

July 31, 1962

S. R. HOWARD

3,047,053

CONTAINER FORMING MACHINE

Filed June 27, 1958

2 Sheets-Sheet 1

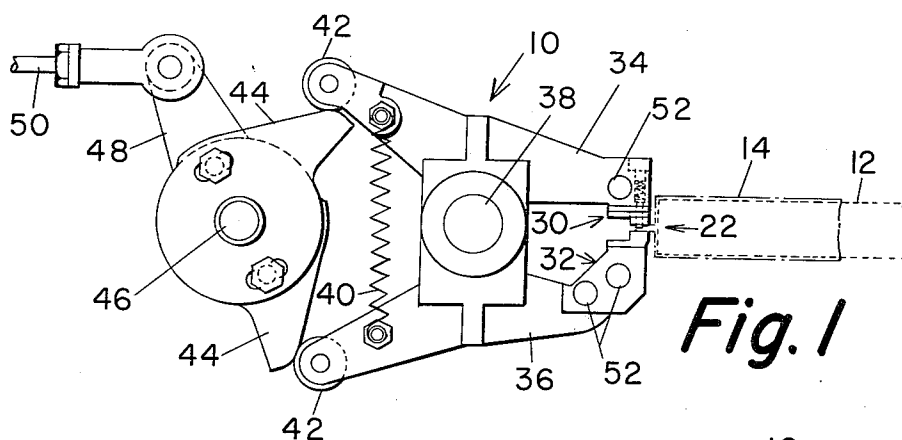


Fig. 1

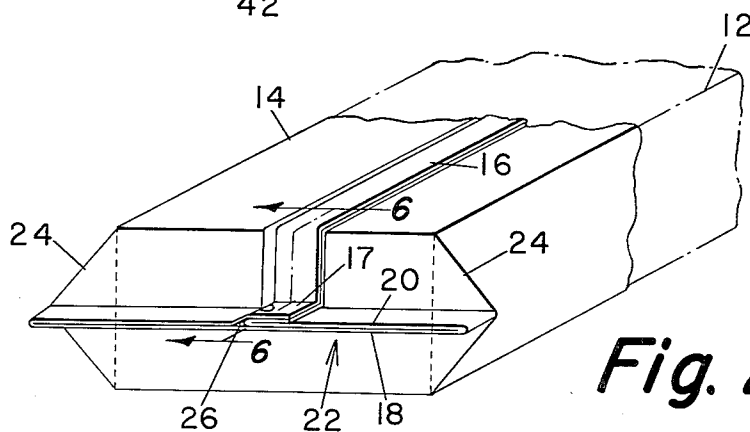


Fig. 2

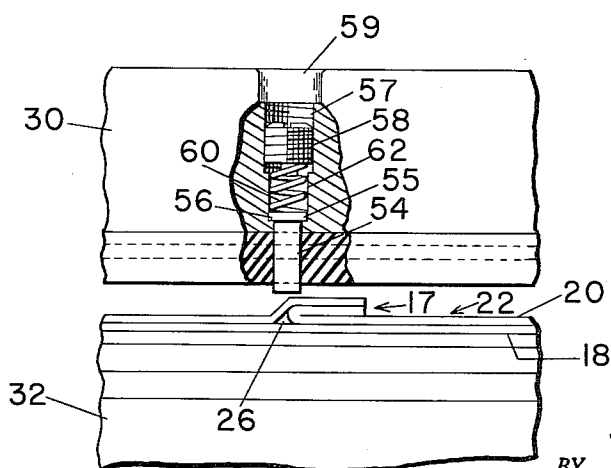


Fig. 3

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2 Sheets-Sheet 2

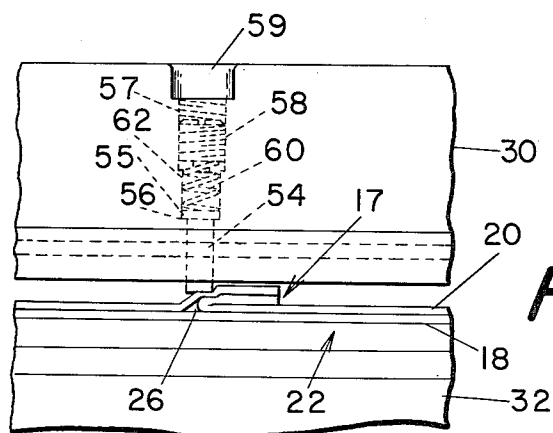


Fig. 4

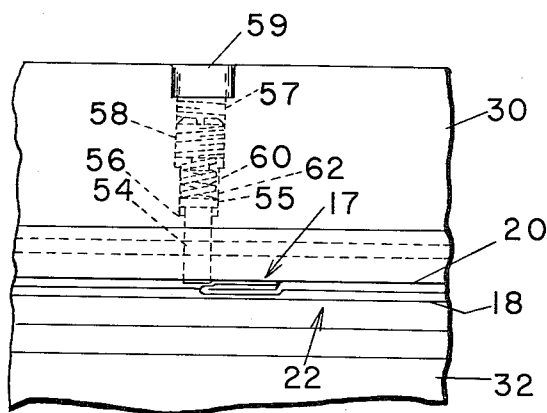


Fig. 5

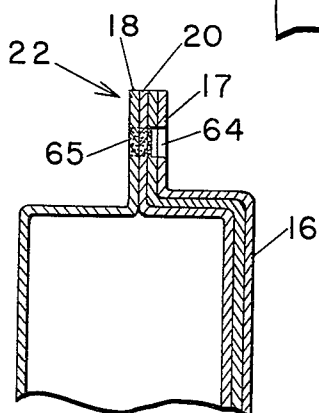


Fig. 6

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3,047,053
CONTAINER FORMING MACHINE
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This invention relates to a container forming machine. The invention has for an object to provide a novel and improved container forming machine having novel provision for sealing the end closure of a tubular container of the type having a longitudinally extended face-to-face side seam and a transversely extended face-to-face end closure wherein one wall of the face-to-face end closure includes a portion of the folded face-to-face side seam, and wherein novel provision is made for applying auxiliary sealing pressure to the end closure in the area of the folded portion of the side seam whereby to provide an efficient leakproof end closure.

With this general object in view and such others as may hereinafter appear, the invention consists in the container forming machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a side elevation of end closure sealing mechanism which may be incorporated in a container forming machine and which embodies the present invention;

FIG. 2 is a perspective view of a container supported on a forming block and provided with an end closure sealed by the present sealing mechanism;

FIGS. 3, 4 and 5 are detail views in end elevation showing the sealing elements in different stages of operation relative to the end closure being sealed, FIG. 3 being shown partly in cross section; and

FIG. 6 is a cross sectional detail view through the sealed end closure produced by the present sealing mechanism, the section being taken on the line 6—6 of FIG. 2.

In general the present invention contemplates a container forming machine having novel provision for sealing the end closure of a container and is particularly designed for sealing the end closures of a carton lining bag of the so-called "fin" seal type formed by folding a sheet of bag forming material to provide a rectangular tube by bringing the longitudinal edges of the sheet into face-to-face relation and sealing the same to provide a tubular container having a longitudinally extended upstanding side seam which is then folded down flat against the side wall of the bag. Each end closure, comprising the top and bottom closures, for such containers is preferably formed by bringing opposed side walls of the extended portions of the container together to provide an elongated face-to-face transverse closure wherein a portion of the folded longitudinal side seam occurs in one wall of each end closure.

In practice it has been found that in the formation of the longitudinally extended face-to-face side seam a relatively small longitudinal groove or gap is formed on the inner surface of the liner bag defined by a slight separation or break in continuity of the opposed portions of the bag forming material at the bottom or inner end of the side seam, and when the end portions of the bag are subsequently folded and heat sealed in face-to-face relation with extended portions of the side seam it was found that a relatively small and substantially triangular channel was formed in each end closure defined by the side seam groove in one wall of the end closure and the adjacent inner face of the opposing wall of the heat sealed end closure. This results in an imperfectly sealed end closure

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through which finely divided, dry material, liquid and/or semiliquid materials may leak. In accordance with the present invention novel provision is made for closing and sealing such relatively small channels in the end closures in a novel manner whereby to render the package substantially leakproof and to enable it to be capable of being used for packaging substantially all types of materials.

The present novel end closure sealing mechanism is adapted to be embodied in a high speed packaging machine wherein the liner bag is formed by wrapping the liner sheet about a mandrel and forming the face-to-face heat sealed side seam and thereafter forming a face-to-face transverse seam providing a bottom closure. A prescored carton blank may then be folded about the mandrel and formed liner bag and sealed along a side seam in any preferred manner. The bottom flaps of the carton are then preferably folded and sealed while supported on the mandrel. The lined carton may then be removed from the mandrel and filled with the product being packaged, the lining bag top closure formed and the top closure flaps of the carton folded and sealed to complete the package.

In practice the lining bag may comprise a fibrous and preferably moistureproof sheet material which may be provided with a coating of adhesive along the marginal edges to be sealed, or the sheet material may be of the heat sealable type impregnated with or provided with a coating of thermoplastic adhesive to render the same capable of being heat sealed face to face by the application of heat and pressure.

The invention is herein illustrated as embodied in heat sealing mechanism for a container forming machine and which includes a pair of cooperating heat sealing jaws for sealing the face-to-face transverse bottom end closure of a tubular container having an initially unsealed portion comprising a longitudinal side seam channel as above described. The present sealing mechanism having auxiliary pressure applying means is arranged to compress and compact the end closure material at the channel forming area of the seam to close and seal the channel opening and thus render the closure substantially leakproof.

Referring now to the drawings, the present end closure sealing mechanism indicated generally at 10 may be embodied in a container forming machine of the type having a plurality of horizontal forming blocks or mandrels 12, one of which is indicated by dotted lines in FIG. 1, and upon which an inner container or liner bag 14 is formed by wrapping a liner sheet about the mandrel and forming a longitudinally extended upstanding face-to-face side seam 16 at one station of operation, the upstanding side seam being folded flat against the bag during the travel of the bag to a second station of operation. The tubular structure thus formed has portions extended beyond the end of the mandrel, such extended portions being folded at the second station of operation to spread the end walls outwardly and to bring the opposed side walls 18, 20 of the extended portions together in face-to-face relation, as shown in FIG. 2, to provide an elongated transverse end closure 22. The end closure preferably extends outwardly substantially at right angles from the end of the forming block and across the triangular tab portions 24 formed by the folding operation, the latter being extended laterally beyond the end walls of the block as shown.

It will be observed that during the formation of the side seam 16, the inner or bottom portion of the seam adjacent the folding crease 19 is not sealed and defines a relatively small groove or gap, and as herein shown, when the end closure side walls 18, 20 are brought together in face-to-face relation, the side wall 18 extends across the gap forming therewith a substantially triangular

open channel 26 extending from the interior of the bag to the atmosphere.

It has been found in practice that when the opposed walls 18, 20 of the end closure are sealed in the conventional manner, either by the application of pressure to a closure having adhesively coated surfaces, or by the application of heat and pressure to a closure embodying heat sealable material, the relatively small opening 26 is not effectively closed, and an efficient seal is not made.

In accordance with the present invention the end closure sealing mechanism illustrated in FIG. 1, in addition to applying normal sealing pressure to the closure 22 to seal the opposed face-to-face walls thereof together, the sealing mechanism is provided with novel auxiliary pressure applying mechanism arranged to additionally compress and compact the material forming the end closure in a relatively small area along the channel to effectively close and seal the opening 26 and to thereby provide a leakproof end closure for the container. As herein shown, the sealing mechanism 10 includes a pair of co-operating sealing jaws 30, 32 carried by arms 34, 36 which are pivotally mounted at 38. Extensions of the arms 34, 36 are connected by a coil spring 40 which tends to urge the sealing jaws apart to an open position. Each extension is also provided with a roller 42 arranged to co-operate with individual cam portions 44 adjustably mounted on a rocker shaft 46. The shaft 46 is provided with an arm 48 connected by a rod 50 to actuating mechanism, not shown, which may be of any usual or preferred form and which may be operatively connected to and form a part of the container forming machine. Thus, in operation when the cams 44 are rocked in one direction the sealing jaws are brought into engagement with the end closure 22 disposed therebetween, and conversely, when the cams 44 are rocked in the opposite direction the spring 40 is permitted to separate the jaws.

In practice both of the sealing jaws 30, 32 may be faced with metal, or one jaw may be metal-faced and the other jaw may be faced with a resilient rubber-like material, such as "neoprene" or silicone rubber. Preferably, the jaw 30 may be provided with the resilient facing, as shown in FIG. 3, the jaw 32 being faced with metal. When the bag material embodies heat sealable material, at least one of the sealing jaws may be provided with conventional electrical heating units as indicated at 52. In operation the sealing jaws are brought together with substantial pressure and are heated to a degree such as to reactivate the thermoplastic material to provide an adhesive seal in the closure 22.

In order to apply auxiliary pressure to the channel forming area of the end closure to effectively close the opening 26, one of the jaws, herein shown as the jaw 30, is provided with a relatively small spring pressed pin 54 which, as best shown in FIG. 3, is slidably mounted in the lower end of a stepped bore formed in the sealing jaw. The pressure applying pin 54 is provided with a head portion 55 engageable with a shoulder 56 of the stepped bore. The upper portion 57 of the bore is threaded and provided with an adjustable set screw 58 having a reduced diameter depending extension. A relatively heavy coil spring 60, operating in an intermediate portion 62 of the bore is interposed between the head 55 of the pressure applying pin and the underside of the set screw 58 as shown. As also shown in FIG. 3, the bore is formed substantially centrally of a recessed portion 59 formed in the outer face of the jaw supporting arm 34.

As illustrated in FIG. 3, the free end of the pressure applying pin 54 extends through the resilient facing and normally projects a short distance beyond the face of the sealing jaw 30 in alignment with the channel portion 26 of the end closure. Thus, in operation as the jaws are closed together, the pin 54 engages the material adjacent the channel area 26 prior to engagement of the sealing faces of the jaws with the closure, as illustrated

in FIG. 4, and as the jaws 30, 32 are moved into sealing engagement with the closure 22 the pressure applying pin 54 in cooperation with the opposed metal-faced sealing jaw 32 continues to apply increasing pressure as the pin is gradually retracted against the pressure of the spring 60 to compact and deform the material at the channel area 26, as illustrated in FIG. 5, to effectively seal the channel opening in the end closure. The relatively small engaging area of the pin 54 provides a relatively high concentrated pressure at the channel area as the relatively heavy spring 60 is compressed during the sealing operation. The compressing force of the spring 60 may be varied for most efficient operating pressure by adjusting the set screw 58. As shown greatly exaggerated in FIG. 6, the pressure applying pin 54 actually forms a relatively small depression 64 in the four-ply area of the end closure adjacent the channel 26, thereby urging the compressed and compacted material underlying the pin into the channel sealing the same as indicated at 65.

It will be observed that when one of the sealing jaws 30 embodies a resilient rubber-like facing the resilient material is adapted to yield when it engages the four-ply thickness adjacent the side seam portion of the end closure, and in cooperation with the metal-faced jaw 32 enables the two-ply portions of the end closure 22 to be effectively heat sealed. It will thus be apparent that in such a structure the present auxiliary pressure applying pin 54 is of particular advantage to effect a relatively greater pressure adjacent the channel area to close the channel opening as described.

After sealing the extended face-to-face closure 22 in the manner above defined, provision is made in the container forming machine for thereafter folding the closure down flat against the end of the container 14 supported on the mandrel 12 and for folding the end tabs 24 down against the opposed end walls of the container. Thereafter the container or liner bag thus formed may be moved to another station where a conventional carton provided with the usual end closure flaps may be formed about the liner bag supported on the mandrel. The formed carton and liner is then ready to be filled and may be stripped from the mandrel, filled and closed. The closure for the liner bag mouth may and preferably will be formed in a manner similar to the formation of the bottom end closure 22, herein defined, wherein the channel opening in the mouth closure may be closed by auxiliary pressure applying means of the type described. While the invention has been herein defined as embodied in a container forming machine of the type provided with horizontal forming blocks, it will be apparent that the invention may be used with advantage in other types of container forming machines producing a fin type seam bag.

From the above description it will be seen that the present end closure sealing mechanism in a container forming machine is particularly adapted to apply heat and pressure to seal the end closure of a fin seal type of container in which the container forming material is provided with a coating of thermoplastic adhesive on the contacting faces of the end closure wherein the folded-over face-to-face side seam of the container occurs in the end closure and wherein the channel formed in the end closure by said side seam is effectively closed by auxiliary pressure applying means carried by the sealing mechanism. Such thermoplastic coatings may include a so-called "hot melt" adhesive activated by the application of heat and pressure. It will be apparent that the disclosed auxiliary pressure applying means may be used with equal advantage in a sealing mechanism adapted for applying pressure alone to seal a face-to-face end closure of the type described wherein the contacting faces of the bag forming material are provided with a coating of a conventional type of adhesive.

While the preferred embodiment of the invention has been herein illustrated and described, it will be under-

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stood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a container forming machine, in combination, means for supporting a container having a longitudinal face-to-face side seam and having a transverse face-to-face end closure in which a portion of the side seam occurring in the end closure forms a channel opening, end closure sealing mechanism comprising a pair of opposed cooperating sealing elements relatively movable to press together opposed walls of said face-to-face end closure in sealing relation, one of said sealing elements being heated and provided with a metal facing, the other sealing element being unheated and having a resilient facing, and auxiliary pressure applying means carried by one of said sealing elements and engageable with the side seam portion of the end closure to compress and compact the material in a circular area adjacent the channel opening to close the same whereby to provide a leakproof end closure, said auxiliary pressure applying means comprising a cylindrical spring pressed metal pin having a flat end surface carried by the unheated sealing element and extended through and a short distance beyond the plane of said resilient facing and cooperating with the metal facing of the heated sealing element.

2. End closure sealing mechanism as defined in claim 1 which includes a compression spring arranged to urge the pin outwardly and means for adjusting the effective compression of said spring.

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3. In a container forming machine having a horizontally extended forming block for supporting a container wrapped thereabout to provide a folded-down longitudinal face-to-face side seam and a transverse face-to-face end closure in which a portion of the side seam occurring in the end closure forms a channel opening, end closure sealing mechanism comprising a pair of cooperating sealing jaws, said jaws having a rigid facing and the second jaw having a resilient facing, means for moving the sealing jaws into and out of pressing engagement with said end closure to seal the same, and auxiliary pressure applying means carried by one of said second jaws comprising a resiliently mounted member engageable with the side seam portion of the end closure to compress and compact the material in a circular area adjacent the channel opening to close the same, said resiliently mounted member including a spring pressed pin cylindrical in cross section and having a flat engaging face, said pin being normally extended through said resilient facing beyond the face of said second sealing jaw and arranged to be retracted against its resilient mounting during the sealing operation to apply increasing pressure to the material adjacent said opening as the sealing jaws are moved into sealing engagement with the closure.

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