

March 23, 1948.

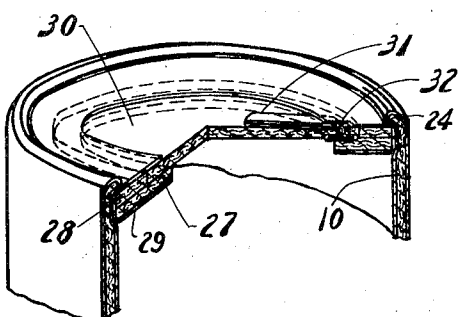
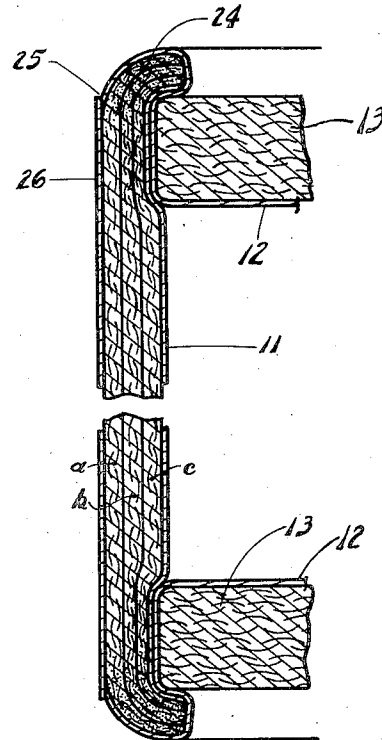
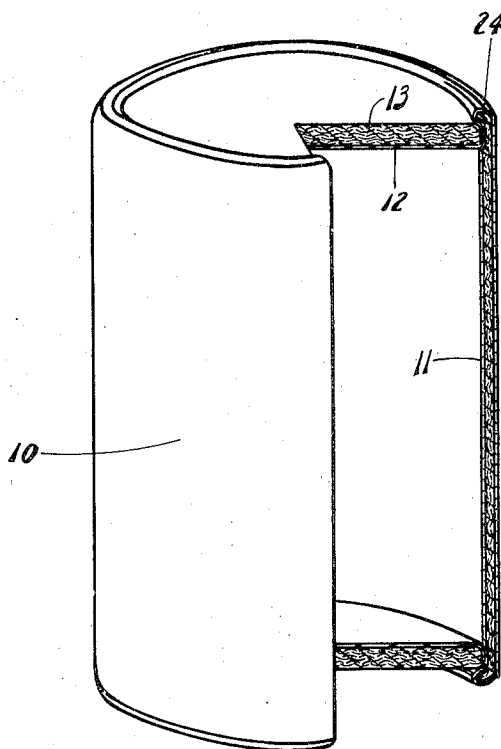
P. V. DI COSMO ET AL

2,438,430

CANISTER

Filed June 19, 1942

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

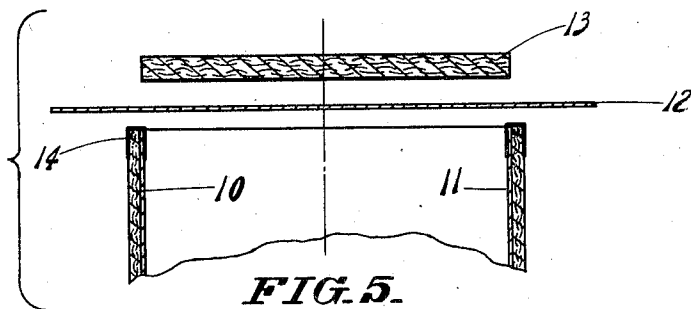


FIG. 5.

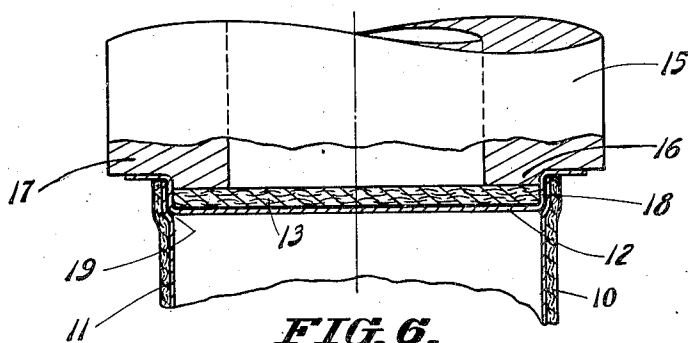


FIG. 6.

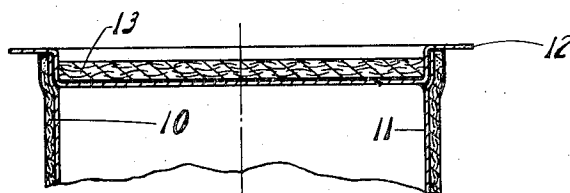


FIG. 7.

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3 Sheets-Sheet 3

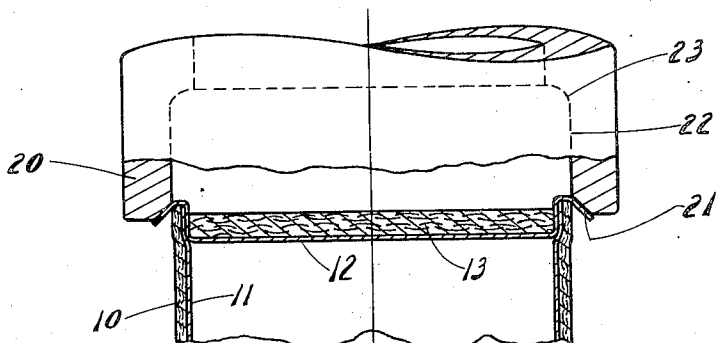


FIG. 8.

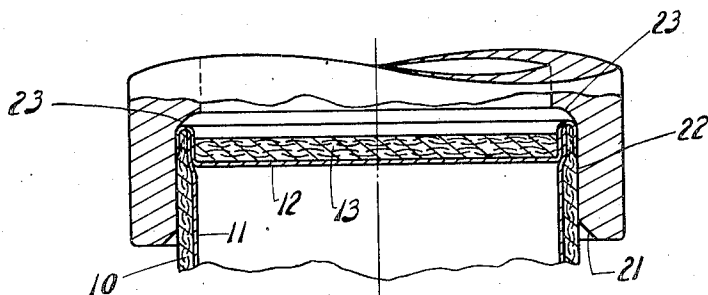


FIG. 9.

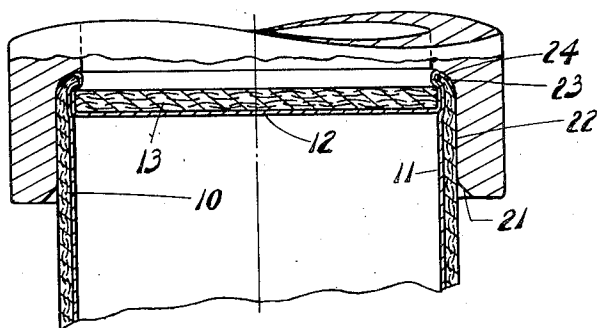


FIG. 10.

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2,438,430

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Application June 19, 1942, Serial No. 447,726

1 Claim. (Cl. 93—55.1)

1

This invention relates to canisters.

Throughout the history of the container industry the skill and ingenuity of those devoting their time and talent to this art have been primarily directed to minimizing costs, while maintaining or enhancing the physical qualities of the receptacle. Despite inventive efforts for almost a century, directed to the increase in strength, durability and imperviousness of the container while minimizing the requirements for the use of metal, the all-metal container or "tin can" has been the only universally acceptable container for most liquids and particularly for paints, oils and the like. This situation prevails today despite numerous inventions and extensive promotional efforts in connection with so-called composite containers, in which a fibrous body is provided with metallic ends or with fibrous ends secured by metallic securing means.

The industry is today under an ever increasing pressure to provide a wholly non-metallic container embodying adequate physical strength and moisture-resistance. Despite this pressure which, due to an increasing curtailment of available metals, practically amounts to an ultimatum, the present invention is the first all-fibre container which meets the rigid requirements as to strength and imperviousness while incorporating physical characteristics which lend themselves to economic manufacture.

The prime object of the invention is to provide a fully non-metallic container.

The present inventive effort has heretofore been directed to a solution of the problems raised by efforts to provide adequate physical strength and positive liquid seal in a completely fibrous container.

Thus, it is among the further objects of the invention to provide a fully non-metallic container having rigidity of structure, permanency of the interrelation of parts, and impervious luting of seams so as to be ideally adaptable as a permanent container for many liquids which have in the past required the use of metallic containers.

A further object is to provide a novel non-metallic end closure construction for containers which is efficient and effective, while simple and inexpensive, and one which readily lends itself to economic manufacture with the use of automatic machinery, thus providing a container which may be produced by mass production methods.

Another and more specific object of the invention is to provide a sealing member for a

2

container, which will act to both seal and protect the open edges of a tubular fibrous container body; and in conjunction therewith, a further object is to provide, in such a sealing member, for the permanent constraining of the edges of the body into a locking relation with an end closure member.

An additional and extremely important object is to provide a container of the type referred to, the body walls of which are made from chipboard or the like which is inexpensive and plentiful but which has been limited in its use as a container body because of its inability to stand without fracture an angular bending of 90° or more.

It is also among the objects of the invention to provide a novel method of canister manufacturing involving simple, practical, and effective steps for uniting fibrous elements into a rigid, permanent relationship. In particular, the method includes the step of molding, forming and compressing portions of a fibrous material into securing engagement with other portions of an independent piece of material, the same preferably being done in the presence of an adhesive which renders such material temporarily moist and pliable and thereafter, permanently dense, hard and rigid.

Numerous other objects and features of the invention will become apparent from a consideration of the following specifications and the annexed drawings. A detailed listing of each object and feature of the invention would therefore be a redundancy; however, it is pointed out that in addition to the foregoing desiderata, the invention embraces the provision of novel and effective filling and discharging closure structures, as well as other structural characteristics which carry out the primary purposes of the device in a simple effective manner, not only economic in materials and manufacturing requirements but which enhance the physical appearance of the finished unit.

In brief, the present structure may be defined as a lined fibrous body having one or more end closures comprising an inserted stiff closure disc and a companion sealing membrane extending from the inner face of the disc outwardly over the terminal edge of the body. The terminal edge of the body is inwardly molded and compressed to provide a dense, rigid retaining annulus, and is secured and protected in its molded and compressed form by the enclosing membrane.

More specifically, the container may be said to comprise a body of cellular fibrous material, the end edges of which have had an adhesive

55

applied thereto which preferably impregnates the body edges, being absorbed as by capillary attraction into the interstices of the body edges, rendering them temporarily pliable and compressible for assembly purposes but which upon hardening leave the material permanently rigid. The end closure includes a disc or ring of similar fibrous material, slightly greater in outside diameter than the normal internal diameter of the body; mounted upon the innerface of the disc or ring is a membrane of relatively tough, impervious and flexible material such as paper or parchment which extends outwardly from the inner face of the disc or ring and between its edges and the inner face of the body and over the edges of said body to enshroud them within the membrane.

The invention contemplates the use, on either or both ends of the container, of a solid, substantially stiff imperforate disc or the use, on either or both ends of the body, of a modified disc in the form of a ring secured in like manner by the annulus formed by the molded body edges and having a closing and sealing member removably engaging the inner edges of the ring to provide for ingress and egress of material. The invention is not limited to any specific type of such closure, which may be wholly independent from the ring with respect to manufacture or material. Thus it may be a plastic member, mechanically joined, as by a threaded or bayonet type engagement or, as here shown, may be a fibrous disc frictionally fitted within the ring structure and sealed thereto by a tearable securing seal.

In the method of manufacture, the forcible insertion of the disc, preferably after the body edges have been treated with an adhesive, slightly expands the internal diameter of the body to the extent of the disc insertion, thus providing, at the terminal point of such insertion, a shoulder against which the inner face of the membrane abuts. The enshrouding of the body edges by the membrane provides for a protection of the edges against mutilation by the contact of a forming die, thus to preclude a fraying disruption of the body material at its terminal edges. The body edges are compressed and molded inwardly against the outer face of the disc by a forming die. As pressure is exerted by the die, the loose enshrouding of the edges by the diaphragm becomes a closely fitting encasement, the tough material of the diaphragm engaging and binding the raw edges of the body, and, as the forming and compressing action of the die is completed and the material sets in its final form, the diaphragm material acts thereafter as a retaining means precluding the expansion or outward movement of the compact annulus formed by the molded edges so as to provide, between the shoulder beforementioned and such annulus, a rigid, locking securement of the closure disc.

Referring more particularly to the drawings: Fig. 1 is a perspective view, partly in section, of one form of the present invention;

Fig. 2 is an enlarged and exaggerated sectional view of that form of invention shown in Fig. 1;

Fig. 3 is a sectional detailed view of one modification of a cap structure embodying the elements of the present invention;

Fig. 4 is a similar view of another modification of the cap structure of the present invention;

Fig. 5 is a detailed view illustrating the first step in the assembly of the container;

Fig. 6 illustrates a further step showing the insertion of the end closure by a die member;

Fig. 7 illustrates the container after the end closure has been inserted;

Fig. 8 illustrates the first step in the action of the molding die;

Fig. 9 shows a further stage in the action of the molding die; and

Fig. 10 shows the molding die in the final position.

In the drawings, the numeral 10 indicates the container body. The body is here illustrated as cylindrical in form, although it is to be clearly understood that the configuration of the body may be widely varied and that the invention is not confined to the circular cross section here shown. Obviously, many angular cross sections may be used in carrying out the invention as may be dictated by the artistic senses of the purchaser or ultimate consumer. While the walls of the body 10 are, for the sake of simplicity, illustrated in Fig. 1 and Figs. 3 to 10 inclusive as formed of a single thickness of suitable body material, they are more preferably formed of a composite structure of helically or circularly wound laminations of fibrous material. As illustrated in Fig. 2 a practical embodiment of the invention may be a body formed in accordance with Patent No. 2,202,558, issued in the name of Martin P. Kernahan and assigned to The Canister Company, the assignee of the present invention. This structure comprises three spirally wound layers of chipboard indicated by the letters *a*, *b* and *c*. The chipboard is characterized as relatively porous and compressible material having interstices which render the material substantially absorbent and permit the impregnation thereof by capillary action. The layers *a*, *b* and *c* of the body are united by glue and the faces of the chipboard are usually sized so that together with the glue they render the body somewhat less absorbent than the open raw edges where the tubular material is cut. The inner surface of the body material is lined with a substantially impervious, tough, flexible paper or parchment, 11, which renders the internal body surface fully impervious to such materials as oils, paints and similar liquids, particularly of the non-aqueous type.

It will, of course, be understood that specific uses will dictate specific characteristics of materials and adhesives to be used. The present invention is concerned primarily with the physical construction of the container rather than confined to the materials of the body, the liners, or the adhesive which may be used. It will, therefore, be understood that the body of the container may be of paper, chipboard, strawboard, bristol-board or the like, including a wide variety of non-metallic, fibrous materials of the felted types here referred to, as well as those having textile characteristics, without departing from the spirit or scope of the invention.

The end closures for the container may be, as illustrated in Figs. 1 and 2, formed and secured in like manner or as illustrated in Figs. 3 and 4, a modified cap construction may be used to facilitate filling and discharging. In that form of the invention shown in Figs. 1 and 2, the cap closure is usually applied after filling of the receptacle; while in that form of the invention shown in Figs. 3 and 4, the receptacle may be completely finished and subsequently filled and sealed.

The end structure shown in Figs. 1 and 2 includes a flat circular sealing membrane 12, of impervious, tough and flexible material such as

5

paper, parchment, cloth or the like which may be the same as the liner 11 provided for the inner surface of the body. The membrane is used in conjunction with a closure disc 13, which may be of single or multiple ply, substantially rigid material in the nature of the chipboard material from which the container bodies are formed. With regard to materials, here again a wide choice is intended, the disc may even be formed of wood, while the membrane could be of a fabric if desired. As in the case of the body, the invention is not limited to the specific materials here suggested.

An important feature of the invention resides in the relationship of the diameter of the disc with respect to the internal diameter of the body. The relation of dimension will be clearly understood from a reference to Fig. 5, in which the relative dimensions are exaggerated to bring out the fact that the disc 13 is of greater diameter than the internal diameter of the body. The numeral 14 indicates an application of adhesive material to the edges of the body 10, the material being applied in such manner as to cover the internal and external walls for a short distance inwardly of the terminal edge, and preferably being of such characteristics as to infiltrate the interstices of the body as indicated by the dots. Such infiltration and moistening of the body edge, the extent of which is determined by the characteristics of the adhesive material and the amount of capillary action which takes place, render the edges limp and pliable thus to facilitate the insertion of the cap 13, which is accompanied by an expansion of the body edges. Adhesive material also is preferably applied between the disc and the membrane either in conjunction with the application of the membrane and disc to the body or as a preliminary thereto.

As illustrated in Fig. 6, the disc and membrane are preferably inserted by the use of an inserting die 15, which has a central body portion 16 of a diameter substantially equal, if not exactly equal, to the diameter of the disc and which is surrounded by a flange 17 extending outwardly therefrom. As shown in Fig. 6, the body portion 16 of the die engages the external face of the disc forcing it into the container body and thus causing it to expand the terminal edges of the body. It will be noted, of course, that the membrane enters the container body with the disc so as to enshroud the same and unite with it, to form a unitary end closure.

It will also be noted that the encasement of the side edge of the disc by the membrane material, as at 18, increases the diameter of the combined assembly of the disc and membrane; in some instances the thickness of the membrane material may in itself be sufficient to increase the external diameter of the assembly to the desired extent beyond that of the internal diameter of the body, in which instance the diameter of the disc may be equal to, or even less than, the internal diameter of the body.

As the disc and membrane are inserted, causing an expansion of the body wall, it will be noted that the unexpanded wall portion, directly abutting the inner face edges of the membrane, constitutes a shoulder 19, which acts as a stop for subsequent accidental internal movement of the disc assembly.

As further shown in Fig. 6, it will be noted that as a consequence of the act of insertion the inner surface of the membrane will pick up and carry with it some of the adhesive material of the in-

6

ternal surface of the body edge, thus providing for a luted seal between the diaphragm 12 and the liner 11 of the body. It will also be noted that the overlying character of the shoulder 19 greatly assists in the formation of a tight seal.

The extent of insertion of the disc and membrane unit within the body is determined by the amount of extension of the body portion of the die beyond the flange 17 thereof, and as noted in Fig. 7 the membrane after insertion with the disc, constitutes an enshrouding member covering the edges of the disc and sealing such edges against the absorption of moisture. Further, the edges of the membrane extend outwardly in contact with the liner 11 of the body and at right angles thereto across the open raw edges of the body, providing a seal and encasing protective sheet therefor.

Referring now more particularly to Figs. 8, 9 and 10, it will be seen that the final steps in permanently uniting the end closure with the body of the receptacle preferably includes the use of the molding and compressing die 20, which includes a rounded peripheral edge 21 and an internal wall 22, which may preferably be slightly tapered, and which terminates in a radius 23, which is adapted to mold the edges of the body. The first step in the operation of the die is the engagement of the peripheral edge of the membrane by the curled outer edge 21 of the die, which forces the membrane edge downwardly over the outer surface of the body edge. A further movement of the die downwardly with respect to the axis of the body, as shown in Fig. 9, inwardly compresses the body edges, returning the external surface thereof into alignment with the main body of the container and thus compressing that portion of the material of the body which is in transverse alignment with the disc. During this operation it will be noted that the rough, raw edges of the body are protected and shielded by the tough characteristics of the membrane material, thus precluding a fraying or tearing of the body material.

As seen in Fig. 10, the final act of the die is to engage the terminal edges of the body with the radius 23 thereof; to turn and mold them inwardly so that they, with the edges of the membrane, constitute a disc-securing internally extending molded and compressed securing annulus 24. The presence of the adhesive material either on the surface of the body edges or penetrating into the interstices of the body material will act not only to firmly unite the structure, but upon hardening will constitute a filler for the compressed material greatly enhancing the final denseness of annulus thus to secure the disc in a rigid, permanent engagement within the body. It will also be noted that the permanency of the inward displacement of the body edge material against the outer face of the disc is insured by the engagement thereof by the tough material of the membrane.

It is important to note that while the radius of the die turn, molds and compresses the edges of the body material inwardly, the action is clearly distinguishable from a crimping action. Closure members have long been secured within encasing bodies by an inward crimping of the edge of the body material. However, such structures rely upon a complete inward turning or bending of the material as is commonly found in the crimping of the outer edge of shot gun shells, to return bend the material and thus secure the wad in place. It will be understood, however,

that the chipboard material from which the body of the present container is formed is not susceptible of such folding and an attempt to bend such material to the extent of an angle approaching 90° would result in a fracture of the material, the fibres of which are short, coarse and brittle and are mingled with filler material which renders the body considerably more breakable than were it to be formed of a more expensive but tougher paper-like material.

While the movements of the die are herein depicted and described as a simple, rectilinear motion of the die in the direction of the axis of the body, it may well be that in some instances a rotary motion might beneficially be employed in addition to the axial movement and this is particularly true with respect to a molding operation used in connection with a body material spirally wound, as illustrated in Fig. 2. In such body material, the fibre has a tendency to extend longitudinally of the strip and thus helically with respect to the axis of the body. In such an instance, it will be seen that if rotary motion is imparted to the die in the direction of the helix, a disrupting, tearing and fracturing of the fibres of the body will be minimized. It will therefore be seen that with the use of such body material and a rotary die, the angular displacement of the body material in respect to the normal axis of the body may be greatly increased without danger of breaking the body material.

As a final and finishing operation, excessive edge material of the membrane may be removed by a skiving of the edges as at 25 in Fig. 2, which action is preferably followed by the application of a final external sealing label 26, the terminal edges of which should preferably engage the terminal edges of the membrane to enhance its securement with the body.

Referring now more particularly to Figs. 3 and 4, it will of course be understood that the disc may be modified in order to provide various types of dispensing openings. The form of construction of Fig. 3 provides a sealed independent closure element which may be readily removed and replaced, while the disclosure of Fig. 4 provides a hinged closure. As distinct from the use of identically similar ends, as illustrated in Figs. 1 and 2, which require the disc and diaphragm insertion after filling the canister, the structure of Fig. 3 permits of the manufacture of the completed unit which may be subsequently filled and sealed by a simple insertion of the closure disc. In this form of an invention, the disc 13 in Figs. 1 and 2 is substituted by a compound ring including a lower ring portion 27, having a central aperture and an upper closure-receiving ring 28, having a central aperture of greater diameter than the aperture of the ring 27. The diaphragm 12 is substituted by a similar diaphragm 29, which is centrally apertured to conform with the central aperture of the ring 27. The ring and diaphragm are applied in the manner shown in Figs. 5 to 10, the terminal edges of the container being enshrouded by the diaphragm edges which are inwardly deformed and compressed in manner hereinbefore described.

The central aperture of the upper ring 28 is closed by a removable closure disc 30, which is provided with a tab 31 and which is sealed into position by an annular seal 32, which extends between the disc 30 and the upper ring 28. As shown, it may be preferable to extend the seal 32 over a portion of the tab 31, so that manipulation of the tab will fracture the seal to assist

in a tearing action, which will permit the disc to be raised from its enclosure within the aperture of the upper ring. It will, of course, be seen that the disc 30 will rest upon the inward projection of the ring 27 beyond the aperture of the ring 28, thus precluding accidental inward displacement of the disc and assisting in sealing the material within the container.

In that form of an invention illustrated in Fig. 4, a compound disc including an annular ring 33 is provided, together with an annular diaphragm 34. In this instance however the upper member of the disc is a continuous piece of material 35. An addition sealing diaphragm 36 is provided which extends between the ring 33 and the member 35, and the member 35 is provided with throughout incisions 37 which define a closure hinged to the annular portion of the member 35 by serrations 38. In this form of the invention when it is desired to dispense the material within the canister the central portion of the member 35 is raised and the diaphragm 36 is punctured. It may be readily seen that the canister may thereafter be temporarily closed by molding back the central portion of the member 35 to its original position.

From the foregoing it will be noted that the invention provides a simple, efficient, wholly non-metallic container having a rigid, durable structure, the seams of which are securely luted to provide a leak-proof structure well able to withstand the most extensive demand made thereon. As heretofore pointed out, it is to be noted that the invention is not confined to the specific structure here shown by way of illustration nor to the materials which are here suggested. Obviously therefore numerous changes and modifications and the full use of equivalents may be utilized in the manufacture of the device without departing from the spirit or scope of the invention as outlined in the appended claim.

What is claimed is:

The method of closing the end of a cylindrical container body formed of short-fibered material having the properties of chip-board which comprises the steps of softening the end of the body, assembling a disc of stiff material having a diameter substantially equal to the internal diameter of said body with a sealing diaphragm of greater diameter than said container body, inserting the resulting assembly into the softened end of the container body with the sealing diaphragm facing inwardly, and with the marginal portions thereof extending between the edges of the disc and the inner surface of the container body, folding said marginal portions of the sealing diaphragm outward and downward about the end of the container body and the adjacent outer surface thereof, turning the softened end of the body inward over the edges of said disc through an angle of approximately 90° and hardening the inturned edges of the body.

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10

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