

Sept. 3, 1946.

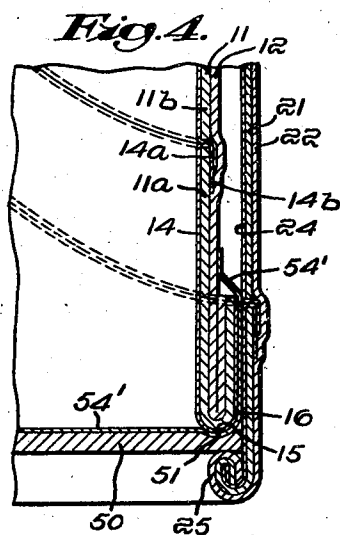
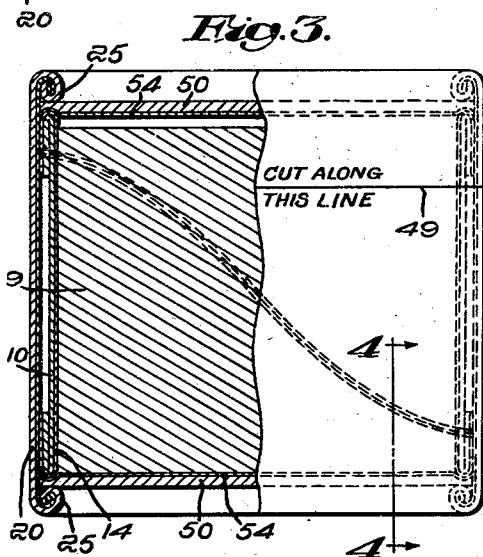
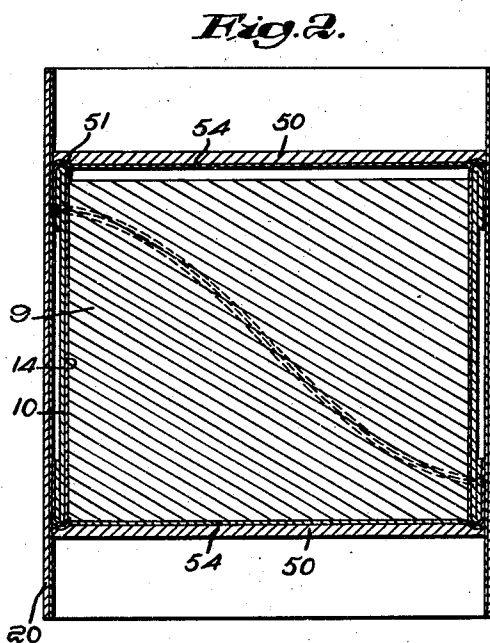
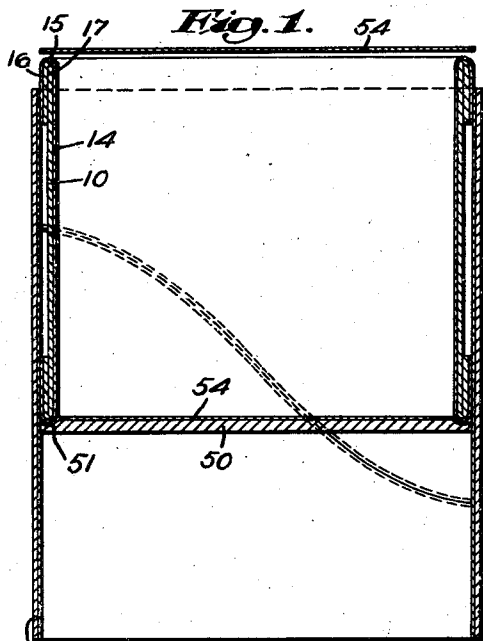
M. E. GAZETTE

2,406,758

CONTAINER MADE OF PAPER, AND METHOD OF MAKING THE SAME

Filed Aug. 7, 1942

4 Sheets-Sheet 1



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Sept. 3, 1946.

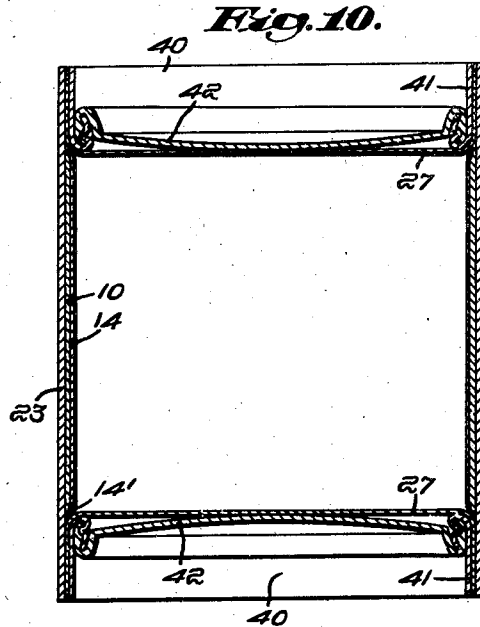
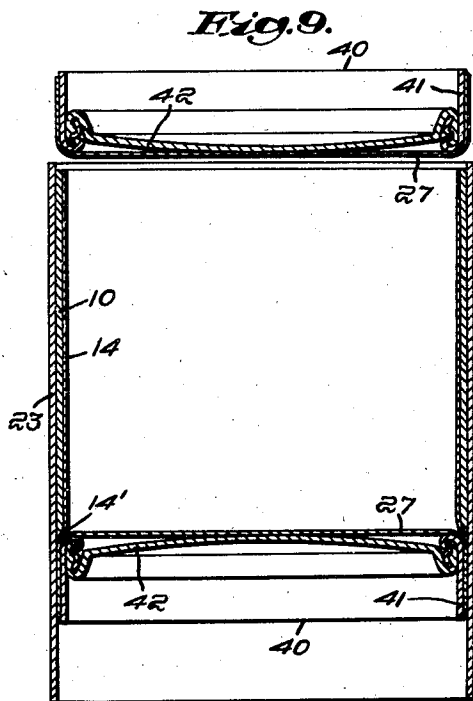
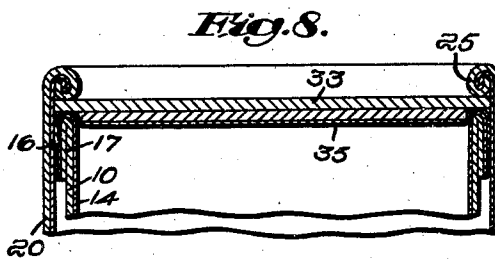
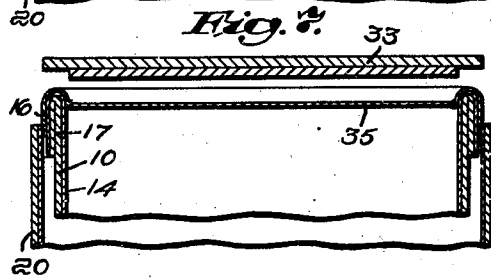
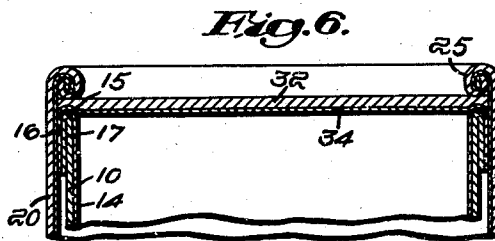
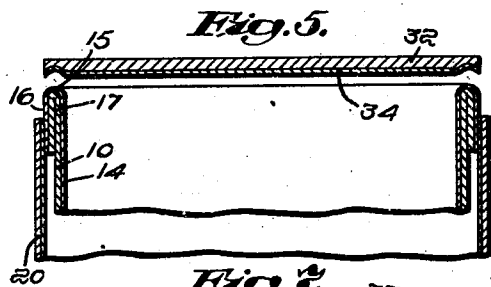
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CONTAINER MADE OF PAPER, AND METHOD OF MAKING THE SAME

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4 Sheets-Sheet 2



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2,406,758

CONTAINER MADE OF PAPER, AND METHOD OF MAKING THE SAME

Filed Aug. 7, 1942

4 Sheets-Sheet 3

Fig. 11.

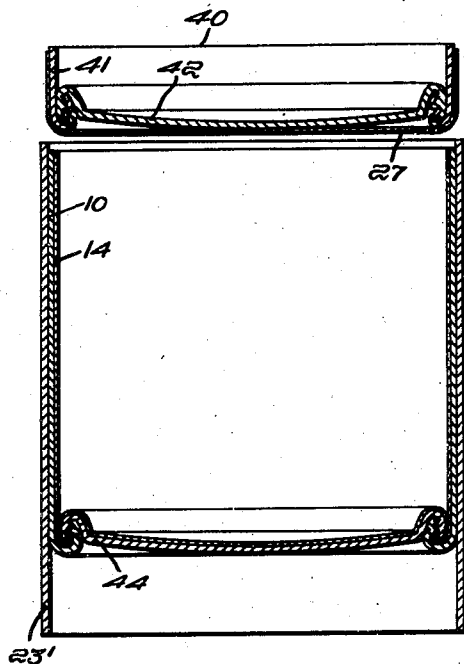


Fig. 12.

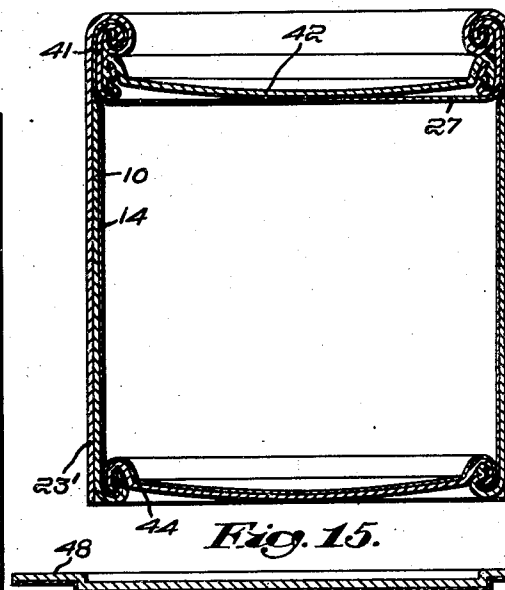


Fig. 13.

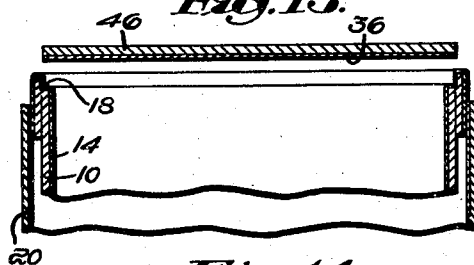


Fig. 14.

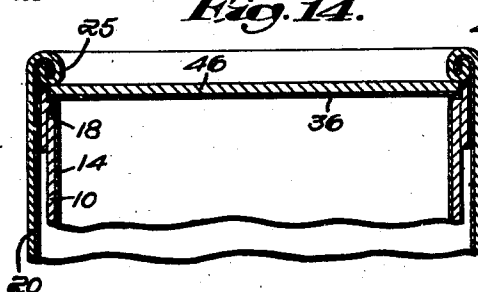


Fig. 15.

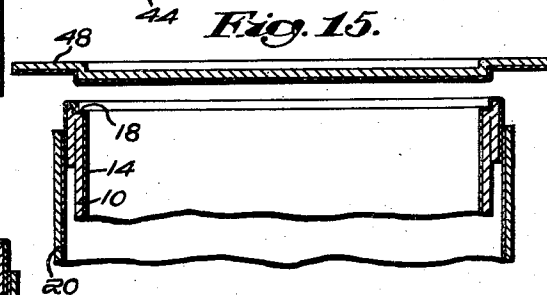
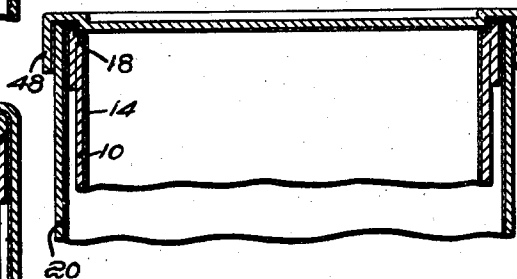


Fig. 16.



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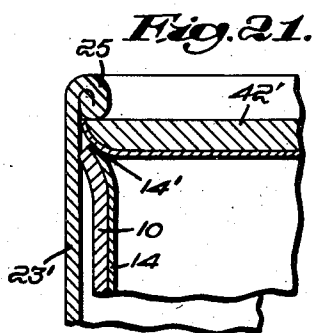
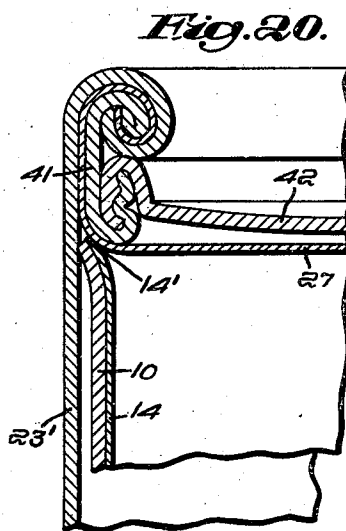
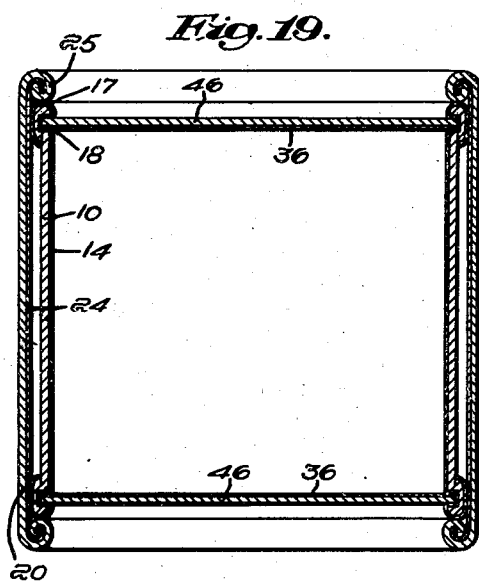
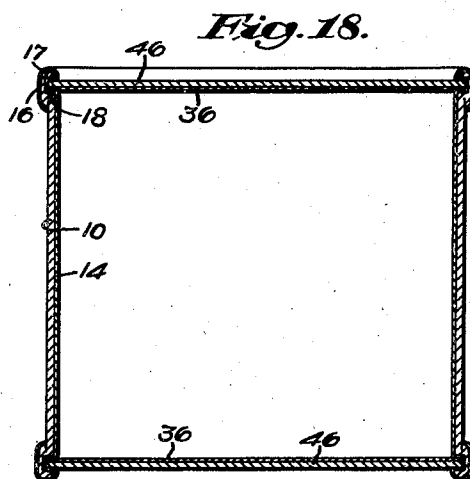
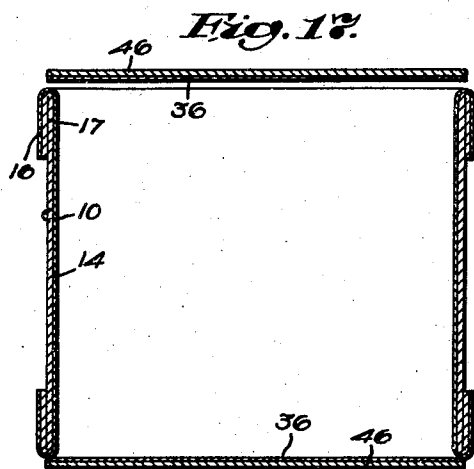
M. E. GAZETTE

2,406,758

CONTAINER MADE OF PAPER, AND METHOD OF MAKING THE SAME

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,406,758

CONTAINER MADE OF PAPER AND METHOD
OF MAKING THE SAME

Marshall E. Gazette, Boston, Mass., assignor, by
mesne assignments, to Continental Can Com-
pany, Inc., New York, N. Y., a corporation of
New York

Application August 7, 1942, Serial No. 453,918

2 Claims. (Cl. 229—4.5)

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The invention relates to improvements in con-
tainers made of paper, and methods of making
the same.

More particularly it relates to cans for holding
foods and other substances, in the broad general
field of utility occupied by tin cans and glass
jars.

The invention provides paper cans which are
capable of being conveniently filled and firmly
closed, tightly sealed if desired, with smooth and
pleasing finish and aspect, which throughout
shipment, warehousing, retail and domestic stor-
age and handling, will be so strong and tight as
normally to hold their contents safe from loss by
leakage, from damage by extraneous causes such
as mechanical shock, and from infiltration lead-
ing to chemical or biological deterioration.

To produce such cans from paper has long
been recognized as highly desirable. The can of
the present invention accomplishes this and may
be made of ordinary plural-ply sheet paper stock,
wound helically to cylindrical tube formation
with end closures of similar material, and involv-
ing no metal in the can structure. The body can
be made impervious to liquid or gas when that
is requisite, by the structural arrangement and
juncture-sealing of an interior lining of impervi-
ous thin film.

It is also an object of the invention to provide
a can whose body can be closed when filled to the
level of its top edge, so that the body can con-
stitute a precise measure of denominated ca-
pacity.

It is also an object to provide a construction
such that the closing of a filled can leaves no sub-
stantial body of air or other gas contained between
the contents and the top closure; and, particu-
larly, to accomplish the closing of the can with-
out increasing the pressure within the package,
this being a matter of special difficulty when the
closure element is a cylindrically flanged disk.
However, the invention provides for using plane
disk closures. In either case the paper stock locks
the closure on the body; and in certain cases re-
silience inherent in the paper stock contributes
to the holding of the joints tight. Two tubes
may constitute the can, one enclosing the other,
with its ends turned inwardly for annularly hold-
ing the end closure tight in that other; or a single
tube can annularly hold firmly its own end clo-
sure.

The opening of a double walled closed can of
the invention can be effected conveniently by
cutting through one of the tubular walls, whereby

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a removable cap is formed which is replaceable if
desired.

The can of the invention is "tamper proof," in
the sense that if an opening of the can has oc-
curred between the time of its sealing by the
packer and its reception by a retail purchaser,
the fact that something irregular has occurred
will be manifest. This safeguards the purchaser
against surreptitious substitution of inferior
contents.

It is an important attribute of the invention, in
the present state of emergency, that the me-
chanical operations for closing and sealing the
paper can of the invention require only simple
compressive and rotative movements, for which
apparatus is already available or readily obtain-
able at canning establishments.

In the strong tightly sealed container thus
provided, the interior surfaces are of cellulosic
or other non-metallic material, and so are not
subject to the risk of corrosion that is charac-
teristic of tin plate, nor to the risk of breakage
that characterizes glass. The can is a fit sub-
stitute for either tin or glass, without requiring
either rubber or soldering metal for its closure.
In addition, the inherent slight capacity of paper,
to bend and to stretch without breach, adapts
these cans to withstand such changes of vol-
ume of contents as may result from changes of
temperature.

The various advantages, which attend the pro-
cedure and the construction and the varieties in
which embodiments of the invention can be
made, will be best understood in connection with
the description which follows. The drawings,
which show several embodiments of the inven-
tion, are to be understood as illustrative rather
than definitive. They are somewhat diagram-
matic for the thicknesses of paper and film are
necessarily exaggerated, which produces distor-
tion in some places in the drawing where none is
visible in the actual cans.

It is intended that the patent shall cover, by
suitable expression in the appended claims, what-
ever features of patentable novelty exist in the
invention disclosed.

In the accompanying drawings of various cans
embodying the invention:

Figures 1-19 are side elevations of various cans
or fragments of cans, each showing a section
through the axis except that in Figure 4 the
section is on 4-4 of Figure 3, and is parallel to
the axis;

Figures 1, 2 and 3 show the elements and suc-

cessive stages of the closing of a can made in one of the preferred constructions;

Figure 4 shows details of that construction, on a larger scale, and illustrates also the film structure which makes the can body tight notwithstanding the cracks between successive convolutions of each paper ply;

Figures 5 and 6 show preliminary and final positions of parts of a can closed by a disk pre-lined with film and pre-formed at its margin;

Figures 7 and 8 show preliminary and final disk-closure positions of a body where the film initially is stretched across the end of the body;

Figures 9 and 10 show a preliminary and an intermediate stage where each end of the tubular can body is closed by being wedged into a groove between its cylindrical outer tube and an end closure having a conical and cylindrical periphery;

Figure 11 shows a corresponding preliminary stage in which the top closure is the same as in Figure 9 but the bottom closure is a disk crimped with the can body; and

Figure 12, at its top, shows the final form of the style which is incomplete at the top and the bottom of Figures 9 and 10 and at the top of Figure 11; the bottom being of the style of Figure 11;

Figures 13 and 14 illustrate a closure by a disk that fits into a seat within a body-end that is everted to double thickness, held seated by an inverted end of an outer tube.

Figures 15 and 16 show preliminary and final forms in which a film that lines a closure-disk has a broad seal, with a disk-flange deformed to the outside of a tube-protected can body.

Figures 17 and 18 show preliminary and final forms of can body and disk closure therefor in which the margin of the disk is seated on the end of the body wall, and is locked in by a deformation of the end portion of that wall; and

Figure 19 shows the same construction as in Figure 18 with addition of an exterior enclosing tube for strengthening the body and its end closure.

Figure 20, on a larger scale, shows detail of an annular wedging of the raw end of a tubular can body between an outer tube and the crimp of a crimped flanged disk end closure; and

Figure 21 shows a similar wedging against a conical-formed periphery of a plane disk.

The drawings portray the invention as it may be applied with cylindrical tubular can bodies, for which the well-known plural-ply helically-wound paper stock is illustrated with end closures of plane disk type and of cylindrically flanged disk type, these styles being suitable for a wide variety of uses; but other sorts of paper stock may be used; the bottom closures may be molded integral with the body stock, or may be otherwise connected to the walls; the flanged disk, shown in some cases as a short tube crimped to a disk, might be formed by molding flanges integral on the disk, and variations using other known types, of body, of ends, and of body and end connections, may be employed where suitable.

The larger scale Figure 4 shows the detailed construction of the style of body stock 10 which is herein used for illustrative purposes, with means by which it can be made impervious to liquids and gases if such is desired.

There the constituent two plies 11 and 12 of the can-body wall, which together are marked 10 in all of the figures, can be seen in helical windings, staggered in relation to each other.

As the making of a helical paper wall impervi-

ous to air and liquid is a matter of difficulty, but may be requisite in a can, each of the figures shows walls equipped with a film 14 for this purpose. This can be omitted from can bodies in which such tightness is not requisite. Such bodies may be either of plain paper stock, or may be impregnated with wax, or may be treated otherwise in ways already known, for preventing liquid from soaking through.

The numeral 10 designates an ordinary two-ply cylindrical wall, but this is combined with a lining of impervious film 14. The said ply 11, which may be of any usual or suitable paper stock, is in its initial state a flat strip of any suitable width, e. g., four inches; and on that face of this which is to be inward there is adhered a lining film 14 of any suitable larger width, for example, four and a half inches. This allows a margin of one-fourth inch of film to project beyond each edge of the paper strip. One of these projecting margins is folded around the edge of the paper and is adhered to the back outer side of the paper, as is the margin 14^a of the film 14 that is on the convolution 11^a in Figure 4. When this lined strip is wound into helical form the face of each fresh convolution of the projecting margin at the other edge of the paper strip falls as at 14^b upon the film-bordered back of the first margin 14^a of the same strip in the last preceding convolution of the strip. There it becomes adhered, either by heat, paste, inherent quality, or whatever other means may be chosen. In so doing it becomes bent past the edge of the paper on whose face it lay in the convolution 11^b. The original two oppositely projecting margins of the film ultimately become sealed together overlapping each other on the outside of the convolutions of the paper ply 11.

The paper may have any selected thickness, for example, .010 inch; and the film may have any selected thickness, for example, .001 inch; and the film may be of any desired suitable material having the required qualities of impermeability by liquid or gases or both, a considerable variety of which films are now known in the market under trade names as Cellophane, Pliofilm, etc., which can be adhered together and to the paper. This makes a permanent flexible septum between the can contents and the inner ply 11 of the can body. The outer ply 12 of the can body, similar to the inner, is staggered so that each covers broadly the helical crack in the other, in the manner well known. In the present case, however, the outer ply 12 covers thus broadly the sealed-together film margins 14^a, 14^b, which are on the outer face of the inner ply 11. Thus the body as a whole presents exteriorly the usual aspect of a cylindrical tube of this type, showing nothing but the paper; but interiorly it is lined with film so that the side walls of the body are impervious from end to end.

The outer tube 20 may be similarly made of two plies 21, 22, with an inner lining 24 as represented in Figure 4, although often there is no need for the film lining of this tube, and that element 24 may therefore ordinarily be omitted.

In view of the dimensional requirements of the drawing, and as the two plies 11 and 12 always act as one, these two are treated as if they were integral together and together are marked 10; and similarly the component plies of the outer tube are indicated by the single numeral 20.

The can may be made with a plain-ended tubular body 10 fitting loosely in a similar outer tube 23, one example of which is seen in Figures 9 and

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10, 20 and 21, where the raw cut edge of the tubular body becomes wedged and sealed as herein later described with reference to those figures. Or, the raw plain-tube ends may be crimped, on the outside of the can-end, with the margin of a flanged cap, inserted into the end portion of the body, as in the lower part of Figure 11. But ordinarily it will be preferred to carry the film 14 around the end of the body, by everting the whole end of the tubular body, as seen at the top in Figure 1. This is accomplished by a simple spinning process already known, producing a double-thick end rim of the tubular body, which rim presents endwise the film surface 15 and peripherally the film surface 16, the double thick paper body being here indicated by the numeral 17. In this case the outer tube 20 is to be made with its inner diameter such as will fit closely over the outer diameter 16 of the doubled end of the tubular body. This provides stiff end portions of the tubular body, and a stout tube 20 surrounding that body, with an air space between these two equal to the thickness of that part of the tubular body which has been turned out at each end.

In the form of can which is illustrated in Figures 1-4 each end-closure of the tubular body is a two-ply disk 50 of stock comparable to the body wall 10 and tube wall 20, initially plane; and the film 54 is a plane sheet cut to a circular size equal to the diameter 16 of the outside of the doubled end of the tubular body. These therefore have their edges capable of fitting closely within the outside tube 20, and their margins overlying the doubled end 15 of the body, with the film 54 there in contact with the film of the body, and slightly deformed by pre-formation of a groove and pressure together, as seen at the top of Figure 2 and in the lower part of each of the Figures 1-4. The endwise pressure and the curved end of the body aid the making of a tight and permanent joint, suitably impervious. The tubular body and the outside tube are to be cut in such dimension of length that for the final stage seen in Figure 3 the end portion of the tube can be rolled inward to press upon the margin of the disk, for holding this inner seal firm and making the contents of the can secure. To accomplish this, the tubular body is first set up to near the top of the tube, preferably projecting a little as seen in Figure 1, the relative dimensions of rim and of enclosing tube being such that friction between the two rims of the body and the tube holds it there; or supports (not shown) may be provided underneath. After the can has been filled, preferably to the level of its top, the disk of film 54 can be laid on; and over that the cover disk 50 (Figure 2) can be applied; after which pressure, applied in the axial direction on the margins over the pre-formed groove 51 of the top disk, will seal together the films 54 and 15, and will translate that disk and the tubular can body and its bottom closure downward until they reach the position illustrated in Figure 2, which is predetermined such that there is enough projection of the outer tube 20 at each end of the can body 10 to permit of the end margins of that tube being spun inward to the positions 25 portrayed in Figure 3 which shows the finished can. This can is thus made tight and strong in a permanent way for the holding of its contents without loss or contamination.

Yet it can easily be opened by cutting circumferentially through the outer tube in the region of the line 49, a little below the everted rim 17. For the convenience of retail purchasers such a

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line may be indicated on the can, or on the label of the can. When the outer tube has been completely cut around, its top portion can be lifted, thus lifting the top disk 50 and leaving the whole upper part of the can body 10 intact without the implement used for the opening having entered the contents 9 of the can. Another easy way to open, leaving the top of the can body unaffected, is to cut from the inside outward between the cover 50 and the roll 25 which is holding the cover.

Such cans having been received by the packer in stage of Figure 1, and having been filled by him, the packer needs only to hold the top in atmosphere of inert gas while he slips the closure disk 50 to a central position on the can body and then pushes downward on its circular margin, stopping the movement when the body is mid-positioned within the tube, where rotary spinning devices such as are well known are to be applied, preferably on both ends at the same time, for spinning inward the ends of the tube to make the locking rolls 25. Since pressure of the translating movement is applied only through the walls of the can body, and that of the spinning is applied only to the outside of the tube, no pressure is applied to contents.

Figure 4 illustrates an optional variation, in that the disk film 54' is cut larger than the outside film 16, and its excess margin is wiped around the outer cylindrical part 16 of the film, and its skirts are stuck to the outer ply of the can body 10.

Figures 5 and 6 show the alternative arrangement in which a disk 32 and its lining 34 of film are preliminarily stuck together by any suitable means, their circular margins being pre-formed together as a concave groove to fit the size and shape of the film 15 at the rounded double thick end of the can body. The end of the outer tube may be rolled inward down upon this to lock it as in the other case.

Figures 7 and 8 show an end closure in which the disk 33 is double thick, being two disks cemented together and acting as one. The second thickness is concentric and is of slightly less diameter so as to fit inside the mouth of the tubular body, and so to make a close marginal contact there with a sheet 35 of film that had been preliminarily placed flat across the mouth of the can body, pressing it to the pictured position. This insertion makes a somewhat longer radial extent of sealing between the two films 35 and 14. This style may be used if the can body is not filled to the very top; and it can be used when the closure being made is to be the bottom of the can.

Figure 9 has no eversion of the end of the can body. Each end of the can body 10 is cut off square having a raw edge, but it fits loosely into the outer tube 23 so that it can be flared outward a little like a bell, as seen at 14' in Figure 20. There is a crimped flanged disk closure at each end designated as a whole by the numeral 40, whose flange 41, which is a short cylindrical tube securely crimped in well known manner to the margin of a disk 42; around which closure there is laid on the outside of the crimping, as a drum head, a disk of film 27 with its peripheral margin turned down as a skirt around the outside of the flange of the cap 40. The exterior diameter of this is a tight fit within the outer tube 23. Therefore there is static friction, preferably, suitable for holding the body and its contents at the elevation where it is filled, yet not so much as to

prevent it from being pushed downward within the tube to the middle position for the final closing operation. Such a bottom closure 40 being put into the position illustrated in an upstanding tube 23, (Fig. 9), and the can body being within that tube above it, that body may be filled with the desired contents, after which a similar cap body 40 with drum head film 27 may be centered on the axis over the filled body and pushed downward. The curve of the crimping of each cap combines with the adjacent cylindrical interior of the outer tube to make an annular V-shape groove into which the flared raw end 14' of the can body becomes forced by the downward pressure, and the same thing occurs at the bottom, so that a physically tight wedge-like compressive closure is made both at top and bottom by the same stroke of pressure, and an impervious seal is made between the end portions of the film in the can body and those films 27 which lie in the groove on the crimped surface of each end closure, in the position indicated in Figure 10. The can thus closed is to be completed at both ends by a rolling inward of the double-thick projection, consisting of the outer tube and the flange of the closure, to the position indicated at the top of Figure 12, thus securing the wedged sealings and closures at both bottom and top, and producing a can whose cylindrical walls are double thick.

The having of a can body level full of solid or liquid contents is inconsistent with the having of a cover which intrudes the body. If the cover is held on by an outside cylindrical flange, the settling of the cover to its seat entraps air and undesiredly builds up interior pressure. The can of Figures 9-12 provides a tight closure secured by strength and friction of the cylindrical engagement type without building up pressure on the contents of the can.

The cylindrically flanged closure of the present invention has the conventional aspect of an ordinary flanged cap, but has the distinction that it fits endwise against the interior wall of the can body; and that it is secured there by being crimped to the exterior can wall. Unique among covers having cylindrical flanges, it becomes seated with respect to the can body without compressing any contents thereof.

The end closure may optionally be a thick stiff disk of paper as at 42' in Figure 21, the edge of that disk being beveled a little to constitute the throat for the wedging compression of the end of the tubular body. In that case the disk is locked by a single-thick in-roll of the outer tube.

Without making the double-thick crimp at the bottom as in the structures of Figures 9 and 10, the bottom closure may be a crimping to a flanged disk in the ordinary way, as at 44 in Figures 11 and 12; although the top of the can is to be closed as in Figures 9 and 10, or 21. In this case the length of the outer tube 23' is less because, not having to provide stock for a crimping at the bottom, it is of proper length to be flush with the bottom closure when the can body shall have been depressed within it to the position for whatever type of top closure is to be used, as a crimping together of the top end of that tube and the flange of the top closure. This latter crimping holds the can body within the tube so that its two-ply wall strength is doubled.

Although herein described for sealing a raw-edged tubular body, the construction of Figures 9-12 may be applied to a can body whose edge

is film-coated, being doubled outward as in the other figures.

A step beyond the simple everting of the top end of the can body is portrayed in Figures 13 and 14, where the top is first made into the everted rim 17 shape shown in Figure 1 and then by die-confined pressure applied upward on the outer part of the everted stock is molded interiorly by down pressure to make a recessed seat 18 into which a plane disk cover 46 fits, lined with film 36. For securement, a translation of the can body downward into the outer tube is followed by rolling the top end of the outer tube over on top of the margin of the disk, as in Figure 14 at 25. This translation adds no pressure to the enclosed contents.

Figures 15 and 16 show a modification of this in which a similar internal seat 18 is formed in an everted top end of a can body, but the outer tube 20 is molded upward only far enough to be flush with the top of the can body; and the top closure is a large disk having a central portion to be set in on the seat 18 and a peripheral margin extending out as at 48, with enough stock to permit of its being wiped down outside of the tube 20. It will be understood that in this, as in any other situation where it may be desirable, heat or adhesives may be used to stick parts together, such practice being common in the art.

In the can of Figures 17 and 18 a tight end closure seal is obtained without use of an outer tube, although such may be applied if desired, as in Figure 19, to strengthen the closure made in the can body of Figure 18. In these figures a further step is added to the molding of the everted stock of the end of the can body, as shown in Figures 1 and 13, in that after the everted portion has been molded to form an internal seat like that at 18 in Figures 13-16, and after the can has been filled, and the cover 46 with film 36 has been fitted into it in that seat, the everted portion of the can body is subjected to a further molding operation by which the everted portion 17 is pressed upward somewhat and is somewhat rolled over inward on top of the seated cover 46, as seen in Figure 18. The part that was everted, having originally had the cylindrical dimension of the can body 10, is under resilient constrictive stress, while it is everted. This constricts that part of the can body which lies radially inward from it, holding it radially toward the edge of the disk which is seated at 18 in Figures 14, 15 and 16. Such of this as becomes molded above the plane of the top of the closure disk 46, by the molding step now being described, can be molded slightly further inward to a position which it tends to maintain, constituting a marginal ledge, a sort of annular lug, overlying the disk 46 and holding it permanently in place. These molding steps may be accomplished by spinning mechanism of types already known for operating on the edge portion of a cylindrical tube.

In Figure 20 the inner container body 10 is shown as tapered outwardly at its upper end so as to space the outer container 23' from said inner container. Furthermore, when the closure end 42 with the collar 41 secured thereto is inserted in the outer container the liner 27 carried thereby will contact with the liner 14 on the inner body. When the outer body portion is rolled into a seam with the collar 41 the outwardly tapered portion of the body wall will wedge in between the seam which connects the collar 41 to the closure member 42 and this will make a very tight seal.

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In Figure 21 the inner body 10 with its liner 14 is shown as tapered outwardly so that the outer body wall 23' is spaced away from the inner body wall 10. The closure disk 42' has its peripheral edge rounded on the under side and the liner extends over this edge. When the end portion 25 of the outer body 23' is rolled downwardly into contact with the closure disk 42' it will wedge the inner body wall in between the closure disk and the outer body wall, thus making a tight joint.

However, if doubled wall strength be considered requisite for safely holding the contents of the can, an outer tube can be applied outside of this self-sealed can body, to afford both radial and axial addition of strength. The annular roll 25 of the outer tube has a cushioning value to resist shock as well as providing a smooth exterior finish and a doubling of wall strength.

The various tubular forms herein shown are not necessarily cylindrical, but that is simplest for manufacture. The top and bottom closures of a can are not necessarily alike, but option can be exercised among the various types known.

I claim as my invention:

1. A fiber container comprising a tubular inner fiber body, a liner within said fiber body covering the entire inner face thereof and extending outwardly over the ends of the inner body, a closure disk for each end of said container body, said closure disks being dimensioned so as to overlie the ends of the inner fiber body, a liner associated with each closure disk and extending throughout the entire inner face of the disk to the peripheral edge thereof and contacting with the

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body liner, an outer tubular body having telescoping engagement with the inner body and projecting beyond the closure disk, the ends of said outer body being rolled inwardly into contact with the outer face of the peripheral portions of the respective closure disks for forcing said disks into contact with the liners overlying the ends of the inner tubular body for sealing the container.

2. A fiber container comprising a tubular inner fiber body having the end portions thereof folded outwardly and downwardly into contact with the outer face of said body, a liner within said fiber body covering the entire inner face thereof and, extending outwardly over the ends of the inner body and downwardly onto the outer face of the folded back portion, a closure disk for each end of the container body, said closure disks being dimensioned so as to overlie the ends of the inner fiber body, a liner associated with each closure disk and extending throughout the entire inner face of the disk to the peripheral edge thereof and contacting with the body liner, an outer tubular body having telescoping engagement with the turned back portions of the inner body and the end closure disks, said outer body being dimensioned so as to project beyond said closure disks, the ends of said outer body being rolled inwardly into contact with the outer face of the peripheral portions of the respective closure disks for forcing said disks into contact with the liners overlying the ends of the inner tubular body for sealing the container.

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