May 1, 1945. H. F. WATERS 2,374,793

METHOD OF FLUID-TIGHT PACKAGING

Filed June 20, 1940 2 Sheets-Sheet 1

Fig. 1.

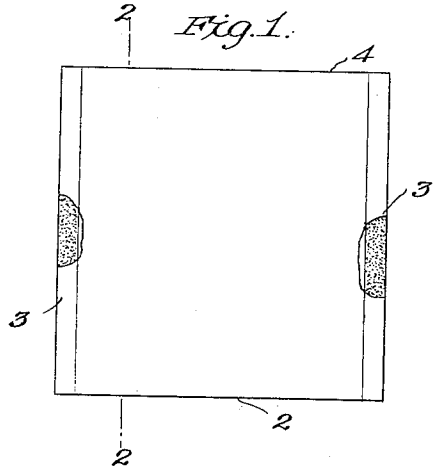


Fig. 2.

Fig. 3.

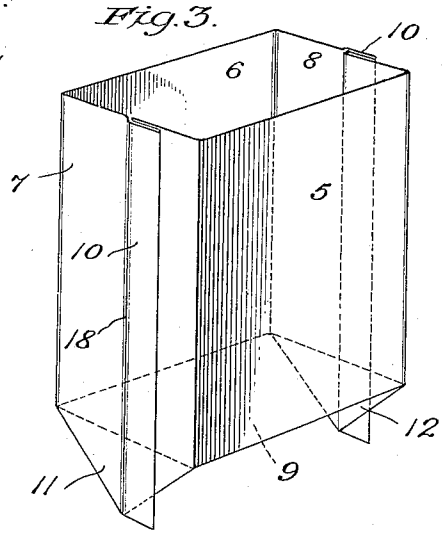


Fig. 4.

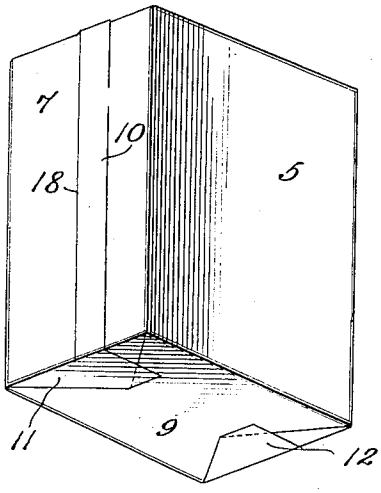


Fig. 5.

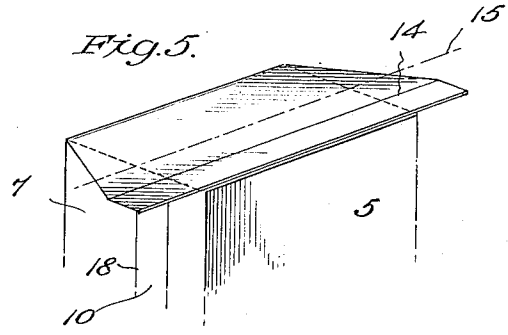


Fig. 6.

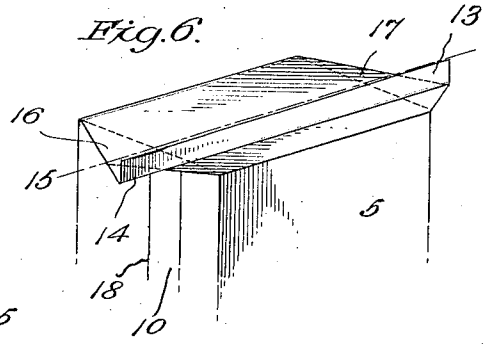
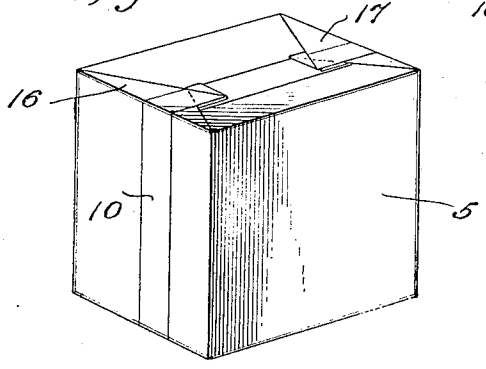


Fig. 7.



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May 1, 1945. H. F. WATERS 2,374,793

METHOD OF FLUID-TIGHT PACKAGING

Filed June 20, 1940 2 Sheets-Sheet 2

Fig. 8.

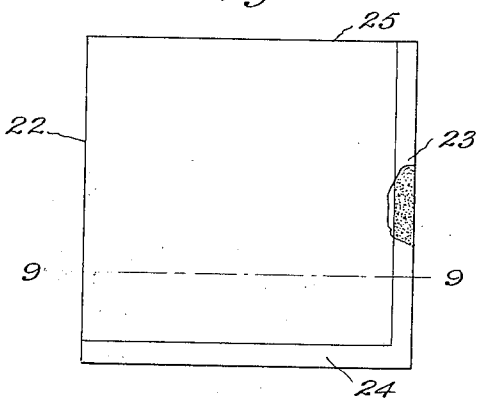


Fig. 9.

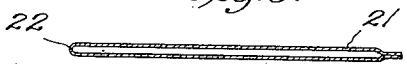


Fig. 10.

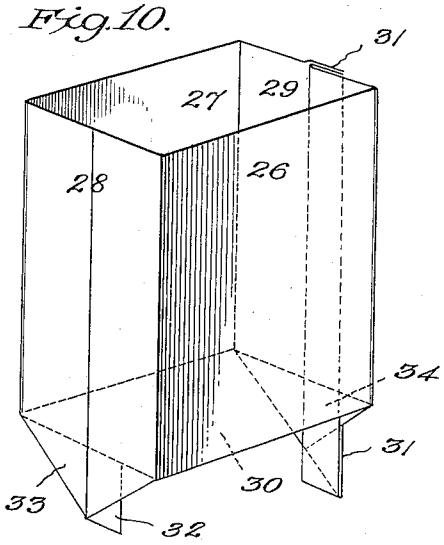


Fig. 11.

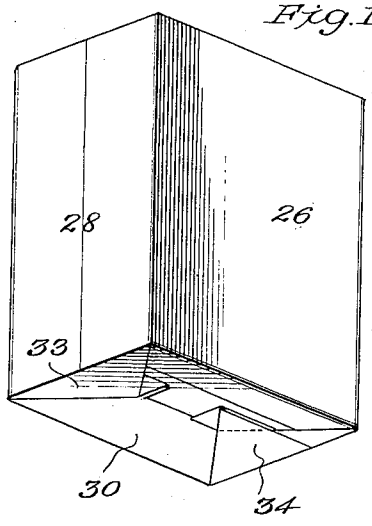


Fig. 13.

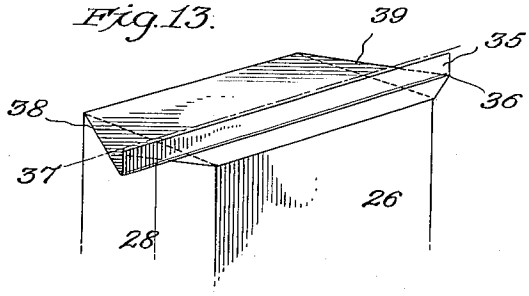


Fig. 14.

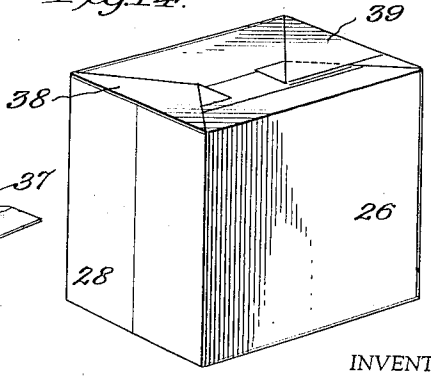
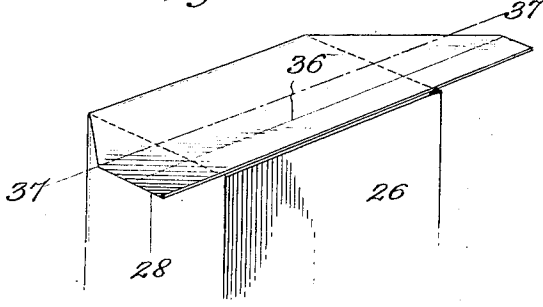


Fig. 12.



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UNITED STATES PATENT OFFICE

2,374,793

METHOD OF FLUID-TIGHT PACKAGING

Harry F. Waters, New York, N. Y.

Application June 20, 1940, Serial No. 341,447

14 Claims. (Cl. 93—3)

The present invention relates to the art of packaging and, more particularly, to a method of fluid-tightly packaging commodities, and to the products of such method.

In my copending application, Serial No. 337,112, filed May 25, 1940, I have disclosed various types of bags of the automatically opening bottom type for the purpose of fluid-tight packaging. The present invention is related to this application and is concerned with a method of fluid-tight packaging in which bags of a novel type are employed in such a manner that exclusively flat seams are employed both for forming the bag or envelope and for sealing the contents therein.

It is an object of the present invention to provide a method of packaging food-stuffs and similar commodities to be preserved in a hermetically sealed condition.

It is another object of the present invention to provide a novel and improved method of fluid-tightly packaging commodities, including food stuffs, which involves providing an integrally formed flat envelope free from re-entrant folds and intervening layers, squaring-up said envelope, filling the envelope with a commodity to be packaged, and finally sealing the squared-up and filled envelope with a completely flat, transverse seal.

It is a further object of the invention to provide a packaging method capable of producing fluid-tight packages which are completely free from danger points of leakage including reentrant folds, intervening and doubled up layers of materials, and the like.

It is also within the contemplation of the invention to provide a novel type of hermetically sealed package integrally formed of a single sheet of material, fluid-tight and fusible on at least the inner face thereof, exclusively with flat and leakage-proof seams.

The invention also contemplates a fluid-tight package of the described character which is simple in structure, satisfactory in operation and which may be manufactured on a practical and commercial scale at a low cost.

Other and further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 illustrates a top elevational view of a fluid-tight envelope employed in carrying the principles of the invention into practice;

Fig. 2 depicts a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 shows a perspective view of the envelope illustrated in Fig. 1 in its squared-up condition;

Fig. 4 is a similar view of the squared-up envelope with its bottom tabs folded towards each other and ready for filling;

Fig. 5 illustrates a perspective view, somewhat fragmentary in character, of the mouth portions of the squared-up and filled envelope bent down into a substantially horizontal position preliminary to forming the top seal;

Fig. 6 depicts a similar view of the top portions of the squared-up envelope in the position in which the transverse and flat top seal is applied thereto;

Fig. 7 is a similar perspective view of the finished fluid-tight package;

Fig. 8 illustrates a top elevational view of a modified fluid-tight envelope for the purposes of the method of the invention;

Fig. 9 depicts a sectional view taken on line 9—9 of Fig. 8;

Fig. 10 shows a perspective view of the envelope depicted in Figs. 8 and 9 in its squared-up condition;

Fig. 11 is a similar view of the squared-up envelope at a later stage of the manufacturing process and immediately prior to filling;

Fig. 12 illustrates a fragmentary perspective view of the upper terminal portions of the filled envelope bent down into a plan vertical to the main panels thereof;

Fig. 13 depicts a similar view of the upper terminal portions of the envelope in the sealing position; and

Fig. 14 shows the modified package in its completely sealed and finished condition ready for shipment.

Broadly stated, I have discovered that in the fluid-tight packaging of various commodities on a commercial scale, great advantages are obtained by employing a packaging structure in which only completely flat seams are employed. As those skilled in the art know, in the art of fluid-tight packaging it was already suggested to employ a container structure constituted of an outer carton having at least some rigidity and strength and a flexible inner liner of fluid-tight character which is either integrally formed of a thermoplastic and fusible, fluid-tight material or which is constituted of a sheet of non-fusible material having a fluid-tight and fusible coating or layer bonded thereto. A large variety of such thermoplastic and fluid-tight materials is now available on the market, preferred materials being a rubber hydrochloride product sold under the name of Pliofilm or certain vinyl resins such as Vinylite. This carton and

liner were combined into a composite packaging structure in which the carton provided the mechanical strength and the liner assured the fluid-tight character of the container. Preferably, the fluid-tight liner was integrally formed of a single piece of material, the edges of which were fluid-tightly secured together by means of heat-sealing. I have now found that in a large number of cases it is advantageous to dispense with the external re-inforcing carton and to employ only a fluid-tight and flexible sheet formed into an envelope, filled with the commodity to be packaged and then hermetically sealed.

Various important considerations have to be observed in order to provide a package which is positively fluid-tight and which is free from danger points of leakage. The most essential of these considerations is that all of the seams of the envelope and of the package resulting therefrom must be of such character that only two layers of material are placed into a face to face relationship and that reentrant folds and intervening layers of material must be completely absent in the sealing regions. A second likewise important consideration is that in the finished package the sealing regions and seams should be protected by a fold to avoid excessive pressure and possible rupture of the sealed areas during shipment and storage of the finished package. This is accomplished by placing the seams beyond a fold. The first and second conditions imply that also the top seam, sealing the package after it has been filled, should be of a completely flat character and should not contain more than two layers of material placed in a face to face relation. This is accomplished by flattening the mouth portions of the filled envelope or bag into a face to face relationship and then heat-sealing such flattened portions.

In carrying the method of the invention into practice, I provide first a completely flat envelope which is preferably formed by folding a sheet of material, fluid-tight and fusible on at least one face thereof, along a longitudinal or along a transverse medial line. This folding operation will bring the edges of the sheet into a substantially registering position and will provide a folded sheet closed at one edge and open at three edges. I now heat-seal two of these three edges whereby an envelope is obtained having three closed edges and one open edge adapted to serve as a filling opening. This envelope structure may now be squared-up by means of a suitable device, such as a former, or the like, whereby the seams of the envelope are converted into fins running along at least one of the side panels and in some cases across the bottom panel. The squared-up envelope is filled with the commodity and hereafter the top or mouth portions of the filled envelope are sealed.

I have found that the lateral fin extending along one of the side panels of the squared-up envelope provides a reinforcing rib which prevents bringing together the collapsed mouth portions unless the walls of the envelope are extended to a substantial height above the level of the contents. This, of course, would involve considerable waste of expensive material. On the other hand, I have also discovered that by bending down these upper terminal portions of the envelope into a substantially horizontal position and in the direction in which the lateral fin or fins are pointing, it is possible to completely flatten out the mouth portions of the envelope including the top portions of the lateral fins. Therefore, by means of this simple expedient it is possible to bring the full length of the mouth portions into a single plane in which only two layers of material are placed into a face to face relation so that the desired completely flat top seam may be obtained. After this sealing operation has been completed, the resulting tabs may be folded towards each other and the package may be completed as it will be explained more fully as the description proceeds.

Referring now more particularly to Figs. 1 to 7 of the drawings, a preferred embodiment of the invention will be described.

Fig. 1 illustrates a plan view of an envelope for forming the fluid-tight packages of the invention. This envelope is constituted of a sheet 1 of flexible material which is fluid-tight and fusible on at least one face thereof and which is folded along a transverse medial line 2 to bring its edges into a substantially registering position. This flexible sheet may be made of Pliofilm or some other integrally fusible material. I prefer, however, to employ a paper sheet having a layer or film of thermoplastic material bonded thereto. After the sheet has been folded, it is converted into an envelope by applying two heat-seals 3 along its two lateral marginal portions. The envelope thus obtained is completely closed at its two lateral edges and at its bottom edge, and is open for the introduction of material at its top edge 4.

When it is desired to fill this fluid-tight envelope and to form a hermetically sealed package therefrom, it is squared-up into the position illustrated in Fig. 3. This may be accomplished manually but, of course, in most cases a suitable machine or device will be employed to carry out this operation in a more or less automatic manner. As it will be readily observed in Fig. 3, after squaring-up the envelope a rectangular bag will be provided having a pair of oppositely disposed main panels 5 and 6 and a pair of oppositely disposed end panels 7 and 8. In addition, a bottom wall or panel 9 is formed which is substantially at right angles to the plane of said main and end walls or panels. The sealed marginal strips 3 will be converted into lateral fins 10 extending along the medial lines of end panels 7 and 8 and flattened in the plane of said end panels. The end panels and the bottom panel merge in the form of tabs 11 and 12 which may be folded in the plane of bottom panel 9 in the position illustrated in Fig. 4 and may be adhesively secured in such position. In this condition the envelope is fully prepared for the introduction of the contents.

After the squared-up envelope has been filled with the contents, it is necessary to bring together the mouth portions of the envelope or bag into a flattened relation. The obvious procedure would be to pull the lateral ends of the mouth portion apart. It will be found, however, that this is not possible unless the upper portions of the envelope would extend to a very substantial length above the level of the contents, which, of course, would involve great waste of expensive fluid-tight material. This is due to the fact that fins 10 are directed in a plane which is vertical to the plane of the opposed mouth walls of the container and act as reinforcing ribs preventing displacement of such mouth portions in the desired direction. To avoid this difficulty, I bend the upper terminal portions of the envelope into a substantially horizontal direction and in the

direction in which fins 10 are pointing, as this is shown in Fig. 5. This manipulation will have the effect of bringing the full length of the mouth portions, including the upper end of fins 10, into a single plane, to wit: into a plane vertical to that of the main and end panels. Thus, a completely filat sealing region is provided transversely extending across the mouth portions of the envelope.

While it is possible to apply heat and pressure to this completely flat sealing region already in this condition of the filled envelope, it is preferred to fold the extremity of the envelope upwards along a line 14 which is remote from center line 15 of the package, as this is indicated in Fig. 6. In this condition a standard heat-sealing machine can readily apply a transverse and flat heat-seal 13 across the mouth portions of the envelope. After the top seal has been provided, the sealed region may be folded down along line 14 in a horizontal plane and the resulting tabs 16 and 17 may be folded together and adhesively secured, as this appears in Fig. 7 showing the fluid-tight package in its finished form.

It will be readily noted that this fluid-tight package satisfies all of the conditions which in the foregoing were stated to be essential for the provision of a fluid-tight package. Thus, the finished package has sealed regions along three marginal strips corresponding to strips 3 in the envelope, which are subsequently converted into fins 10, and flat top seal 13. All of these three sealed regions are completely flat and reentrant folds, intervening layers, doubled-up layers and similar danger points of leakage are completely absent therefrom. Moreover, all of these sealed regions are located beyond fold lines in the finished package. Fins 10 are beyond fold lines 18 while seam 13 is protected by and is beyond fold line 14. Therefore, a positively fluid-tight package structure of strong and well protected character is obtained.

Figs. 8 to 14 illustrate a modified embodiment of the invention which in most respects is closely similar to the one described in the foregoing. While in the previous embodiment a sheet fluid-tight and fusible on at least one face thereof was converted into an envelope by folding it along a transverse medial line and heat-sealing two parallel edges thereof, in the second or modified embodiment a similar sheet of flexible material is folded along a longitudinal medial line to bring its edges into registering position and is heat-sealed along one lateral marginal strip and a bottom marginal strip. This will be readily observed in Figs. 8 and 9 showing a sheet 21 folded along a longitudinal medial line 22 and provided with a lateral heat-sealed marginal strip 23 and a heat-sealed bottom marginal strip 24. In this manner an envelope structure is provided having an opening 25 at the top edge thereof through which the contents may be introduced thereinto. The manipulations followed in forming up, filling and sealing this modified envelope are closely similar to the procedure followed in the foregoing embodiment. The envelope is first squared-up by means of a suitable device whereby the structure illustrated in Fig. 10 is obtained. This squared-up structure has oppositely disposed main panels 26 and 27 and similarly disposed end panels 28 and 29. Likewise, a bottom panel 30 is formed in a plane at right angles to the planes of said main and end panels. As it will be readily observed in Fig. 10, lateral seam 23 of the envelope will be converted into a lateral fin 31 extending along the medial line of end panel 29 and flattened in the plane thereof. Bottom seam 24 will be converted into a bottom fin 32 which is running along a transverse medial line of bottom panel 30 and is flattened in the plane thereof. Two tabs 33 and 34 will be formed at the region where the end panels 28 and 29 merge with the bottom panel 30. These tabs may be folded towards each other and adhesively secured to the outer surface of the bottom panel whereby the structure shown in Fig. 11 is obtained. This bag has a flat bottom and a squared-up wall structure and may be filled with the commodity to be packaged in any desired manner. After the squared-up envelope has been filled with contents, its top marginal portions have to be sealed with a completely flat and fluid-tight seal. The procedure followed is similar to the one described in connection with Figs. 1 to 7. First of all, the upper terminal portions of the envelope are bent down into a substantially horizontal plane above the level of the contents, the direction of bending being the same as the direction in which lateral fin 31 is pointing. Hereafter, the flattened mouth portions 35 are folded up along the line 36 remote from the center line 37 of the package and these flattened mouth portions are heat-sealed to provide closure of the contents. After the sealing operation has been accomplished, the sealing region 35 may be folded down in the plane of the top panel and the resulting tabs 38 and 39 may be folded together and adhesively secured. It will be noted that tabs 38 and 39 are of unequal length due to the fact that tab 39 has the top portion of lateral fin 31 incorporated therein.

The resulting finished and sealed package is illustrated in Fig. 14. It will be readily appreciated that this package is completely fluid-tight in character and is constituted of an integral sheet of material the edges of which are fluid-tightly secured together by completely flat and heat-sealed seams. Likewise, it will be observed that all of the heat-sealed regions are located beyond a fold and are adequately protected.

It will be noted that the advantages provided by the present invention are numerous. Thus, first of all, a novel and improved method of fluid-tight packaging is obtained in which an extremely simple envelope-type structure is employed formed from a single sheet of material by means of positively fluid-tight and well protected seams.

It is also to be observed that the packaging method of the invention includes a novel procedure for sealing the top portions or mouth opening of a fluid-tight package with a completely flat and leak-proof seam.

Moreover, the present invention teaches a novel type of fluid-tight package containing a predetermined amount of merchandise in a positively and permanently fluid-tight condition so that the package merchandise may be preserved in such hermetically sealed condition indefinitely.

Although the present invention has been disclosed in connection with a few preferred embodiments thereof, variations and modifications may be resorted to by those skilled in the art without departing from the principles of the present invention. Thus, although the packages disclosed in the foregoing are constituted of a single sheet of material, my invention is likewise applicable to materials of a composite character in which two or more layers of flexible material are laminated, bonded or spotted to each other.

Likewise, it is also possible to insert the finished package into a carton to further reinforce the same or to increase the utility or the attractive appearance of the finished product. I consider all of these variations and modifications to be within the true spirit and scope of my invention as disclosed in the foregoing description and defined by the appended claims.

I claim:

1. The method of fluid-tight packaging which comprises providing a flat envelope constituted of a flexible material fluid-tight and fusible on at least one face thereof folded over along a line to have its edges in a substantially registering position and sealed along two marginal strips, said envelope having only two layers of said material in face to face position including said sealed marginal strips, squaring-up said envelope to form a pair of main panels and a pair of end panels and a bottom panel and to convert said sealed marginal strips into medial fins flattened in the plane of said panels, filling said squared-up envelope with contents, bending down the upper terminal portions of said envelope into a plane transverse to that of said main and end panels and in the direction in which said fins extend, flattening the bent down mouth portions of said envelope in a single plane including the topmost portions of the lateral fin, and applying a completely flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained having a uniform number of layers incorporated in its sealing regions and being free from reentrant folds and intervening layers of material and from similar danger points of leakage.

2. The method of fluid-tight packaging which comprises providing a flat envelope constituted of a sheet of paper having a layer of fluid-tight and fusible material bonded thereto folded over along a line to have its edges in a substantially registering position and sealed along two marginal strips, said envelope having only two layers of said material in face to face position including said sealed marginal strips, squaring-up said envelope to form a pair of main panels and a pair of end panels and a bottom panel and to convert said sealed marginal strips into medial fins flattened in the plane of said panels, filling said squared-up envelope with contents, bending down the upper terminal portions of said envelope into a plane transverse to that of said main and end panels and in the direction in which said fins extend, flattening the bent down mouth portions of said envelope in a single plane including the topmost portions of the lateral fin, bending said flattened mouth portions upwards along a line spaced from the center line of the package, and applying uniform heat and pressure along a narrow strip across said bent up mouth portions to form a completely flat top seal whereby a hermetically sealed fluid-tight package is obtained having a uniform number of layers incorporated in its sealing regions and being free from reentrant folds and intervening layers of material and from similar danger points of leakage.

3. The method of fluid-tight packaging which comprises providing a flat envelope constituted of a sheet of paper having a layer of fluid-tight and fusible material bonded thereto folded over along a transverse medial line to have its edges in a substantially registering position and sealed along two lateral marginal strips, said envelope having only two layers of said material in face to face position including said sealed marginal strips, squaring-up said envelope to form a pair of main panels and a pair of end panels and a bottom panel and to convert said sealed marginal strips into medial fins flattened in the plane of said end panels, filling said squared-up envelope with contents, bending down the upper terminal portions of said envelope into a plane transverse to that of said main and end panels and in the direction in which said fins extend, flattening the bent down mouth portions of said envelope in a single plane including the topmost portions of said lateral fins, bending said flattened mouth portions upwards along a line spaced from the center line of the package, and heat-sealing said bent up flattened mouth portions with a complete flat top seal whereby a hermetically sealed fluid-tight package is obtained having a uniform number of layers incorporated in its sealing regions and being free from reentrant folds and intervening layers of material and from similar danger points of leakage.

4. The method of sealing the top filling opening of a package squared-up from a flat envelope having only two layers of material in face to face position including its seams to form oppositely disposed pairs of main panels and end panels and having a medial fin extending along and in the plane of at least one of said end panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained having a uniform number of layers incorporated in its sealing regions and being free from reentrant folds and intervening layers of material and from similar danger points of leakage.

5. The method of sealing the top filling opening of a package squared-up from a flat envelope having only two layers of material in face to face position including its seams to form oppositely disposed pairs of main panels and end panels and having a medial fin extending along and in the plane of at least one of said end panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction in which said fin extends, flattening the mouth portions of said package in a single plane including the top portions of said fin, bending said flattened mouth portions upwards along a line remote from the center line of the package, and then applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained having a uniform number of layers incorporated in its sealing regions and being free from reentrant folds and intervening layers of material and from similar danger points of leakage.

6. The method of sealing the top filling opening of a package squared-up from a flat envelope to form oppositely disposed pairs of main panels and end panels and having a medial film extending along and in the plane of at least one of said end panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth por-

tions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

7. The method of sealing the top filling opening of a package squared-up from a flat envelope to form oppositely disposed pairs of main panels and end panels and having a medial fin extending along and in the plane of at least one of said end panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction in which said fin extends, flattening the mouth portions of said package in a single plane including the top portions of said fin, bending said flattened mouth portions upwards along a line spaced from the center line of the package, and then applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

8. The method of sealing the top filling opening of a package having oppositely disposed pairs of main panels and side panels and having a medial fin extending along and in the plane of at least one of said side panels, which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

9. The method of sealing the top filling opening of a package having oppositely disposed pairs of main panels and end panels and having a medial fin extending along and in the plane of at least one of said end panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

10. The method of sealing the top filling opening of a package having oppositely disposed pairs of main panels and side panels and having a medial fin extending along and in the plane of at least one of said side panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction in which said fin extends, flattening the mouth portions of said package in a single plane including the top portions of said fin, bending said flattened mouth portions upwards along a line spaced from the center line of the package, and then applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

11. The method of sealing the top filling opening of a package having oppositely disposed pairs of main panels and end panels and having a medial fin extending along and in the plane of at least one of said end panels which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction in which said fin extends, flattening the mouth portions of said package in a single plane including the top portions of said fin, bending said flattened mouth portions upwards along a line spaced from the center line of the package, and then applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

12. The method of sealing the filling opening of a package having oppositely disposed pairs of main panels, side panels and an end panel, and having a medial fin extending along and in the plane of at least one of said panels, which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

13. The method of sealing the filling opening of a package having oppositely disposed pairs of side panels, end panels and a main panel, and having a medial fin extending along and in the plane of at least one of said panels, which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

14. The method of sealing the filling opening of a package having oppositely disposed pairs of end panels, main panels and a side panel, and having a medial fin extending along and in the plane of at least one of said panels, which comprises bending down the upper terminal portions of said package into a substantially horizontal plane in the direction determined by said fin, flattening the mouth portions of said package in a single plane including the top portions of said fin, and applying a flat transverse seal across said flattened mouth portions whereby a hermetically sealed fluid-tight package is obtained free from reentrant folds and intervening layers of material and from similar danger points of leakage.

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