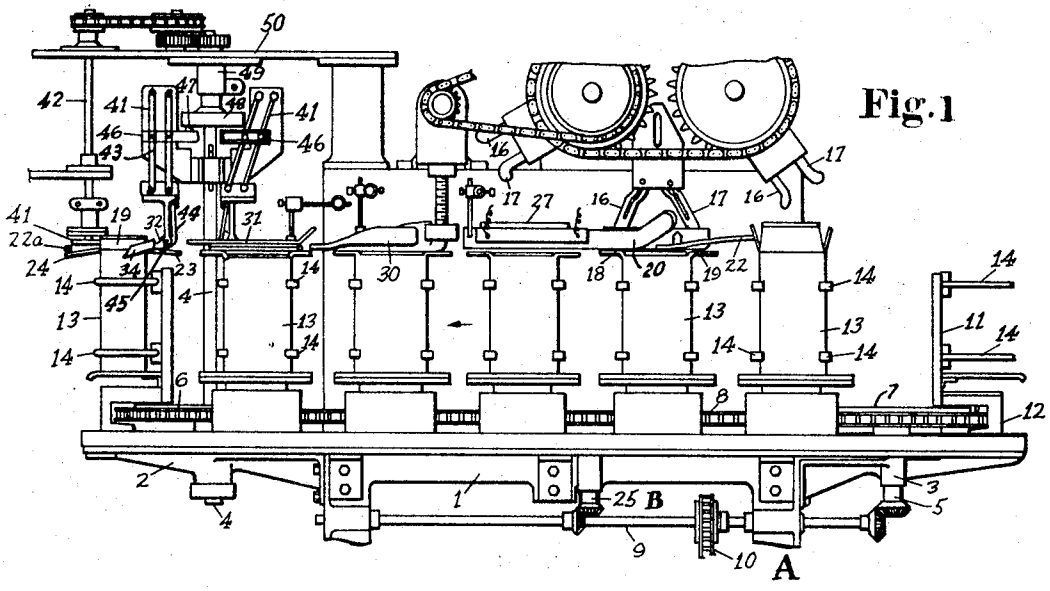


Fig. 1

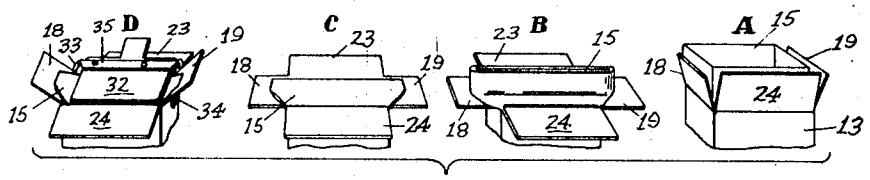
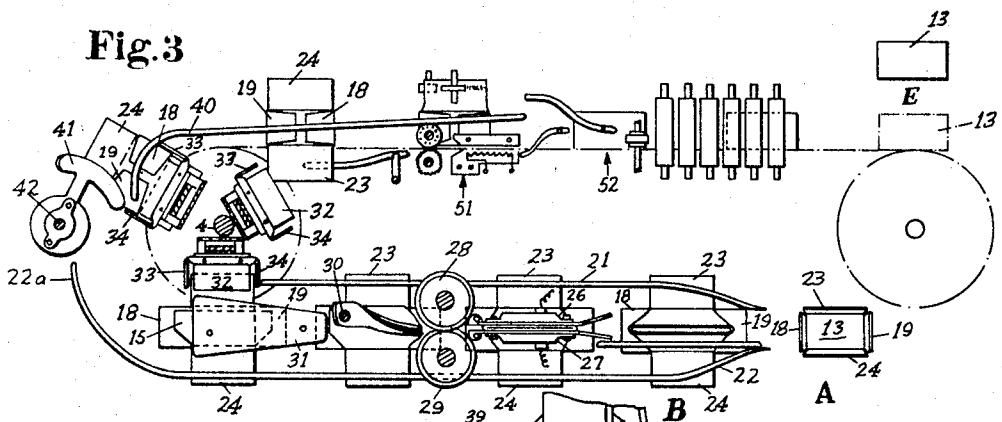


Fig. 2

Fig. 3



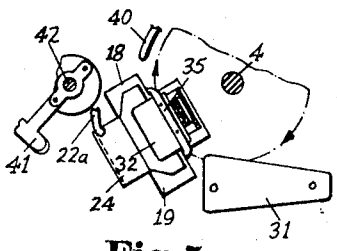


Fig. 5

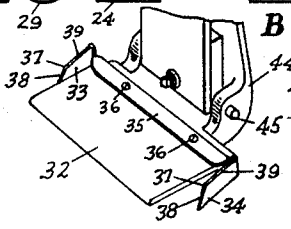


Fig. 4

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FLAP FOLDING MEANS FOR PACKAGING APPARATUS

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ABSTRACT OF THE DISCLOSURE

Improvements in the flap folding mechanism of packaging apparatus comprising flap folding fingers extending from a folding plate, and adapted to move with the container to be folded while engaging and folding upwardly a pair of opposing flaps of said container.

This invention relates to packaging apparatus and has to do more particularly with an improvement in the closure flap folding means utilized in conjunction with the packaging apparatus disclosed in Bergstein et al. United States Patent 2,979,995, dated Apr. 18, 1961, and entitled, Apparatus for Closing and Sealing Lined Containers.

The aforementioned patent discloses a packaging machine wherein lined containers to be closed and sealed are delivered to carriages which advance the containers through a series of operating stations at which the extending liner mouths and end flaps are folded and sealed. In such apparatus, the infolding of the container end closure flaps is effected as the containers are moved in a semicircular path of travel, the initially out-folded closure flaps being acted upon by a series of folding instrumentalities including a folding plate adapted to be moved to a position overlying the opened upper end of an advancing container, whereupon a contoured folding arm lying adjacent the path of travel of the container acts to sequentially engage the leading and trailing end closure flaps and fold them upwardly to positions in which they may be contacted by additional folding instrumentalities which enforce the infolding of the said closure flaps over the folding plate, whereupon the plate is withdrawn.

While such apparatus has been in widespread use, the contoured folding arm just described has presented certain problems in that, being positioned adjacent the path of travel of the containers as they are moving in an arcuate path, the folding arm of necessity must engage marginal edge portions of the leading and trailing closure flaps. Such engagement requires precise alignment of the folding arm and the maintenance of such alignment at all times. Even though the folding arm may be accurately aligned with respect to a given carton, the cartons themselves will vary in the dimensions of their flaps and the position of the flaps will vary depending upon a slight twisting of the container body walls or the position in which the container is engaged by the carriage or cage which advances it through the machine. The net result of these variations in position is that occasionally the contoured folding arm will fail to engage one or the other of the closure flaps, resulting in such flap remaining unfolded. Such improperly folded cartons must be scrapped. Since the containers have been filled with their contents prior to the folding and sealing operation, the scrapped cartons and their contents must either be thrown away or else the imperfect cartons manually opened and the contents salvaged for reuse.

A principal object of the instant invention is the provision of improved flap folding means which eliminate the difficulties heretofore encountered in apparatus of the character described.

A further object of the invention is the provision of improved flap folding means mounted on the folding plates which are juxtaposed to the uppermost ends of the advancing containers, the flap folding means moving with the plates and acting to positively engage and fold upwardly the flaps contacted thereby.

Still a further object of the instant invention is the provision of positively acting flap folding means in the form of folding fingers carried by the folding plates, the fingers being oriented to move beneath and fold upwardly the opposing end closure flaps of a container as the folding plate is juxtaposed to the upper end thereof.

The foregoing, together with other objects of the instant invention which will appear hereinafter, or which will be apparent to the skilled worker in the art upon reading this specification, are accomplished by that construction and arrangement of parts of which an exemplary embodiment shall now be described.

Reference is made to the accompanying drawings wherein:

FIGURE 1 is a side elevation of container closing and sealing apparatus in accordance with the invention.

FIGURE 2 is a schematic fragmentary perspective view illustrating successive stages in the operation of the device shown in FIGURE 1.

FIGURE 3 is a fragmentary plan view of the apparatus illustrated in FIGURE 1.

FIGURE 4 is an enlarged fragmentary perspective view of the folding plate and the flap folding fingers associated therewith.

FIGURE 5 is a fragmentary plan view illustrating the manner in which the folding plate and folding fingers move into engagement with the container being acted upon.

For an understanding of the type of apparatus with which the instant invention may be utilized, reference is made to FIGURE 1 of the drawing which illustrates closing and sealing apparatus of the type disclosed in the aforementioned Bergstein et al. patent. As seen therein, the apparatus is supported on a table-like frame **1** mounting bearings **2** and **3** adjacent its opposite ends for vertically disposed shafts **4** and **5** which mount horizontally disposed sprockets **6** and **7** about which a conveyor chain **8** operates in a horizontally disposed flight. Driving power is supplied by the sprocket **7** which is driven through suitable gearing from drive shaft **9** operatively connected, as by means of driving gear **10**, to any suitable source of power, which is not shown, but which may comprise an electric motor. The conveyor chain **8** carries a series of interspaced carriage members **11** which are guided in proper alignment about the conveyor path by channel guide members generally indicated at **12**.

The carriage members **11** are each adapted to receive and convey a container **13** which will be presented to the carriage at one end of the machine, as at the station A seen in FIGURE 1. The containers, which in the embodiment illustrated have inner liners, will be presented to the carriages in upright position with their top closure flaps and liners projecting upwardly in the maner illustrated at A in FIGURE 2. The carriages are each provided with coacting pairs of locking arms **14** adapted, upon presentation of the container to the carriage, to engage the container body walls and secure it to the carriage. For details of the construction and operation of the carriages, reference is made to Bergstein et al. United States Patent 2,443,293, issued June 15, 1948, wherein the construction and operation of such carriages is disclosed in detail.

As each container **13** is advanced by its carriage, the upstanding liner portion **15** will be contacted by a spreading device comprising a pair of fingers **16** and **17** which enter the mouth of the liner and bring it to the flattened

and elongated position seen at B in FIGURES 1 and 2. In addition to elongating or spreading the liner mouth, the fingers serve to outfold the leading and trailing end closure flaps **18** and **19** which are engaged and maintained in their outfolded positions by means of a hold-down bar **20**. Simultaneously with the action of the fingers **16** and **17**, a pair of sweeps **21** and **22**, best seen in FIGURE 3, engage and outfold the remaining end closure flaps **23** and **24**.

The mechanism controlling the spreading movement of the fingers **16** and **17** is essentially identical to that disclosed in Bergstein United States Patent 2,114,622, issued Apr. 19, 1938, and reference is made to the said patent for details of the construction and operation of the spreading fingers. It may be noted that the spreading fingers will be driven in timed relation to the movement of the carriages **11**, as by means of drive shaft **25** seen in FIGURE 1, which is driven from drive shaft **9**.

As the fingers **16** and **17** are withdrawn from the elongated and flattened mouth of the liner, the liner passes between a pair of closely spaced apart heating elements **26** and **27**, seen in FIGURE 3, which serve to activate a heat sealable coating on the inner surface of the liner, whereupon a coacting pair of pressure wheels **28** and **29** seal together the juxtaposed and flattened walls of the liner. Thereafter, the sealed end of the liner is contacted by a sweep **30** which folds over the projecting end of the liner, the container thus assuming the condition illustrated at C in FIGURE 2, whereupon the upper end of the container is contacted by a tapered hold-down plate **31** which acts to maintain the upper end of the liner in the folded condition and at the same time holds all of the end closure flaps in outfolded horizontally disposed condition. The sweep **21**, which maintains the closure flaps **23** in outfolded condition during the flattening and sealing of the liners, terminates as the containers approach a position tangential with respect to the sprocket **6**, and it is at this point that the closure flaps come under the influence of hold-down plate **31**. The closure flaps **23** are thus freed for passage thereover by folding plates **32** which, as will be explained more fully hereinafter, are juxtaposed to the upper ends of the containers as they move in a curved path about the sprocket **6**.

As seen in FIGURE 4, each of the folding plates **32** is of rectangular configuration, the dimensions of each plate being such that its opposite end edges will be aligned with the fold lines of the closure flaps **18** and **19** and hence provide edges about which the extending end portions of the flattened liner may be neatly folded as the closure flaps are infolded. In accordance with the instant invention, each of the folding plates is provided with a pair of folding fingers **33** and **34** which are spaced outwardly from the opposite end edges of the folding plate, the fingers preferably being formed from a continuous strip of metal which has ben configured to provide an intermediate strap portion **35** adapted to overlie the plate **32** along its rearmost edge, the strap portion **35** being fixedly secured to the plate, as by means of attachment screws **36**. The fingers thus project freely forwardly from the rear end of the plate in general parallelism with its opposite end edges.

The upper edges **37** of the fingers are inclined downwardly from rear to front, with the leading portion **38** of each of the fingers lying below the plane of the plate **32**, whereas the trailing portion **39** of each of said fingers will lie above the plane of the plate **32**. With such arrangement, as the plates **32** are presented to the advancing containers, the fingers **33** and **34** will pass beneath and engage the undersurfaces of the leading and trailing closure flaps **18** and **19**, respectively, and as the folding plate advances to its extended position in which it overlies the upper end of the container, the inclined upper edges **37** of the fingers will fold the flaps **18** and **19** upwardly in the manner illustrated at D in FIGURE 2, thereby elevating the said flaps to positions wherein they may be readily contacted by the folding means which enforce their folding over the folding plate **32**.

The infolding of the leading closure flap **18** is effected by means of sweep **40** which contacts the outer surface of the now upwardly inclined flap **18**, as will be evident from FIGURES 3 and 5. The trailing end closure flap, which is also upwardly inclined by reason of its contact with folding finger **34**, is infolded over the folding plate **32** by means of rotary weep **41** mounted on shaft **42** and driven in timed relation to the traveling containers. The rotary sweep **41** acts as a kicker to infold the trailing closure flap. In this connection, the sweep **22** which holds the closure flap **24** in outfolded condition, is provided with a trailing section **22***a* which folds the flap **24** into a downwardly inclined position as the container approaches the rotary sweep **41**, thereby assuring the unobstructed travel of the rotary sweep thereover. It will be further noted that the positioning of sweep **40**, which infolds the leading flap **18**, is such that flap **18** will be completely infolded so that the rotary sweep may also pass over it and, as the container advances, the now infolded trailing flap **19** will also come under the influence of sweep **40**, as will be apparent from FIGURE 3. It also will be apparent from FIGURE 3 that upon completion of the infolding of flaps **18** and **19**, the folding plate **32** will be retracted and the container will advance along the second straight-line portion of the machine for subsequent folding and gluing of the remaining closure flaps. It will be understood that the length of the folding fingers **33** and **34** relative to the depth of the cartons being folded will be such that the trailing portions of the fingers will lie rearwardly of the points at which the sweeps **40** and **41** contact the end closure flaps and hence will not obstruct the folding action of the sweeps.

Movement of the folding plates **32** and the folding fingers **33** and **34** affixed thereto from the retracted to the extended position is effected by the pantograph linkage **43** (FIGURE 1) terminating at its lower end in a forked member **44** to which the plates **32** is pivotally mounted by means of a horizontally disposed pin **45**, as seen in FIGURE 4. Since such mounting means is fully disclosed in the aforesaid Bergstein et al. Patent 2,979,995, it will not be described in detail herein other than to point out that the pantograph linkages are actuated by means of actuating arms **46** provided with cam followers **47** which engage the race of a cam **48** surrounding the shaft **4** and fixedly secured to a mounting bracket **49** secured to an extension **50** forming a part of the machine frame. As will be evident from FIGURE 3, the cam **48** will be oriented so that the folding plates **32** will begin their outward movement upon alignment of a container therewith, the plates being fully extended by the time the closure flaps **18** and **19** are acted upon by the sweeps **40** and **41**. Retracting movement will begin subsequent to the engagement of both flaps by the sweep **40**.

Following removal of the folding plate **32**, which will occur as the containers pass around sprocket wheel **6** and enter the second straight-line portion of the machine, the remaining closure flaps will be infolded and sealed, as by means of the folding and sealing instrumentalities **51** and **52** which form no part of the instant invention. The closed and sealed containers will be discharged from the apparatus at a discharge station E where the locking arms **14** of the cages will be opened and the containers removed from the machine.

As should now be apparent, the instant invention provides improved apparatus which will insure positive engagement of the leading and trailing closure flaps and initiate their infolding. Once the folding fingers have been properly affixed to the folding plates, no further adjustment is necessary and positive engagement with the leading and trailing closure flaps is assured. Minor variations in the dimensions of the closure flaps have no effect on the operation of the folding fingers, nor does slight misalignment or twisting of the containers relative to the cages in which they are carried.

Modifications may be made in the invention without departing from its spirit and purpose. For example, while the invention has been described in conjunction with lined containers wherein the ends of the liner are folded together with the leading and trailing closure flaps, it will be readily apparent that the folding fingers of the instant invention could be utilized in any apparatus wherein the problem of enforcing the folding of opposing closure flaps is encountered.

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

1. In apparatus for folding and sealing the end closure flaps of containers as they are advanced in a path of travel with their closure flaps folded outwardly, including a folding plate adapted to be juxtaposed to the upper end of an advancing container to provide a support over which the end closure flaps may be infolded, said plate being movable from a retracted position in which it is out of contact with the container to an extended position in which said plate overlies the container, the improvement comprising in combination therewith, flap folding means extending from said plate in general parallelism with two edges thereof and positioned to engage beneath and fold upwardly an opposing pair of the container end closure flaps as the plate moves from its retracted position to its extended position, said flap folding means comprising a pair of fingers lying outwardly beyond the opposite end edges of said plate and substantially normal to the path of travel of said end closure flaps, said fingers having their free ends extending forwardly with respect to said plate and having upper edges which incline downwardly from rear to front, with the leading portions at least of said fingers lying below the plane of said plate and the rearmost portions thereof lying above the plane of said plate.

2. The apparatus claimed in claim 1 wherein said fingers are formed from a continuous strip of metal and are interconnected by an intermediate strap portion fixedly secured to said plate.

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U.S. Cl. X.R.

93—36, 44, 53