

June 22, 1943.

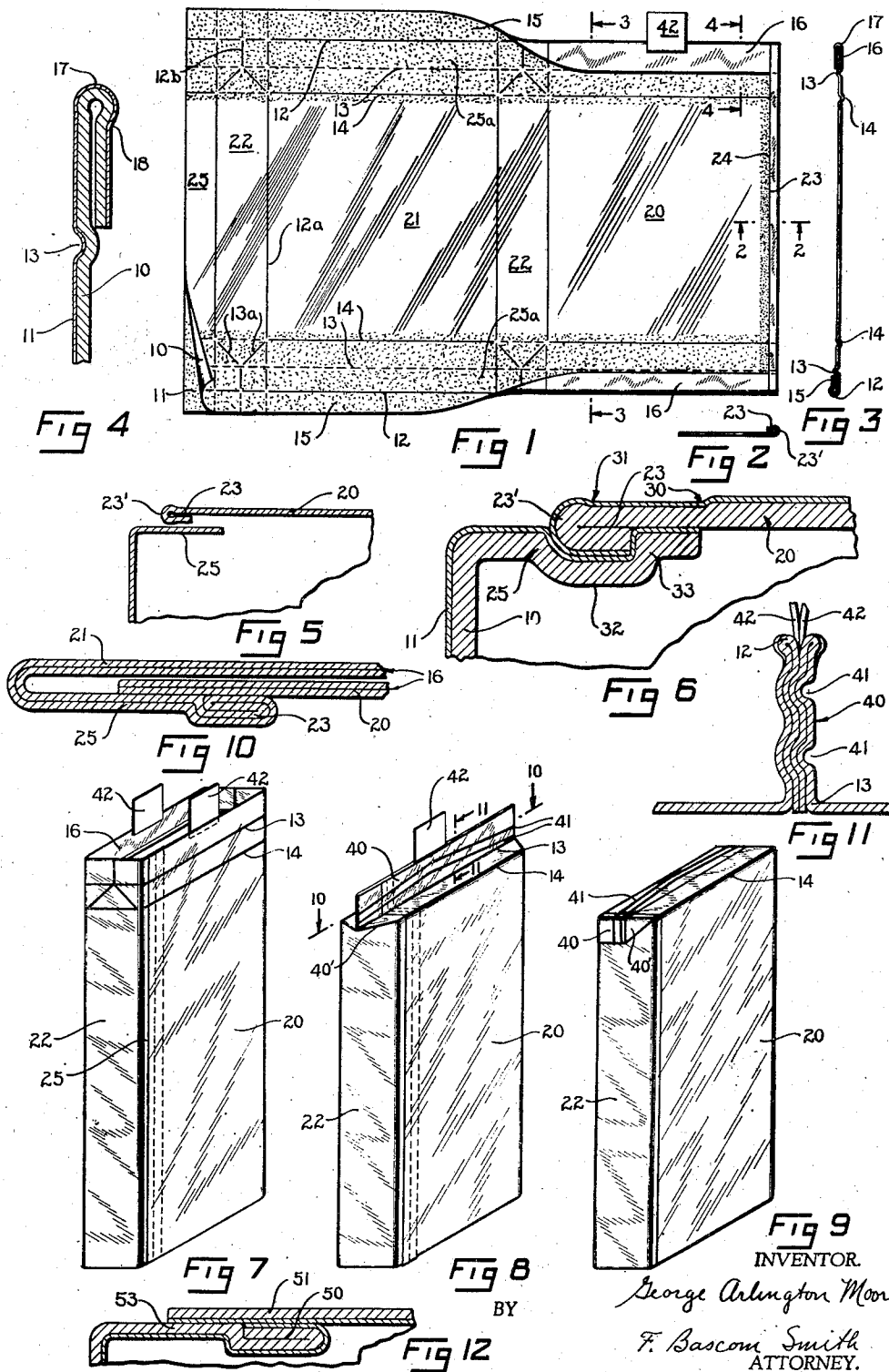
G. A. MOORE

2,322,654

CONTAINER

Filed Nov. 30, 1937

2 Sheets-Sheet 1



June 22, 1943.

G. A. MOORE

2,322,654

CONTAINER

Filed Nov. 30, 1937

2 Sheets-Sheet 2

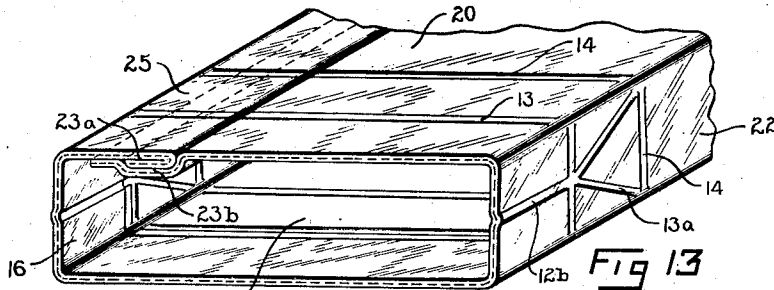


Fig 13

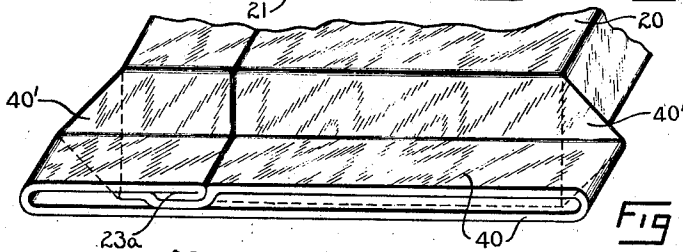


Fig 14

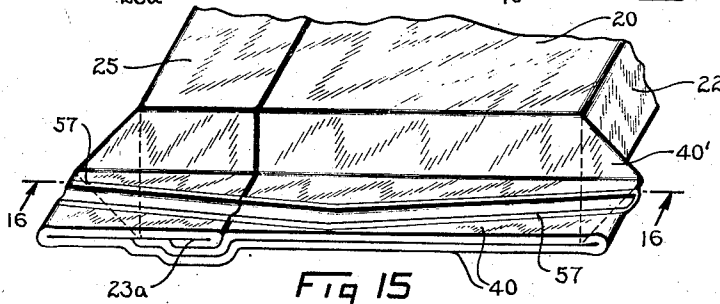


Fig 15

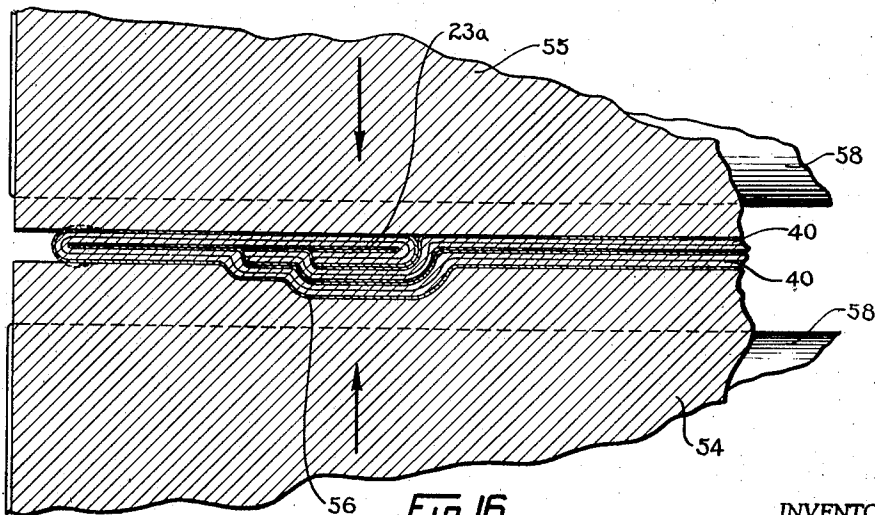


Fig 16

BY

INVENTOR.
George Arlington Moore
F. Bascom Smith
ATTORNEY.

UNITED STATES PATENT OFFICE

2,322,654

CONTAINER

George Arlington Moore, Louisville, Ky., assignor
to Humoco Corporation, Louisville, Ky., a cor-
poration of Delaware

Application November 30, 1937, Serial No. 177,176

4 Claims. (Cl. 229—55)

This invention relates to receptacles and more particularly to containers of the type formed from a folded blank and to methods and means for making the same.

In my previous application Serial No. 153,705, I disclosed a container of the type used for packaging tobacco and similar products. The container was shown as formed from a laminated blank which comprised an inner layer of fibrous material, such as paper, and an outer layer of impervious material, such as metal foil. The bottom and top closure seams included hems formed by infolding opposite edges of the blank to thereby provide a metal-to-metal contact and, hence, prevent wicking of moisture into or out of the container by the fibrous material. The ends of the folded blank formed an overlapped seam extending longitudinally of the container, said end being secured by a suitable adhesive material such as a thermoplastic lacquer. This construction is well suited to certain types of materials and provides a moisture-proof container in which tobacco or the like may be kept for long periods of time without change in the moisture content thereof. It has been found, however, that when the blank is made of the above materials or when the fibrous layer is thick with respect to the layer of impervious material, there may be a tendency for the latter to crack or break at the sharp bends and corners and thereby expose the fibrous material for transfer of moisture.

It is accordingly an object of the present invention to provide a novel and improved construction wherein cracking or breaking of the non-hygroscopic impervious layer of the blank at the folds is obviated even when the blank is made of thin, fragile material.

A further object is to provide a novel method and means for sealing the closure seams of a container of the above type.

A still further object is to provide a container adapted to be made from a blank comprising a layer of metallic material integrally secured to a fibrous sheet, said blank being folded in a novel manner to form a substantially impervious container having a total of three metal-to-metal seams.

Another object is to provide a container made from a laminated blank comprising fibrous and metallic materials integrally secured together and treated in a novel manner with sealing substance and with means for lubricating the fibrous material in the region of the lines of fold whereby

the production of an impervious container is insured.

Still another object is to provide a novel method of folding and sealing a blank to form an impervious container, the rigidity of which is materially enhanced by the folds and seams.

Another object is to provide a novel and improved container of the above type which is easy and inexpensive to manufacture, convenient and dependable in operation and highly efficient for the purpose intended.

Another object is to provide a novel and improved method of preparing, folding and sealing a blank to form a container of the above type.

Another object is to provide a container of the above type having a novel and improved folded hem at the bottom and top closure seals and also at the longitudinal seam.

The above and further objects and novel features of the invention will more fully appear from the following description when the same is taken in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention, reference for this latter purpose being had primarily to the appended claims.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

Fig. 1 is a development, with parts infolded, of the inner surface of a partially prepared blank which may be employed in making one form of container comprehended by the present invention;

Fig. 2 is a detail view taken on the line 2—2 of Fig. 1;

Fig. 3 is an end view taken on the line 3—3 of Fig. 1;

Fig. 4 is a partial section, on an enlarged scale, taken on line 4—4 of Fig. 1;

Fig. 5 is a transverse section through the longitudinal seam before the sealing operation;

Fig. 6 is an enlarged transverse section through the seam after the sealing operation;

Fig. 7 is an isometric view of the container body before making the top closure;

Fig. 8 is a similar isometric view showing the top sealing flange or closure seam in upstanding position;

Fig. 9 is a similar isometric view showing the finished top closure;

Fig. 10 is an enlarged transverse section taken

substantially on line 10—10 of Fig. 8 prior to the sealing of the end closure seam;

Fig. 11 is an enlarged section taken along line 11—11 of Fig. 8 after the sealing of the end closure seam;

Fig. 12 is an enlarged transverse section similar to Fig. 6, but showing a different embodiment in which the fibrous material is on the outside and the impervious material on the inside;

Fig. 13 is a partial isometric view of an open-ended container body employed in making another embodiment of the invention;

Fig. 14 is a similar view showing the end closure prior to sealing thereof;

Fig. 15 is a similar view showing the end closure sealed and embossed; and,

Fig. 16 is an enlarged view, partly in section and with parts broken away, showing the novel sealing dies for forming an end closure seam, the section through said closure seam being taken substantially on line 16—16 of Fig. 15.

Referring to the drawings more in detail, the blank shown in Fig. 1 comprises a layer of fibrous material 10, such as paper or the like and a layer of impervious material 11, such as sheet aluminum composition foil, tin foil, or other metallic or non-hygroscopic material. It is to be understood that the layers may be of any desired relative thickness and that they may be integrally secured together throughout their entire areas by a suitable adhesive, such as an adhesive which will not crystallize but will have a degree of flexibility adapted to prevent cracking or flaking when the blank is folded. In the end and sectional views of the drawings, laminated blank 10, 11 has, in the interest of clarity, been shown as comprising a single thickness instead of a double thickness, except in figures wherein very large scales are employed, i. e., in Figs. 4, 6, 7 and 17.

The layer of impervious material 11 may be coated or cast on the outer surface thereof, i. e., on the surface thereof opposed to that which is adhered to paper lamina 10, with a lacquer such as a thin, dry film of cellulose acetate having thermoplastic adhesive properties. DuPont's nitro-cellulose lacquer No. X-660-208, which is a cotton base thermoplastic, has also been found suitable for this purpose. Such lacquers have the property of forming a protective film over the surface of the foil and producing a gloss and, at the same time, are heat-fusible so that superposed surfaces can be readily joined by suitable application of heat and pressure. Because of the extreme thinness of the lacquer coating on foil lamina 11 and in the interest of clarity no attempt has been made in the drawings to show said coating in any of the sectional or end views of the blank. The presence of this coating has been indicated, however, by shade lines in all of the figures in which any part of the coated surface appears in elevation.

In preparing blank 10, 11 for folding, the same is preferably embossed in a novel manner to provide a plurality of grooves and complementary ribs along predetermined lines of bend to facilitate folding of the blank and to prevent fracture of the foil or other non-hygroscopic material during the folding and sealing operations to be hereinafter described. For making the container of the present invention, the blank is embossed along lines 12, 13 and 14 adjacent the top and bottom edges thereof, along lines 12a and 12b extending at right-angles to said edges, and along diagonal lines 13a between lines 13 and 14. All of said lines are not continuous, certain of the

same being blended at the intersections to thereby reduce the stressing and distortion of the material at those points, hence guarding against any rupture of the non-hygroscopic lamina of the blank. The embossing of blank 10, 11 is preferably accomplished by pressing the same between substantially flat male and female platens or dies having cooperating grooves and ribs on the operating faces thereof.

The embossing of blank 10, 11 by said platens is preferably such that the direction of each fold or bend during the folding and sealing operations will be in the direction of the groove of the embossed line at which the bend is made, that is, so that the groove will be, in reality, between the folded portions and the bead or rib outside of said portions. A curved bend, as distinguished from a sharp bend, is thus obtained in each instance. As viewed in Fig. 1, the several embossed lines or the portions thereof illustrated by full lines constitute grooves in the inner or upper surface of the blank with corresponding beads or ribs on the outer or lower surface and those shown as dotted lines are constituted by beads on the inner surface with complementary grooves on the opposite side of the blank.

It will be noted that a flap 15 is formed between the embossed line 12 and the edge of the blank. This flap 15 is folded about the embossed line 12 as shown at the right of Fig. 1 to provide top and bottom hems 16 with the layer of impervious material 11 on the outside to protect and cover the inner layer of fibrous material 10, care being taken not to apply pressure to the material at a point adjacent the embossed line as the folding proceeds. The pressure exerted by the folding tool, in the embodiment shown by way of example in Fig. 4, extends only from the point 18 to the edge of the blank. Consequently, the flap 15 is caused to lie flat against the body of the blank while a rolled or looped edge 17 relieves the strain which would otherwise be produced if the material were caused to make a sharp bend at that point. Throughout the entire forming operation, as will be described, care is taken to avoid exerting pressure against this rolled edge 17, which otherwise would be susceptible to fracture. The die-embossed lines or depressions formed in the blank assist in making the above-mentioned fold without necessitating the use of pressure at a point adjacent the actual folded edge and it will be seen that those portions of embossed lines 12a and 12b which extend across flaps 15 are so formed that the same will mesh with corresponding portions of the same lines between horizontal lines 12 and 13 when hems 16 are formed, to thereby facilitate the forming of said hems and subsequent lateral folding thereof. The vertical embossed lines 12a divide blank 10, 11 into front and back panels 20 and 21, end panels 22, and a side flap 25. The side edge of the blank opposite side flap 25 is folded to form a hem 23 similar to the hems 16 above mentioned. It is to be understood that this hem is also formed by providing a suitable embossed line and rolling the marginal portion over about the embossed line to form a flat hem having a rolled edge 23'. A stripe of thermoplastic adhesive material 24 may be applied over the engaging surfaces of hem 23 and may extend over a portion of the adjacent inner surface of the blank to provide means for securing the same to side flap 25 to form the overlapped longitudinal seam to be described.

For the purpose of insuring the imperviousness of the container to be formed from blank 10, 11,

the top and bottom margins of the fibrous surface of said blank are preferably coated with paraffin wax 25a, said coated margins extending inwardly beyond fold lines 14 (Fig. 1). If desired, a coating of wax may be substituted for the thermoplastic stripe 24. Wax coating 25a is effective to lubricate the fibrous material and, hence, facilitate the folding thereof in a manner to be hereinafter fully pointed out. Additionally, said wax serves as a medium for holding hems 16 and 23 in folded position and impregnates the fibrous material for thus preventing any leakage of moisture into or out of the container in the event that microscopic breaks occur in the non-hygroscopic, metallic layer 11 during the folding and sealing operations, such breaks being apt to occur at times by reason of the texture and brittleness of the thin, metallic material, which texture and brittleness cannot be kept uniform by any known method of manufacture.

In making the container, the blank is first folded to form the top and bottom hems 16. One side of the marginal edge is then folded over to form the longitudinal hem 23 above mentioned and the blank is folded around a suitable arbor or mandrel to form a tubular body, as shown in Fig. 7, with the hem 23 overlapping the flap 25 and embossed lines 12a forming the corners. When folded in this way, the hem 23 and the flap 25 form an overlapped seam as indicated in Fig. 5. In order to effect a seal, suitable heat and pressure are applied to activate the thermoplastic lacquer coating on the blank and at the same time to press the adjacent surfaces into firm engagement, the pressure being effective to press the activated lacquer into the interstices of said engaging surfaces. The pressure may be applied, as indicated in Fig. 6, from a point 30 to a point 31 on the outer surface of the body and between corresponding points on the inner surface thereof. It will be noted that the pressure terminates short of the rolled edge 23' so that no pressure is applied to this rolled-over portion of the hem. The sealing dies are preferably so shaped that the pressure exerted thereby serves to cause the flap 25 to conform to the inner edge of the hem 23, thereby forming an offset portion 32 extending over the hem 23 and a portion 33 which is bent over the end of the hem 23 and engages the inner surface of the fibrous layer 10, as well as the raw edge of the infolded part of the hem. The heat and pressure thus applied, in addition to activating the thermoplastic material to render the same adhesive, serve to compress and compact the fibres so as to effect a firm, permanent seal.

It will be noted that, when the impervious layer consists of metal foil, the hem 23 forms a metal-to-metal seal with the corresponding portion of the flap 25, thereby positively preventing moisture from passing through the seam and forming a trap for any moisture which may be absorbed and wicked by the fibrous material. The flange 33 is also adhesively secured to the fibrous material 10 and thereby completes a strong and impervious seam. It is to be understood that in Fig. 6 the relative dimensions of the various layers are shown as exaggerated for clearness of illustration. In practice, for example, the layers may comprise paper of any desired weight and metal foil ranging in gauge from ".0003 to ".001. In any event, the edge 23' of hem 23 remains in a rolled condition and care is taken to prevent the application of any pressure thereto which would tend to make a sharp bend at which the

internal structure of the foil might be so stressed and distorted as to destroy the imperviousness thereof.

If, as pointed out above, the stripe 24 is constituted by paraffin wax, the application of sealing heat and pressure in the manner above described melts the wax and causes the same to permeate and impregnate the fibrous layer 10 in the vicinity of loop 23'. Thus, if a microscopic break should occur in the metallic component of the blank by reason of the folding thereof, the wax serves as an effective seal for preventing the passage of moisture to or from the contents of the container. It will be noted that the wax does not in any way interfere with the joining of the metallic surfaces to form the desired metal-to-metal longitudinal seam, since the melted wax will not pass through the metallic material.

Either end, such as the top, for example, of the container may be closed and sealed by folding the opposed marginal portions of the body inwardly about the embossed lines 14 at the upper edges of panels 20 and 21 to form a two-part end wall and thence upwardly about the embossed lines 13 and along lines 12b to form opposed reinforced upstanding flanges 40, as indicated in Figs. 8 and 11, with the surface of hem 16 in contact.

During this folding operation, portions of the blank above side panels 22 are folded along lines 13a to form laterally extending triangular tabs 40'. It will be seen that each fold or bend is made along an embossed line and toward the grooved side thereof to thereby avoid sharp bending and, hence, breaking down of the metal component of the blank. Flanges 40 may be sealed together by the application of heat and pressure, using suitably opposed sealing members to be hereinafter more fully described. The heat and pressure thus applied for forming the end closure seam are effective to melt the wax coating 25a thereby causing the same to impregnate the paper component of the blank in the vicinity of the lines along which the blank is folded.

The above-mentioned sealing members may be and preferably are provided with cooperating grooves and ribs to form compressed grooves 41 extending across flanges 40. These grooves 41 constitute lines of concentrated pressure along which the stock is more firmly compacted and thereby increase the effectiveness of the seal, particularly where the flanges consist of multiple plies. By embossing flanges 40 in the above manner, an impervious seal is assured at the point where the longitudinal body seam extends across the end closure seal. The grooves 41, in the embodiment shown, are sloped downwardly from the center of the flanges 40 toward the ends of said flanges so as to facilitate the opening of the package. The flanges 40 may be left unsealed above the upper groove 41 to provide a finger grip by which the opposed halves of hem 16 can be separated for breaking the seal and opening the container. Solvents can be employed for activating the lacquers on the engaging surfaces of flanges 40, if desired, as an alternative.

If the container is of small size, it may be desirable to provide a pair of tabs 42 for this latter purpose, said tabs, as illustrated, being attached to opposed engaging surfaces of hem 16 above the upper groove 41 and being of a sufficient size to be readily grasped by the fingers for pulling the flanges 40 apart to open the container. Tabs 42 may be made of any suitable material, such as linen, and may also be secured

to the blank by a thermoplastic adhesive lacquer. They must be attached firmly enough to prevent the same from pulling off when a pull is exerted thereon for opening the container.

It will be noted that in applying heat and pressure to the two flanges 40, the pressure is terminated well below the top edges thereof so that no pressure is exerted against the rolled portions or embossing 12 at the extreme edges thereof. This prevents the metal component of said rolled portions from fracturing and, at the same time, leaves the flanges in a suitable condition to be readily pulled apart by the fingers for opening the container. It will, of course, be understood that the provision of the embossed lines along the fold lines, the folding of the material in the direction of the groove of the embossing, and the non-application of pressure to the edges of the folds prevent internal destruction of the fibre, as well as of the metal component of blank 10, 11 during the folding and sealing thereof.

While two grooves 41 have been shown for purposes of illustration, it is to be understood that the number of these grooves may be varied as desired. In some cases, one groove may be sufficient or, on the other hand, a plurality thereof may be desired, depending upon the materials and the adhesive used.

After the flanges 40 have been sealed in the manner above described and to be hereinafter amplified, they may be folded flat against the top of the container, as illustrated in Fig. 9, with the tabs 42 tucked under. The ends of the flanges 40 and triangular tabs 40' may be bent downwardly against sides 22 and secured in position, either by a revenue stamp or the like which may be placed over the entire top and may extend beyond the turned-down ends of the flange 40 or by tacking the same by the application of heat and pressure.

It is to be understood that the bottom of the container may be closed and sealed in a similar way. Inasmuch as the bottom is not to be opened, however, it is not necessary to leave a portion of the flaps unsealed. The entire width of the flaps may accordingly be sealed by exerting pressure to a point closely adjacent the edges thereof. The pressure should, however, terminate short of the rolled edges so as not to injure the same. At the bottom of the container, the ends of the sealed flanges 40 and the triangular tabs 40' may be folded back over the bottom or end wall instead of extending around the sides.

The particular way in which the ends are folded and closed is more fully set forth in the copending application above referred to and it is to be understood that the present invention is applicable to the various embodiments set forth in that application.

When the above-described container is to be opened for dispensing the contents thereof, the revenue stamp or the like is first removed or broken and the ends of the flanges 40, together with tabs 40', are bent upwardly into the plane of the top end wall. The flanges 40 are then bent into upstanding position as shown in Fig. 8. The tabs 42 may then be grasped by the fingers and a pull exerted for breaking the seal between the two flanges and opening the container. It will be noted that, as the pull is exerted on the tabs 42, the seal is broken first at the apex of the diagonal grooves 41 and extends progressively outwardly to the ends of the flanges 40

as the seal is broken. The seal is thus easily broken without rupturing or tearing the material. The container may be again temporarily closed without sealing by refolding the top in the manner above described.

The above-described container is light of weight and sufficiently flexible to be readily carried in the user's pocket and yet is durable and highly efficient in preventing transfer of moisture between the contents and the atmosphere. The container is entirely closed by metal-to-metal points and the metal layer is unbroken at the folded edges so that the wicking of moisture into or out of the container by the fibrous material is entirely avoided. A wax seal is also provided as a safeguard in the event the metallic layer of the blank is broken during the folding thereof.

In certain circumstances, it may be desirable to fold the blank with the fibrous material on the outside and with the impervious material or metal on the inside. Such an embodiment can also be closed by a metal-to-metal seal as shown more in detail in Fig. 12. Referring to that figure, the material at one side edge of the blank is folded over to form a hem 50 with the layer of metal on the outside. This is joined to the metal layer on the inside of the opposite side edge 51 of the blank, suitable heat and pressure being applied to effect the necessary seal. It is to be noted that the metal foil on the side edge 51 of the blank effects a metal-to-metal seal with the foil on the inside of the hem 50 and also a metal-to-paper seal with the fibrous material 53 adjacent the hem 50 over which the side edge 51 extends. Any moisture entering the fibrous material is thus effectively trapped in this construction and cannot pass from the inside to the outside of the container or vice versa.

Another embodiment of the invention is illustrated in Figs. 13 to 16, inclusive, wherein the longitudinal side seam is formed so as to guard against separation thereof at the top of the container when the latter is opened by pulling on tabs 42 which, in the interest of clarity, have not been illustrated in the last-mentioned figures. Substantially the same blank is employed for making this latter embodiment as is used in making the embodiment of Fig. 9 and, accordingly, the same reference numerals are used to designate like parts. As shown in Fig. 13, the longitudinal side seal of the body is formed by providing a hem 23a (corresponding to hem 23 of Fig. 1) in flap 25 and said flap is lapped over, rather than under, the marginal portion of the opposite end of the blank. Thus, when a pull is exerted on sides 20 and 21, such as by means of tabs 42, to break the end closure seal in the manner above described, there will be no tendency to separate the sealed surfaces of the side seam until after the end closure seam adjacent said side seam has been broken. In the formation of said side seam, the mandrel on which the body is formed is preferably grooved to compensate for the extra thickness introduced by hem 23a. In this manner, hem 23a is caused to be embedded in a groove 23b formed in side 20 of the body so that the resulting seam is locked against any sheering stress.

After the formation of the body, the end of the container is formed, as illustrated in Fig. 14, by folding the peripheral marginal portion of the body in the manner above described. Flanges 40 are then simultaneously embossed and the engaging surfaces thereof are sealed

together in a novel manner by heat and pressure applied by means of novel sealing members or dies 54, 55. In order to insure an impervious seal throughout the entire width of flanges 40 and particularly adjacent the longitudinal side seam, one of the sealing dies 54 is provided with a groove 56 for receiving the excess material at said seam. Additionally, die 54 is provided with a transversely extending groove and die 55 has a corresponding rib (not shown) for producing the groove 41 in flanges 40. Preferably, the pressure of dies 54, 55 is such that the engaging surfaces of flanges 40 are sealed together over small areas 57, 57 (Fig. 15) both above and below groove 41. Dies 54 and 55 may be heated by means of electrical cartridge heaters 58 and pressure is applied thereto by any suitable means, many of which are well known in the art.

By employing the foregoing novel method and means for forming the longitudinal body seam and end closure seams of the above-described container, it will be seen that the double thickness portions of flanges 40 on each side of said longitudinal seam are brought into parallel relationship during the formation of the end closure seam, whereas the inwardly projecting extra thickness or offset portion of said longitudinal seam is pressed against the opposite flange 40 in such manner as to form an offset in the latter. The multiple thickness of the longitudinal seam is thus blended into the end closure seam with the opposing flange 40 wrapped snugly and compressed around the offset portion so as to conform to the shape thereof. Harmonious configuration of the joined surfaces and hence a tight joint are thus assured.

For convenience of description, the impervious material has been referred to herein as metallic foil and the seal has been referred to as a metal-to-metal seal. It is to be understood, however, that these terms are not used as a limitation of the scope of the invention. Other types of impervious material, such as cellulosic products, resins and other suitable products may be employed and the seal may be effected by bringing two layers of such material into contact in the manner above pointed out.

Although only a limited number of specific embodiments of the invention have been illustrated and described, it is to be expressly understood that the invention is not limited thereto. Various changes may be made, for example, in the particular materials and examples specified, without departing from the spirit and scope of the invention, as will be readily understood by a person skilled in the art. For a definition of the limits of the invention, reference is had primarily to the appended claims.

What is claimed is:

1. A container made from a laminated blank comprising a layer of fibrous material and a layer of impervious material, the top and bottom marginal edges of said blank being rolled and folded over to form top and bottom hems having rolled unpressed edges with the impervious material on the outside, one side marginal portion of said blank being likewise rolled and folded to form a side marginal hem having a rolled unpressed edge with the impervious material on the outside, said blank being folded to form a tubular body with said last-mentioned hem overlapping and in engagement with the other side marginal portion of the blank to form an overlapped seam extending longitudinally of said body, the impervious material of said hem engaging the impervious material of said other side marginal portion and being secured thereto by a thermoplastic adhesive interposed therebetween, the top and bottom portions of said blank being folded inwardly to close the top and bottom portions, respectively, of said body, with the top and bottom, respectively, pressed together and joined by thermoplastic adhesive interposed therebetween.

2. A container constituted by a tubular body having a wall comprising a layer of fibrous material and an outer layer of foil, a marginal portion of an end of said body being infolded to form a foil-covered, reinforcing hem, the engaging fibrous surfaces of said hem being coated with paraffin wax and opposed halves of the surface of said hem inside the body being pressed into engagement with each other and joined together by a thermoplastic adhesive interposed therebetween to form a metal-to-metal closure seam.

3. A container constituted by a body formed from a laminated blank having a layer of fibrous material and a layer of metallic material, a marginal portion at one end of said body being infolded to form a hem with said metallic material outermost, the engaging fibrous surfaces of said hem being coated with paraffin wax and opposed halves of the surface of said hem in the body being sealed together by a thermoplastic adhesive to form a substantially impervious closure seam.

4. A container made from a laminated blank comprising a layer of fibrous material and a layer of impervious material, said blank being folded to form a tubular body with the side marginal portions of the blank overlapping to form an overlapped seal extending longitudinally of said body, one of said side marginal portions being folded over to form a two-ply hem with the impervious material on the outside and a coating of paraffin wax on the engaging fibrous surfaces of said hem, said hem engaging the layer of impervious material on the other side marginal portion and being adhesively secured thereto.

GEORGE ARLINGTON MOORE.