

April 19, 1938.

R. M. BERGSTEIN

2,114,622

HERMETIC PACKAGE SEALING

Filed Aug. 10, 1936

3 Sheets-Sheet 1

FIG. 1.

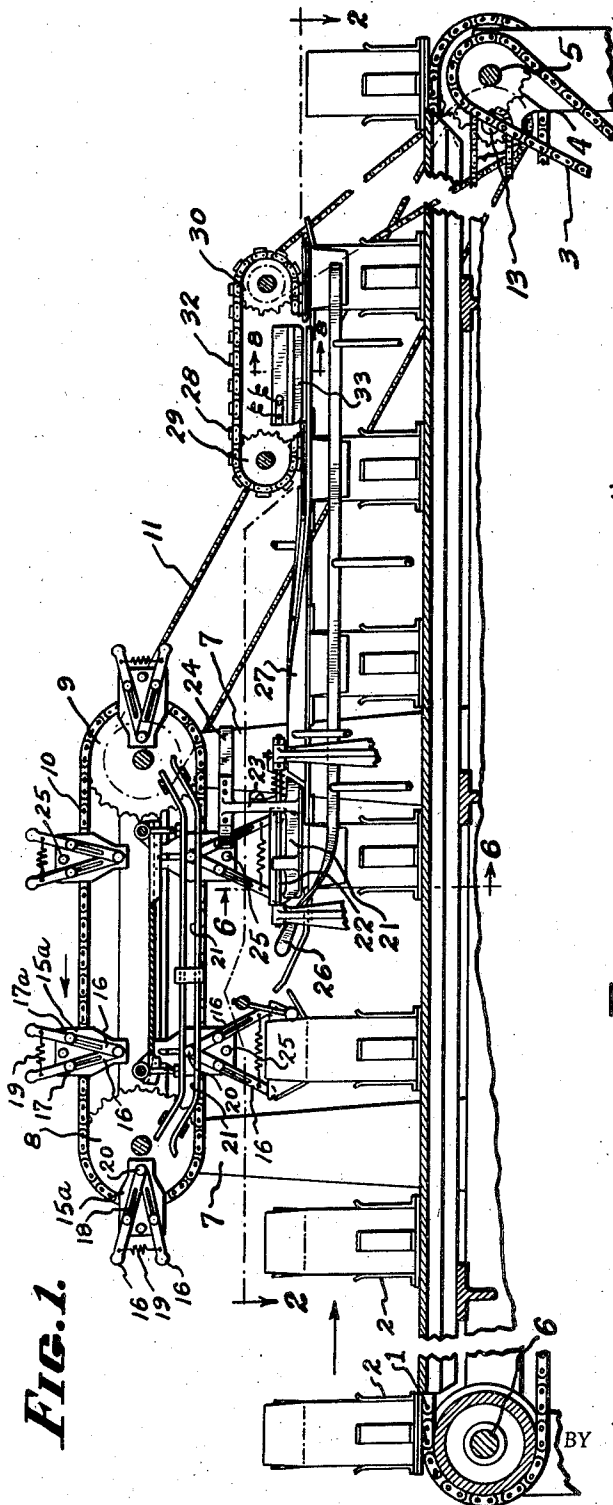
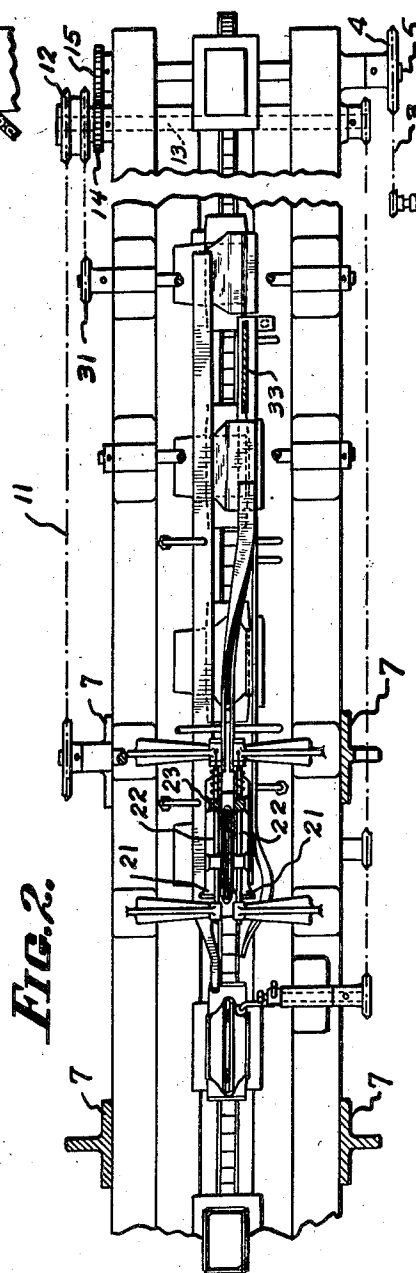


FIG. 2.



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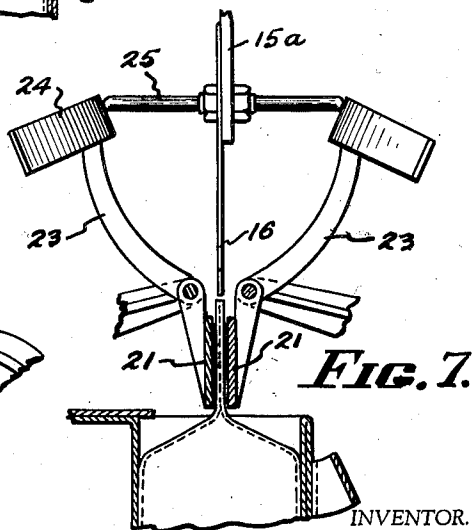
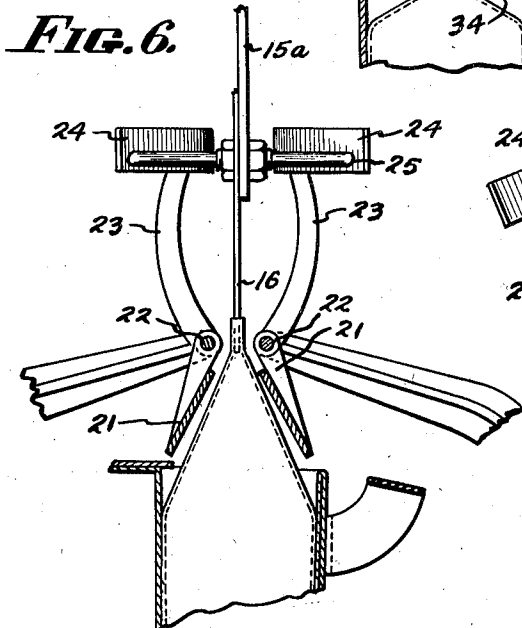
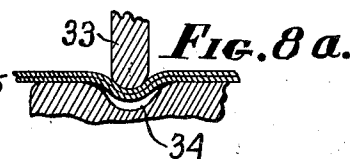
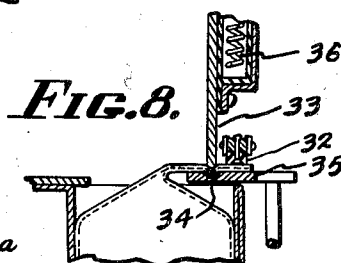
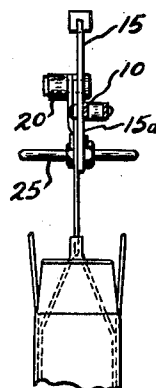
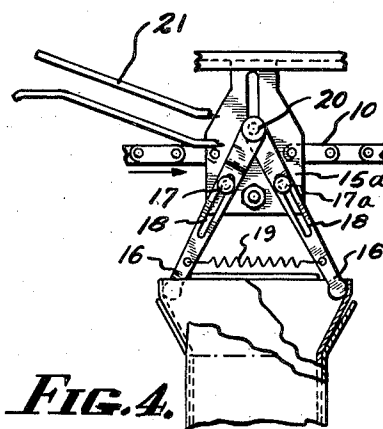
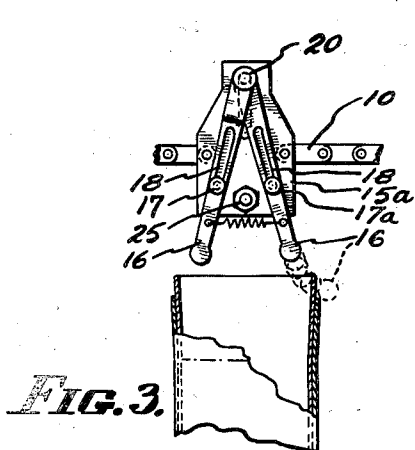
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HERMETIC PACKAGE SEALING

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3 Sheets-Sheet 2



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2,114,622

Filed Aug. 10, 1936

3 Sheets-Sheet 3

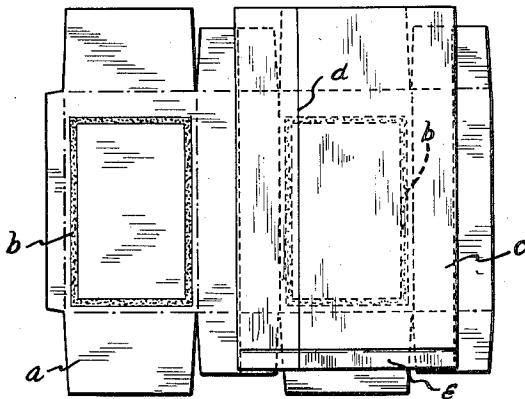


FIG. 9.

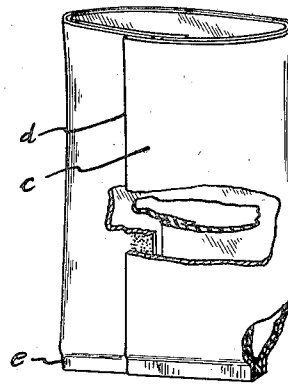


FIG. 10.

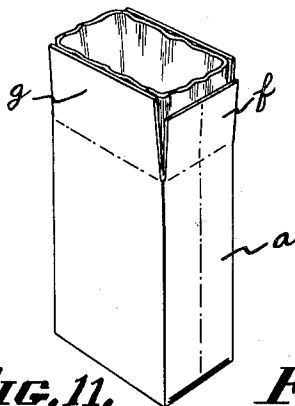


FIG. 11.

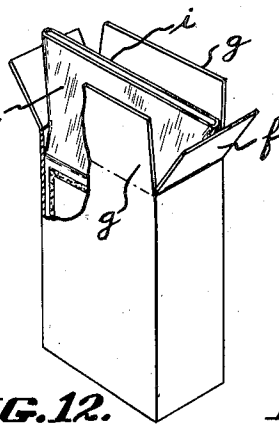


FIG. 12.

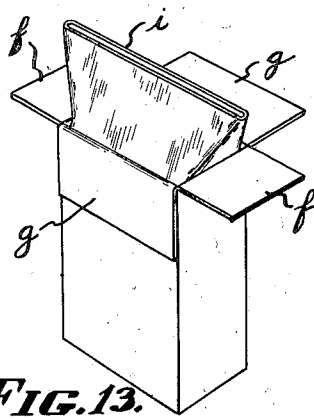


FIG. 13.

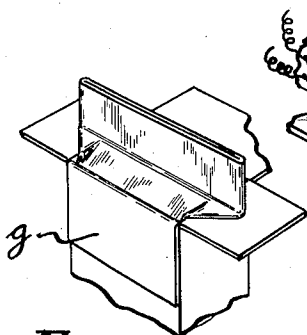


FIG. 14.

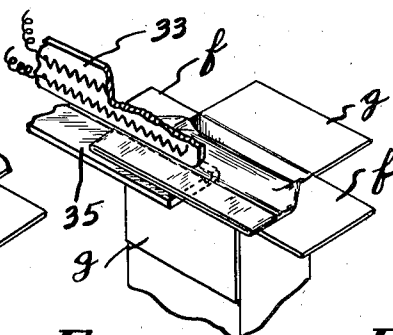


FIG. 15.

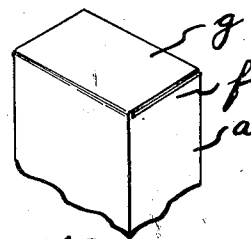


FIG. 16.

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UNITED STATES PATENT OFFICE

2,114,622

HERMETIC PACKAGE SEALING

Robert Morris Bergstein, Cincinnati, Ohio, assignor to Edna May Bergstein and himself, as trustees

Application August 10, 1936, Serial No. 95,124

22 Claims. (Cl. 93—6)

My invention relates to hermetic package sealing, to a machine for accomplishing hermetic sealing, to the sequence of steps which I find preferable for accomplishing the seal and to the hermetically sealed packages themselves.

It is the object of my invention to seal hermetically the open ends of liners or bags within packages having closure flaps attached to the upper edges of the main body of the packages, in which the bag liners are composed of flexible relatively impervious material heat sealable on the interior at least and in which liners all seams are hermetically sealed independent of the outer carton.

In my applications Serial No. 43,570 and Serial No. 66,650 I have disclosed a flat bag made of impervious material, heat sealable on the interior surface at least, having a hermetically sealed long joint and seam at one end. In my applications Serial Nos. 43,569 and 62,324 I have disclosed a container in knocked-down form which consists of said bag enclosed within a relatively stiff-walled outer structure or carton having closing flaps on the ends if desired, the walls of the liner or bag being secured to at least two opposing walls of the carton, and with the seams of the liner or bag formed independently of the seams forming the carton and the ends of the bag or liner projecting free of the closing flaps of the carton.

It is the object of my present invention to effect a final closure or seal in said bag or liner after contents have been inserted therein, that will be equally as effective as the other seams previously formed in the bag, thereby retaining the objective of air-, gas-, and liquid-tightness, in the finished sealed package.

One process in connection with which my package is used consists in filling the interior with an inert gas, to displace the air, before inserting the contents therein so that the interior of the sealed package will thereby be substantially free of air, and so protect the contents, as for example food products, from the harmful effects of oxygen. To retain this inert interior atmosphere the importance of an absolute hermetical closure can be readily recognized, and my invention as disclosed herein relates to an hermetical method of sealing the open end of a bag liner after the contents have been placed therein, and to a method and mechanism whereby a portion of the air or gas contained within the liner is evacuated prior to accomplishing my hermetic seal, to provide for any interior expansion that may occur

thereafter due to changes in temperature or other causes.

While I have illustrated my invention in connection with a novel type of package as set forth in co-pending applications referred to, the method which I employ and the mechanism is adapted for use with any type of package in which the contents of the package are contained in an air-tight or liquid-tight bag liner.

I have referred to my co-pending applications only to illustrate a preferred adaptation of the invention when a relatively impervious lining material is used and the seams are so combined that it will result in either a liquid-tight or gas-tight container. My invention relates to the closing of the open end of the liner after the contents have been inserted therein so as to bring about a final or top seal of the open end of the liner or bag as effective as the other seams of the liner or bag are, in regard to air-tightness and liquid-tightness. Unless all the seams are of equal effectiveness hermetically, regardless of how impervious the bag material itself may be, the finished container will not accomplish my desired result of air-tightness or liquid-tightness, or both.

It is a further object of my invention to eliminate, prior to sealing the open end or mouth of the liner, not only a portion of the air or gas content from the area within the walls of the liner projecting above the hinge lines of the closing flaps, but also to eliminate a portion of the air or gas content within the liner in the area of the main body of the package. Since I accomplish this by a gradual flattening of the mouth of the liner, it is necessary therefore that in cases where the liner is adhesively secured to the main body panels of the carton, that such adhesion does not extend to the upper limit of the main body panels, so that the flattening of the extending walls of the liner will thereby taper a portion of the liner within the main body of the package, and so reduce the cubical area of air or gas within the body of the package itself.

Because my invention provides an hermetical seal for a package the balance of which is air- and gas-tight, the evacuating described above must necessarily be accomplished prior to the application of the final seal and closure, since there is no way of evacuating any of the air or gas content of the sealed package later, as it is then hermetically sealed throughout. Because of the hermetically sealed nature of the finished package it is essential that some portion of the inner cubical area of gas or air be eliminated

prior to sealing, in order to provide some internal expansible area for pressures that may arise due to temperature changes or other causes.

This problem does not arise in connection with packages which are not of an air- or gas-tight nature, where either the liner material itself may be porous, the seams of the liner not be air-tight, or the closing seal not air-tight, or where any one or a combination of these factors exist. In any such cases for example the mouth of the liner can be closed without the preliminary evacuating method which is part of my invention, because any simple folding over of the closed mouth will expell the air freely through the material itself or through the seams or both, and this same free passage of air also prevents any problem of later internal expansion.

It is important to recognize these factors because to the best of my knowledge all existing packages possess the defects outlined. In contrast to this the bag or liner which I have invented as disclosed in the applications previously referred to is made of impervious material, and with seams hermetically closed at all seam portions, so that in sealing this bag after the contents have been inserted therein the problems faced are of a different nature than heretofore experienced. Further it is necessary to effect an hermetical seal for closure that will result in a top seam as effective as the remaining seams of the bag, so that the packed and sealed package retain the desired air-tight and liquid-tight properties. These problems have now been solved by the present invention as disclosed herein.

It is a further object of my invention to make provision for so adhesively securing the bag liner to the walls of the carton that the preparation of the projecting open end of the bag liner by a flattening and folding operation prior to sealing is such that space is left in the package to accommodate the expanding of the walls of the bag liner incident to heat changes or the development of gaseous pressure.

It is also an object of my invention to provide a mechanism wherein a package containing a bag liner is received and carried along and during the movement of the package the upper walls of the bag are extended into an elongated tubular mouth. A further object is the flattening of said walls adjacent to the open end of the liner said flattening to gradually taper down into the main body of the package below the hinge lines of the closure flaps so that the cubical area of the contents of the bag liner will be reduced to compensate for internal expansion within the bag itself and of the bag within the outer container.

A further object of my invention is to provide means to bring extending portions of liner walls, after they have been flattened, into horizontal position substantially in the plane defined by the upper edges of the main body panels, prior to sealing. By this means I am able to retain the flattened condition of the liner walls most effectively; I control fusion of the mouth with the greatest accuracy and minimize any manipulation of the liner subsequent to sealing, which might cause injury to the freshly fused seam.

The above objects and other specific objects to which references will be made in the following description I accomplished by that certain combination and arrangement of parts of which I have illustrated a preferred embodiment.

Referring to the drawings:

Fig. 1 is a side elevation of the package sealing mechanism.

Fig. 2 is a plan view with parts in section taken along the line 2—2 in Figure 1.

Fig. 3 is a detailed side elevation of the mechanism for extending the bag into the form of a flat tubular mouth.

Fig. 4 is a detailed side elevation of the mechanism shown in Fig. 3 with the spreading fingers in a different position.

Fig. 5 is an end view of the mechanism shown in Figs. 3 and 4.

Fig. 6 is an enlarged detailed sectional view along the line 6—6 in Fig. 1.

Fig. 7 is an enlarged detailed sectional view of the mechanism illustrated in Fig. 6 with the parts in a different position.

Fig. 8 is a sectional view taken along the line of 8—8 in Fig. 1.

Fig. 8a is an enlarged fragmentary section showing a portion of the apparatus seen in Fig. 8.

Fig. 9 is a plan view of carton blank with a bag liner in position on the blank.

Fig. 10 is a perspective view of a bag liner.

Fig. 11 is a perspective view of package in the initially squared up position.

Fig. 12 is a perspective view after the formation of the flattened tubular mouth on the bag.

Fig. 13 is a perspective view after the flattened mouth of the bag has been folded down, also showing one of the container side flaps folded down at an angle of 180 degrees.

Fig. 14 is a perspective view of the package after the side walls of the bag have been flattened to provide for air or gas expansion.

Fig. 15 is a perspective view of the package after the bag seam is sealed.

Fig. 16 is a perspective view of the package after the flaps of the outer container have been closed in and sealed.

According to the embodiment of the invention illustrated in the present application, a machine is provided which is particularly adapted to receive a box of cardboard or similar material having its base closed and its upper end opened, and having at its upper end a number of flaps which are adapted to be folded in a manner to provide an adequate seal. Disposed within the box is a bag or liner of suitable heat fusible material such as, for example, rubber hydrochloride sheets, known as "Pliofilm" or the like, having its neck or mouth unsealed and being filled with a loose substance which is to be packaged. It is to be understood that the operations of forming the box and the bag or liner, filling the latter with the material to be packaged, and disposing the same within the box either before or after the filling operation, may be accomplished by means of a machine or machines arranged in advance of that which forms the subject matter of the present application, or obviously, these operations, or certain of the same, may be performed by hand. The equipment comprises a belt or chain conveyor 1, carrying package receiving receptacles 2. The conveyor illustrated is driven by a suitable chain 3, which passes around a sprocket 4 on a shaft 5 at the delivery end of the conveyor. At the receiving end of the conveyor the belt or chain 1 passes around a gear or sprocket mounted on a shaft 6.

The mechanism which spreads out the bag liner within the outer container is mounted on a suitable supporting member 7 and consists of sprockets 8, 9, over which a delivery link chain 10 passes, the movement of the chain being in a counterclockwise direction as illustrated in Fig. 1, it being driven by a chain 11 which en-

gages a sprocket 12 mounted on a shaft 13. The shaft 13 carries a gear 14 which engages a pinion 15 mounted on the shaft 5.

Plates 15a at spaced intervals are mounted on the links of the delivery chain 10. Horizontally pivoted on the plates 15a are the spreading fingers 16, these fingers being pivoted at 17, 17a.

The fingers 16 have slots 18 within which the pivoted pins 17, 17a are slidable. The fingers are drawn together by means of a coil spring 19.

The fingers are further joined together at the pivoted point 20 where a roller is provided which, during the spreading of the fingers, engages in a cam track 21.

The spreading of the bag into a flat tubular mouth is accomplished by the movement of the spreading fingers while the packages themselves are being carried in the receptacles 2, the chain 10 and the spacing of the plates 15 being such that as each receptacle carries a package forward the chain 10 moves a set of spreading fingers so that the ends of the fingers dip down into the package as illustrated in Fig. 1 causing the formation of a flat tubular mouth of the bag. The spreading of the bag to form a flat tubular mouth is the first operation, following which the projecting upper portions of the bag liner are flattened down approximately to the extent the contents will permit, so as to exhaust the air within the bag liner to allow for expansion within the package after the package is closed.

By referring to Figs. 6, 7, one type of mechanism which accomplishes the flattening of the top portions of the bag can be clearly seen.

As the bag moves along the flattened elongated mouth of each bag is carried in between the bag top flattening mechanism. This consists of the shutters 21 mounted on shafts 22, which shafts carry the arms 23 provided at their upper ends with cam plates 24. Each spreading plate assembly 15a carries a stud 25 which engages the cam surface of the plates 24 causing the arms 23 to be spread outwardly as indicated in Fig. 7 and as a result the shafts 22 rock, causing the shutters 21 to fold inwardly so that as the upper portion of the bag liner passes through the shutters, the walls are constricted so as to exhaust the air from within the bag liner.

As the package moves in contact with the bag constricting shutters the closure flaps of the package which extend up adjacent the upper edge of the package are folded down at a right angle to the walls of the package. One of the closure flaps however engages a folding flap 26 which causes this side flap to be folded down substantially parallel with the side wall of the package. The purpose of this flat folding of the side closure flap against the wall of the package is for convenience in making room for the heat apparatus which is to subsequently heat fuse a seam across the flattened upper walls of the bag liner.

The package with the bag liner within it which has its upper walls flattened, moves away from the constricting shutters and the flattened portion of the bag engages folding plates 27 which fold over the constricted upper walls of the bag liner so that they lie parallel with the top edges of the package. It is in this condition that the closure seam in the bag liner is preferably formed.

Referring to Figs. 1, 2 and the detailed view in Fig. 8 it will be observed that an auxiliary chain conveyor carrying resilient pads is provided which hold down the flattened walls of the bag in a position spaced from the area which is heat sealed. Thus I have illustrated the chain conveyor 28

mounted on sprockets 29, 30 which are driven by a sprocket 31 and which carry the pads 32.

When the bag mouth is folded over as indicated in Fig. 8, the upper heating unit 33 curves an area extending across the flattened wall of the bag downwardly into the groove 34 in the supporting plate 35. A resistance coil 36 supplied with electrical current heats up the curving element 33. The mechanism for heat sealing a seam across the upper walls of the bag liner may be modified in various ways.

After the flattened folded end portions of the bag liner are heat sealed the container passes through sealing mechanism which may be of any desired form which folds in the closure flaps of the package, the flattened upper portions of the bag mouth at the ends being folded over with the folding in of the closure flaps of the package. The recently heated fused seam in the bag liner is thus not moved from the position in which it is heat sealed throughout most of its length. A folding of the seam portion of the bag liner immediately after the heat fusing of the seam might result in distortion.

Having thus described the bag sealing mechanism, the various operations which the mechanism presents will now be described step by step as they are illustrated in Figs. 9 to 16. In Fig. 9 I have shown the carton blank (a) having adhesive applied to pre-determined areas therein as indicated at (b). The bag liner (c) having a fused longitudinal seam (d) and a fused lower seam (e) is positioned on the blank and the walls of the carton blank are folded over to provide a flat knock-down container. When the container is set up in rectangular shape the tubular liner, being adhesively secured to opposed walls of the carton, also opens up into rectangular shape.

The carton has end closure flaps (f) and side closure flaps (g). After the carton is set up, the bottom flaps are closed, and the contents dispensed into the package, the appearance of the package is as illustrated in Fig. 11 with the upper walls of the bag liner extending intermediate the closure flaps of the package.

The first operation which may be considered the bag mouth flattening operation is illustrated in Fig. 12 wherein the bag (c) has its upper portions (h) drawn out in the form of a flattened tubular mouth (i).

The next operation is to fold down one of the side closure flaps (g) so that the heat forming operation may be subsequently carried out conveniently. Thereafter the other closure flaps are folded outwardly. This is illustrated in Fig. 13.

The operation of evacuating a portion of the air or gas content which I have illustrated as accomplished by mechanism disclosed in Figures 6 and 7, flattens the opposite extending walls of the bag liner. By referring to Figure 9 it will be observed that the upper edge of the adhesive juncture between the main body panels of carton and the walls of the liner is somewhat below the upper edges of the main body panels of the carton. Thus, as shown in Figure 7 when the shutters which effect the flattening are actuated, the air or gas between the projecting walls of the liner is eliminated and a portion of the air or gas is eliminated from within the main body of the package itself, the bag assuming the appearance as illustrated in Figure 7.

This is a distinctly different problem than that involved in sealing of a package lined with, for example, waxed-paper or other flexible types of

packages in use, in which the mouth can be sealed without first requiring any flattening or folding, because even a simple folding operation after sealing would permit a free passage of air either through the material itself or through the seams, or through the closure, or through any or all of these. In my package, since there is no passage of air after the top seam is made, due to its complete hermetical nature, and were it not for the preliminary flattening step prior to seaming, the extended portion could not be folded into position due to the excess air or gas retained therein.

The bag liner after having its upper walls flattened as illustrated in Fig. 14 next encounters the plate folding device which folds over the flattened mouth so that it lies substantially parallel with the top edge of the package. The position of the flattened top portions of the bag is illustrated in Fig. 15. When the closure flaps *f*, *g*, are folded in sequence, a crease may occur in the flattened wall of the bag along the line of the top edge of the side wall of the package and end creases will occur along the line of the top edges of the end walls of the package. When the package is opened the bag will appear in neatly folded condition with portions of the ends thereof exposed for easy access in opening the bag. Further the folding of the bag readily adapts itself to re-folding after some of the contents of the package have been removed, in order to keep the remainder of the contents in fresh condition.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A device of the character described including in combination, means for receiving and moving a package having flaps adjacent its upper edge and the upper walls of a bag liner projecting upwardly intermediate said flaps, means for elongating projecting walls of the bag liner, means for flattening said projecting walls, means for folding said walls at substantially a right angle, and means for sealing said walls together in the right angularly folded position, in a zone located substantially beyond the initial contact point of said walls.

2. A device of the character described including in combination means for receiving and conveying a package having flaps adjacent its upper edge and containing a bag the upper walls of which have an inner surface which is heat fusible and which project upwardly intermediate said flaps, means for elongating said upper walls of the bag into a flattened tubular mouth, and means for applying pressure to a portion of said flattened walls from one side thereof, and means for rendering support adjacent only to said portion on the opposite side, whereby said portion is deflected without compression, and means to apply heat to said portion while so deflected to effect a juncture between said flattened walls.

3. A device of the character described including in combination means for receiving and conveying a package having flaps adjacent its upper edge and containing a bag the upper walls of which have an inner surface which is heat fusible and which project upwardly intermediate said flaps, means for elongating said upper walls of the bag into a flattened tubular mouth, and means for folding the flattened upper walls of the bag at an angle of substantially 90° and substantially flush with the upper edge of the package, and

means for heat sealing a seam across said upper walls when folded at the 90° angle.

4. A device of the character described including in combination means for receiving and conveying a package having flaps adjacent its upper edge containing a bag the upper walls of which have an inner surface which is heat fusible and which project upwardly intermediate said flaps, means for elongating said upper walls of the bag into a flattened tubular mouth, and means for folding the flattened mouth of the bag at an angle of substantially 90°, and means for producing a deflected zone in said flattened walls when folded at the 90° angle, comprising cooperating members located on opposite sides of said flattened walls, one member deflecting the zone and other member rendering support, and means to apply heat confined substantially to said zone where so deflected.

5. A device of the character described including in combination means for receiving and conveying a package having flaps adjacent its upper edge and containing a bag the upper walls of which are heat fusible interiorly and which project upwardly intermediate said flaps, means for forming said upper walls of the bag liner into a flattened tubular mouth and means operative transverse the direction of movement of said package for flattening the upper walls of the bag liner together to squeeze out the gas within the bag liner and means for sealing by heat the said upper walls above the triangle formed at the ends of the liner incident to flattening and at a zone spaced from the apex of the triangle.

6. In a device of the character described means for drawing out in a flattened tubular mouth the upper walls of a bag liner extending from the upper edge of a package, and means for folding over said flattened tubular mouth at an angle to the direction in which the mouth was originally flattened and means for heat sealing said mouth, said means arranged to apply heat to a deflected zone of the mouth, which zone is subjected to engagement from one side only.

7. In a device of the character described means for forming into a flattened tubular mouth, the upper walls of a bag liner extending from the upper edge of a package, and means for narrowing the upper walls of the bag liner in alignment with said mouth, and means for guiding said upper walls into a position folded at an angle to said bag liner, and means for heat sealing a seam across said upper walls of the bag liner while folded, said means arranged to apply heat to a deflected zone of the mouth, which zone is subjected to engagement from one side only.

8. A device of the character described including in combination means for receiving and moving a package having flaps adjacent to its upper edge containing a bag liner with contents therein, the open mouth of which is heat-sealable on the interior surface at least and projecting free of said flaps, means for elongating said mouth and means operative parallel of elongation to bring the two opposite and elongated walls in flattened relationship and also to cause a partial flattening of said walls within the main body of the package, and means to cause fusion between said walls at a zone substantially beyond initial contact point of said walls.

9. A mechanism for sealing the mouths of bags after filling the same, which comprises means for bringing the walls of the bag together at the mouth in flattened condition, means for retain-

ing said walls so flattened while the bag is moved, means for moving the bag and means for heat sealing the flattened mouth on a line spaced substantially above the apex of the taper to the flattened together walls.

10. A mechanism for sealing the mouths of bags after filling the same, which comprises means for bringing the walls of the bag together at the mouth in flattened condition, means for retaining said walls so flattened while the bag is moved, means for moving the bag and means for heat sealing the flattened mouth on a line above the apex of the taper to the flattened together walls while the carton is moving.

11. A mechanism for sealing over the mouths of filled bags projecting from the tops of cartons, which comprises means for bringing the walls of the bag together at the mouth in flattened condition, means for retaining said walls so flattened while the carton is moved, means for moving the carton, and means for heat sealing the flattened mouth on a line above the apex of the taper to the flattened together walls, said flattening means adapted to pull the walls of the bag inwardly from a point below the top edge of the carton.

12. A machine for sealing the mouths of bags projecting from the tops of an outer container after filling the former, which comprises means for bringing the walls of the bag together at the mouth in flattened condition, means for retaining said walls so flattened while the container is moved, means for moving the container, and means for heat sealing the flattened mouth on a line above the apex of the taper of the flattened together walls, said means comprising a supporting plate and a heating element which are relatively immovable, and past which the container is fed by the moving means.

13. A machine for sealing the mouths of bags projecting from the tops of an outer container after filling the former, which comprises means for bringing the walls of the bag together at the mouth in flattened condition, means for retaining said walls so flattened while the container is moved, means for moving the container, and means for heat sealing the flattened mouth on a line above the apex of the taper to the flattened together walls, said means comprising at least one narrow blade-like element with relation to which the container moves while the bag mouth is being sealed.

14. A machine for sealing the mouths of bags projecting from the top of an outer container after filling the former, which comprises means for bringing the walls of the bag together at the mouth in flattened condition, means for retaining said walls so flattened while the container is moved, means for moving the container, and means for heat sealing the flattened mouth on a line above the apex of the taper of the flattened together walls, without the application of pressure.

15. A machine for sealing the mouths of bags projecting from the top of an outer container after the former have been filled which comprises means for bringing together the bag walls to a flattened vertically extended condition, means for retaining the flattened condition while the container is moving and guiding the flattened portions to a position of an angle from the ver-

tical, means for moving the container, and means for heat sealing the flattened together bag mouth when so positioned.

16. A machine for sealing the mouths of bags projecting from the top of an outer container after the former have been filled which comprises means for bringing together the bag walls to a flattened vertically extended condition, means for retaining the flattened condition while the container is moving and guiding the flattened portions to an angle from the vertical, means for moving the container, and means for heat sealing the flattened together bag mouth when so deflected along a line located above the apex of the taper of the flattened together walls.

17. A machine for sealing the mouths of bags projecting from the top of an outer container after the former have been filled which comprises means for bringing together the bag walls to a flattened vertically extended condition, means for retaining the flattened condition while the container is moving and guiding the flattened portions to an angle from the vertical, means for moving the container, and means for applying heat to a limited zone of deflection in said flattened mouth located substantially above the apex of the taper to the flattened together walls, while said mouth is positioned at said angle.

18. In a machine for sealing the mouths of bags, the combination of means for flattening the mouths of bags thereby tapering the walls upwardly from the level of the contents therein, and means for heat sealing the flattened mouths along a line which is substantially spaced above the apex of the taper.

19. In a machine for sealing the mouths of bags, the combination of means for flattening the mouths of bags thereby tapering the walls upwardly from the level of the contents therein, and means for heat sealing the flattened mouths along a line which is above the apex of the taper, while the bags are moving.

20. In a machine for sealing the mouths of bags, the combination of means for flattening the mouths of bags thereby tapering the walls upwardly from the level of the contents therein, and means for heat sealing the flattened mouths along a line which is substantially spaced above the apex of the taper and above the apexes of the triangles formed at the ends of the mouth incidental to flattening.

21. In a machine for sealing the mouths of bags, the combination of means for flattening the mouths of the bags thereby tapering the wall upwardly from the level of the contents therein, means for turning the flattened portion over toward the body of the bag, and means for heat sealing the turned over portion along a line spaced substantially beyond the line of turning.

22. In a device for sealing the open mouth of a contents-containing bag, the interior surface at least of said mouth being heat sealable, means for elongating and flattening together said mouth walls, retaining said flattened condition, and means for moving said bag relative to other means having a projection to deflect a portion of said flattened area, and applying heat substantially to a line defined by said deflection, without contacting said deflected portion at both sides thereof.

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