

April 8, 1941.

F. L. BRONSON

2,237,809

CONTAINER

Filed Oct. 23, 1937

2 Sheets-Sheet 1

Fig. 1.

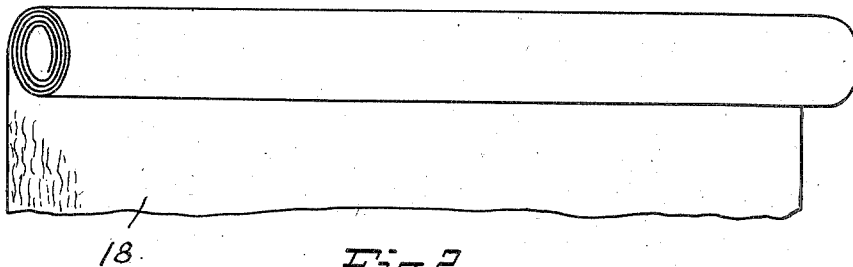


Fig. 2.

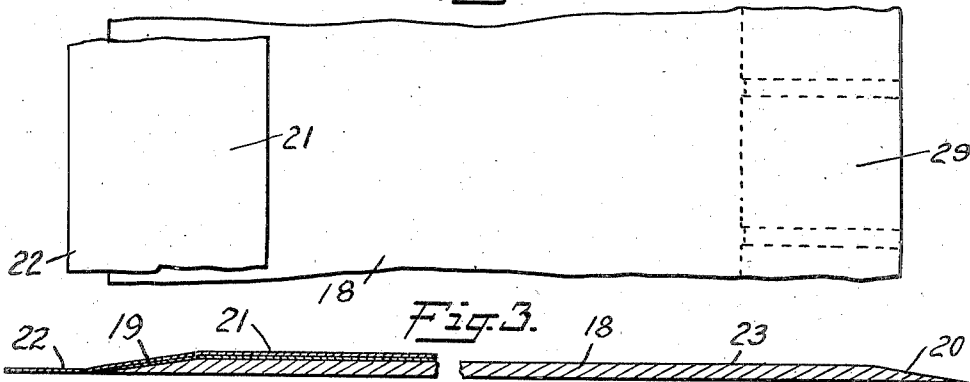


Fig. 3.

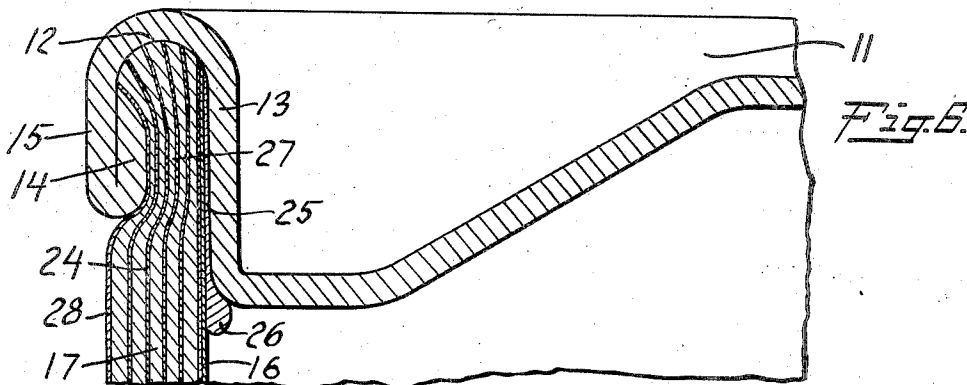
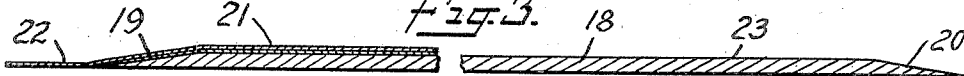


Fig. 4.

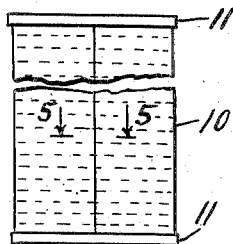
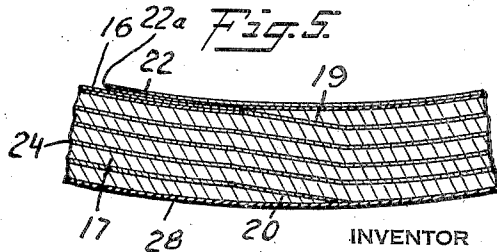


Fig. 5.



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2 Sheets-Sheet 2

Fig. 7.

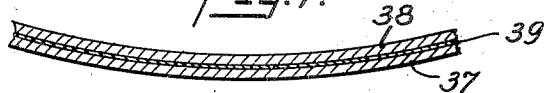


Fig. 8.

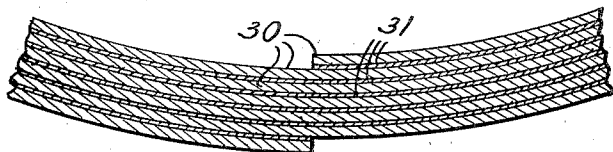
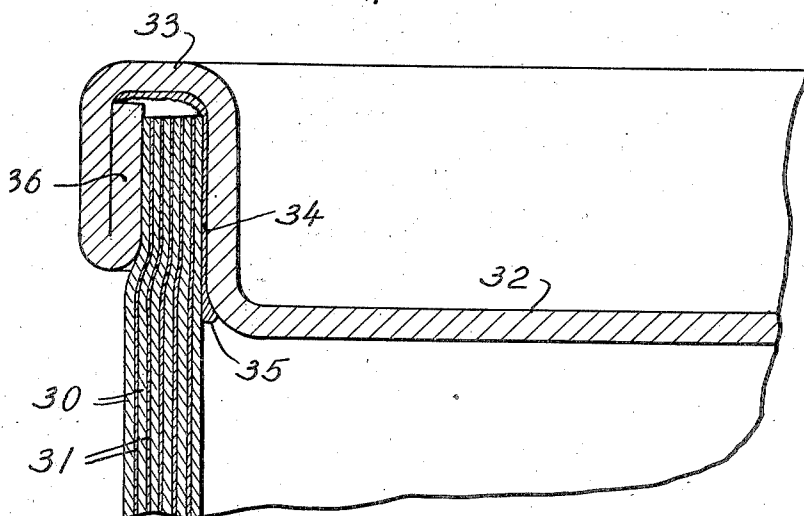


Fig. 9.



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UNITED STATES PATENT OFFICE

2,237,809

CONTAINER

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Fibre Can and Machinery Company, New
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Application October 23, 1937, Serial No. 170,525

9 Claims. (Cl. 229—3.5)

This invention relates to containers comprising a tubular body and suitable end closures, and is concerned more particularly with a novel container of the type referred to which is strong and capable of withstanding shocks in shipment and handling without loss of contents, and can be produced economically and at a high output rate. This application is a continuation in part of my copending application Serial No. 738,250, filed August 3, 1934.

The container of the invention may be used in the distribution of commodities of various kinds, such as liquids and granular or pulverulent solids. It is, however, especially adapted for use with oils, such as petroleum lubricating oils, vegetable oils, and the like. An embodiment of the invention suitable for use with lubricating oils will, therefore, be illustrated and described in detail for the purpose of explaining the principles of the invention, but it is to be understood and will be readily apparent that the utility of the invention is not limited to its use in the distribution of that specific product.

At the present time, it is common practice among oil companies to distribute lubricating oils for motor cars in sealed containers, ordinarily of quart capacity, so that the purchaser may be certain that the oil sold him is of the quality and in the quantity desired. The containers heretofore used for this purpose have been of the ordinary tin can type and in order to discharge the contents, the containers are punctured and after being emptied, are discarded. While such metal containers are entirely satisfactory in that they are capable of retaining their contents during handling without leakage or seepage, their cost is such as to represent a substantial item in the cost of the oil as delivered to the consumer.

Numerous attempts have been made heretofore to produce a cheaper container for the distribution of oil which will serve the purpose as well as tin cans, but so far as I am aware, no such container has been available up to the present. The problem of providing an inexpensive container suitable for use in the distribution of oil is of extraordinary difficulty for several reasons. To keep the cost low, the use of paper or other inexpensive fibrous material for the container body immediately suggests itself, but the body must be so formed that it will not only prevent leakage but also seepage of the contents. Prevention of leakage from the container is essential for obvious reasons, while seepage of oil into or through the wall of the container will cause discoloration of the exterior and seri-

ously impair the appearance of the container and may result in a substantial loss of the contents. Also, in such a container, in which the ends of the body are closed by metal closures or end caps, the caps must be held securely in position as escape of oil between the body and caps must be prevented.

Oil containers are normally shipped in cases of sufficient size to hold a plurality of the containers and in the shipment and handling of the cases as well as in the subsequent handling of individual containers, the latter are frequently subjected to rough treatment. The impacts thus applied are often limited to small areas, as, for example, the edge of the top or bottom where the end cap is mounted on the body. In addition to external blows, the containers must also withstand severe blows applied from within by reason of the "water hammer" effect of the contents occurring particularly when the containers are dropped.

An oil container must further be capable of withstanding exposure to extremes of temperature and humidity without losing its resistance to mechanical injury, since in normal use it may be transported to the tropics or to the Arctic, or to localities where extreme conditions of dampness or dryness exist. This factor presents particularly serious difficulties in the construction of containers involving the use of paper or the like, since the layers of paper must be secured together by adhesive and it is difficult to provide an adhesive which will function properly under varying conditions of temperature and humidity and will also be suitable for use in production operations carried on at high speed. Finally, the container must be capable of production at less cost than a tin can of equal capacity since otherwise its use would be uneconomical.

There are numerous disclosures of oil containers involving the use of fibrous material in the patents and literature, but these containers have not been successful for one reason or the other, and so far as I am aware, there is, at present, no oil company distributing oil in major quantities in quart containers of other than the tin can type.

The prior oil containers made wholly or in part of fibrous materials, with which I am familiar, have, for the most part, been constructed on the theory that the necessary strength for withstanding shipment and handling could be secured only by making the container body strong and rigid, and various expedients

have been adopted to obtain those characteristics within the cost limits imposed. Containers of that type, however, have not proved satisfactory commercially for several reasons, the principal one being that the stiff, rigid body fractures or ruptures in shipment with either complete loss or leakage of its contents.

The present invention is accordingly directed to the provision of a container suitable for use in the distribution of lubricating and similar oils, which fulfills the requirements above pointed out, both as to physical characteristics and cost of manufacture. The new container includes a body and end closures mounted thereon, and the body is formed of laminations of flexible fibrous material, such as paper, bound together by intervening films of adhesive. To prevent escape of the contents, at least one complete circumferential film of the adhesive is oil-impervious and thus provides a barrier which prevents passage of oil through the body wall. The kinds of sheet material and adhesive used, the number of laminations employed, and the thickness of the adhesive films are such that the body is both tough and relatively flexible. As a result, the body will withstand impacts and blows producing substantial distortion but without suffering injury, that is, the container will not be injured to such an extent as to permit loss of its contents when distorted as a result of undergoing such treatment as it would normally receive in shipping and handling under ordinary commercial conditions. The container is, therefore, satisfactory for commercial use.

The body of the new container is preferably cylindrical and it may be formed entirely of a single convolutely wound sheet of oil-impervious material, such as glassine or the like. Preferably, it comprises a relatively thin liner lamination of which oil-impervious material and a main lamination, which is of heavier material and may be somewhat less impervious to oil than the liner. In the latter form of container, the barrier film of adhesive may conveniently be interposed between the liner and main laminations, although, if desired, the oil-impervious adhesive may be used throughout the entire body.

The adhesive employed in the barrier film and, if desired, throughout the entire body of the container, is not only substantially insoluble in and impervious to oil, but is also flexible and gummy. By the term "gummy," I mean that the adhesive after setting is not brittle but pliable, and is somewhat rubbery in texture. The barrier adhesive employed in the new container remains flexible and gummy indefinitely and thus provides a continuously effective film which prevents loss of the oil from the container.

While the flexible gummy adhesive above mentioned may be used throughout the body of the container, an adhesive which is not gummy may be employed, if desired, to secure the major portion of the laminations of the body together, provided a barrier film of the gummy adhesive is also employed. The non-gummy adhesive referred to is one which is relatively flexible, although it may be somewhat brittle under some conditions of use. In the container of the invention, it is applied in films of extreme thinness, so as not to impair the flexibility of the body, and although such films may crack during the use of the container, the loss of the contents is prevented by the barrier film of the gummy material.

The tubular body formed as above described is

closed by end caps which are preferably of metal and have circumferential channels in which the ends of the body are received, the outer walls of the channels being forced inwardly, as by crimping, to clamp the ends of the body between the opposed channel walls. To prevent loss of contents between the body and caps, an oil-impervious sealing material is interposed between the surface of the body and at least one of the channel walls at each end. Preferably, this sealing material lies between the body and the inner wall and also provides a fillet in the crevice or joint where the cap meets the inner wall of the body. The sealing material, which I employ, is similar to the adhesive used in the barrier film, in that it is flexible and gummy. In addition, it is somewhat tacky and remains in that condition indefinitely. These characteristics enable the sealing material to adhere continuously to both the fibrous material of the body and the metal end caps, and it thus forms an effective oil-impervious seal at the ends of the container regardless of localized distortion produced by severe impacts directed, for example, on the edges of the caps.

The convolutions of the body may be bound together by an adhesive which is insoluble in water, in which event the absorption of moisture by the outer lamination of the body may be prevented by employing a waterproof coloring material for a label, which is printed directly on the outer lamination. If the convolutions of the body are bound together by a water-soluble adhesive, it is preferable to provide an external lamination of waterproof material, such as a coating of paraffin. Such a coating may, of course, be used if desired regardless of the kind of adhesive employed.

A container of the construction described has proved to be highly satisfactory for its intended purpose. It holds oil without leakage or seepage resulting in loss of contents or external discoloration, and continues to do so indefinitely, even though subjected to extremely rough treatment. It does not fracture or rupture under severe impact, but yields and flexes and even though subjected to blows sufficient to distort the end caps, it remains oil-tight. Its cost is low enough to represent a substantial saving over the cost of similar tin cans.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which

Figs. 1 and 2 are, respectively, a perspective and a plan view of material used in the production of a preferred form of the new container, showing different steps in its manufacture;

Fig. 3 is a transverse sectional view of a composite strip which may be employed in making the preferred form of the new container;

Fig. 4 is a side view of the completed container;

Fig. 5 is an enlarged sectional view on the line 5-5 of Fig. 4;

Fig. 6 is an enlarged sectional view showing the end construction of the preferred form of the new container;

Fig. 7 is an edge view showing one type of lining material that may be employed in the preferred form of the container;

Fig. 8 is a section, similar to Fig. 5, of a modified form of the new container; and

Fig. 9 is a view similar to Fig. 6 showing the end construction of the modified form of the new container.

The container, as shown in Fig. 4, comprises

a flexible tubular body 10 and end caps 11 which are preferably of sheet metal. Each cap is formed with a circumferential channel 12 (Fig. 6) in which an end of the tubular body 10 is received, with the inner wall 13 of the channel bearing against the inner surface of the body over a substantial area. In the completed container, the peripheral edge portion 14 of the outer wall 15 of the channel is turned in by a crimping operation and is squeezed against the body material to press it tightly against the inner wall of the channel. The body is formed of flexible sheet material and preferably consists of a liner 16 of thin material highly impervious to oil, and a main lamination 17 made up of a plurality of layers of a relatively heavy material which may be somewhat more pervious to oil than the lining material.

In the production of the preferred form of container, a web 18 of a suitable relatively heavy fibrous material having a lengthwise grain is drawn from a roll and the edges 19, 20 are preferably skarfed off, as indicated in Fig. 3, to give them a taper. Thereafter, a strip 21 of the lining material is affixed adhesively to the web 18 so that a portion 22 of the lining material projects beyond one of the edges (as shown in Fig. 3, the edge 19). An adhesive is then applied to a surface 23 of the web 18 and also to the exposed surface of the edge portion of the lining material opposite the projecting portion 22 thereof. The composite web is cut transversely to form strips of a width equal to the height of the body and since the grain of the fibrous material is lengthwise of the web 18, it extends crosswise of each strip or lengthwise of the body into which the strip is to be formed.

The composite strip is then wound on a mandrel to tubular form and, in the winding operation, the projecting portion 22 of the lining material becomes affixed to the portion of that material to which adhesive has been applied and which it overlaps, and the several wraps of the heavy material are secured face-to-face by intervening films 24 of adhesive. The skarfed edges 19 and 20 are brought into registry so that the main lamination is of substantially uniform thickness throughout its circumference.

The tubular body thus formed is closed by the end caps to complete the container, and before the end caps are applied, an adhesive sealing material is interposed between the body and the walls of the channels in the caps. Preferably, the sealing material lies between the inner surface of the body and the inner wall of the channel of each cap, as indicated at 25 (Fig. 6), but, if desired, the sealing material may lie between the walls and the body and end caps wherever those parts would otherwise be in direct contact, and also between the ends of the body and the bottom of the channels. When the sealing material is to lie between the body and the inner wall only of each channel, the material is applied to the inner wall of the body adjacent each end cap before the cap is placed in position, and as the cap is forced inwardly, a portion of the material is moved along by the cap so as to form a fillet 26 in the crevice between the cap and the body. After the cap is placed in position, its outer edges are crimped inwardly by an operation which causes the outer wall 15 of the channel to force the body material in the region indicated at 27 firmly against the inner wall of the channel.

The container is then ready to be filled, and thereafter the open end is closed by a cap crimped

in position as described above. If desired, a label may be affixed to the outside of the container and a coating 28 of water-repellent material, such as paraffin, may be applied thereover. Advantageously labels are printed directly on the web 18, as indicated at 29, along the edge opposite that to which the lining material 22 is to be applied.

Instead of constructing the container of a liner of thin, oil-impervious material and a lamination of a relatively heavy material, it may be desirable, in some instances, to construct the entire body of the oil-impervious material, although this type of construction is somewhat more expensive than that of the preferred container. In the construction of such a container, a strip of thin oil-impervious material, such as glassine, parchmentized paper, or the like, is coated on one surface with a suitable adhesive and wrapped a number of times around a suitable mandrel to form a tubular body composed of a number of convolutions 30 (Fig. 3) of the thin, oil-impervious material secured together by intervening films 31 of the adhesive. The container is completed by closing the ends of the tubular body member with end caps 32, preferably of metal, having circumferential channels 33 adapted to receive the ends of the tubular body member. Before mounting the end caps 32 on the tubular body, an adhesive is applied to the inner surface of the body adjacent the end thereof. When the cap is pressed on to the body, this adhesive forms a film 34 between the inner wall of the channel 33 and the tubular body member, and a portion of the adhesive is forced inwardly to form a fillet 35 in the crevice between the under surface of the cap and the body. The outer wall 36 of the channel is turned under and pressed against the tubular body member by a crimping operation, substantially as described above in connection with the preferred form of container.

Because of the specific physical characteristics desired of the new container, the materials used in making it are of considerable importance and have to be selected with great care to obtain the results sought. The material used as the liner in the preferred container is a thin, flexible, non-porous, oil-impervious sheet material such as glassine or parchment, the former being preferred. Glassine is a cellulosic material produced from cellulose pulp, the pulp being subjected to a prolonged beating in the presence of water to give it a jelly-like consistency, after which it is diluted with water and sheeted out on the usual paper-making apparatus, and the sheet is finally moistened and subjected to super-calendering. Parchment is a somewhat similar material produced by well known operations and has characteristics similar to those of glassine.

Glassine is extremely thin and is susceptible to wrinkling if it absorbs water or adhesives containing water. It is important to avoid any wrinkling of the glassine in affixing it to the main body of the container, because unless the glassine lining is well supported over substantially its entire area, it is easily ruptured at points where it is not supported. Wrinkles or bubbles that may result from absorption by the glassine of moisture from adhesives containing water during the application of the liner to the main lamination material constitute points of easy rupture, and great care must be taken to avoid their occurrence. It may be preferred, however, to em-

ploy water-soluble adhesives to facilitate construction of the container.

I have found that it is permissible to employ water-soluble adhesives in conjunction with glassine if only a very short time interval elapses between application of the adhesive to the glassine and application of the glassine to the material forming the main lamination of the container. I have also found that water-soluble adhesives may be employed without difficulty in connection with glassine, provided the glassine is used in the form of a double sheet made of two layers 37, 38 (Figs. 5 and 7) of the material secured face-to-face by an adhesive 39 which may be water-soluble. Use of the double sheet of glassine is preferred in making containers according to the invention because the glassine, being very thin, may contain imperfections in the form of small pores. In the double sheet, it is likely that all such pores in either of the sheets will be closed by the other sheet as well as by the film of adhesive between them. Moreover, when the double sheet is employed, the time interval between application of adhesive to the lining material and application of lining material to the material of the main lamination may be lengthened considerably, and this is of considerable importance in commercial production of containers.

Instead of using the double sheet of glassine and a water-soluble adhesive (or in some instances, a single sheet of glassine with a water-soluble adhesive), a single sheet of glassine may be employed as the lining material in conjunction with a thermoplastic adhesive. Such adhesives do not tend to wrinkle glassine or to cause bubbles separating the glassine from its underlying support.

The material used for the main lamination of the preferred form container is a strong, flexible, fibrous material, such as heavy paper, and I prefer to employ a sized kraft paper which is resistant to the absorption of oil and water. A paper of substantial weight, such as a so-called 90-pound paper, which is one weighing 90 pounds per ream of sheets 24" by 36", is preferred. With a paper of that weight, the paper is somewhat easier to handle than one of a lighter weight, less convolutions are required to produce a body having a wall of the desired thickness, and less adhesive is used.

Kraft paper of the weight referred to has a thickness of about .010 inch, and in the tapering of the edges of the web, it is ground off by an abrading operation to a thickness of about .001 inch at the extreme edge, the tapered portion being of about $\frac{3}{8}$ inch width. As these portions are of the same slope and reversed, and are placed in registry in the winding operation, the main lamination has a wall of virtually uniform thickness throughout its circumference. As a result, the provision of a tight joint between the tubular body and the end caps is facilitated. This tapering of the edges is also important because it serves to eliminate the space that otherwise would separate the glassine lining from the main lamination along the line where the edge of the inner convolution of the body overlies the second convolution. Such a space would provide a point of weakness where the glassine lining could easily be broken, and would introduce difficulties in securing a tight joint between the end closures and the body of the container. The body wall is not of exactly uniform thickness, since the projecting portion 22 of the lining material overlaps another part of the material in

the liner, but the lining material is so extremely thin that no substantial opening is formed at the free edge 22a of the liner through which leakage might occur. Also, such opening as is formed at this point is easily closed at the ends of the container by the sealing material previously mentioned.

The adhesives employed in the container of the invention are of such nature as to obtain the desired characteristics of flexibility in the body wall, as indicated above, as well as to secure the successive convolutions of the body to one another. In the preferred form of container, which includes a liner formed of a double sheet of glassine and a main lamination of kraft paper or the like, a flexible, gummy, oil-impervious adhesive which is water-soluble may be used to secure the sheets of glassine together and the glassine to the kraft. One adhesive which may be employed advantageously for the purpose is that described and claimed in my copending application Serial No. 303,193, filed November 7, 1939. This adhesive includes casein, triethanolamine, urea, glycerine, and water, and it not only performs the desired uniting functions, but in addition is oil-impervious, flexible and gummy and retains its flexibility and gummy nature indefinitely and regardless of the presence of moisture.

In the manufacture of the preferred container, this adhesive is to some extent absorbed by the kraft paper and is also forced into the pores of the latter during the winding operation, so that it adds to the resistance of the kraft to absorption of oil. When interposed between the glassine and the kraft, the adhesive presents a barrier film that effectively prevents seepage of oil into the pores of the kraft, and such a barrier film prevents discoloration of the outer layers of the main lamination. The adhesive has the further desirable characteristic of being relatively slow-setting so that it will not be taken up quickly by the glassine and cause wrinkling of the latter and, in addition, it is water-soluble, which makes it easy to handle in the production of the container.

Various adhesives may be employed for securing together the convolutions of the kraft paper, and one suitable for the purpose is that disclosed in my copending application Serial No. 303,193, filed November 7, 1939. This adhesive includes shellac, triethanolamine, glycerine and water, and is characterized by setting relatively quickly and being of a consistency such that it may be easily handled on an automatic machine. This adhesive, like that mentioned above, is oil-impervious, flexible and gummy, and retains its flexibility and gummy nature indefinitely and regardless of the presence of moisture. When employed between the successive convolutions of the kraft, it provides a continuous barrier film of a plurality of convolutions that prevents seepage of oil through the body of the kraft paper. Its solubility in water adds to the convenience with which it may be utilized.

In place of the last-mentioned adhesive, the convolutions of the kraft paper may be secured together with an adhesive comprising shellac or casein, water, and ammonia. Such an adhesive is not gummy in nature and is not so flexible as that described above. When used, it must be in a film of such thinness that it does not impair the flexibility of the kraft paper; while such a film may be broken in the handling of the con-

tainer, the presence of the gummy oil-impervious barrier film prevents loss of the contents.

The sealing material used for sealing the container wall to the caps is an oil-impervious adhesive which is capable of adhering continuously to both glassine and metal, and an adhesive sealing material suitable for the purpose is described in my copending application Serial No. 303,193, filed November 7, 1939. This sealing material is a compound of shellac, triethanolamine, and water, and is characterized by being oil-impervious, flexible, gummy, and tacky. It acts as a cushion between the wall of the body and the walls of the channels in the cap, and, in addition, it is capable of stretching to a substantial degree without losing its adhesion to the body or the metal. Accordingly, if the container, during handling, receives a blow on the edge of the cap sufficient to distort the cap, the shock is to some extent cushioned by the sealing material and the tendency of the wall toward being fractured or ruptured adjacent the point of impact is thus reduced. Similarly, localized distortion of the cap does not cause the seal to be broken, so that leakage or seepage of the contents from the container results, because of the continuous adherence of the material to the body and cap.

In the modified form of container, in which the body member is composed entirely of convolutely wound, oil-impervious material, such as glassine, the first of the above-mentioned adhesives may be employed to secure the successive layers of glassine together. Alternatively, a water-soluble adhesive composed of tapioca dextrin, water, and calcium nitrate may be employed. This adhesive is oil-impervious, flexible, and gummy, and retains its flexibility and gummy qualities indefinitely. The successive convolutions of glassine may also be secured together with a thermoplastic adhesive, such as one composed of copal gum and castor oil. This adhesive is flexible and gummy in nature, but is not water-soluble and must be heated for use.

In the completed container, the crimped edges of the end caps bear against the wall of the container across the grain of the material of the main lamination, so that the material is not likely to be split at the edge either in the formation or handling of the container. The end caps may thus be applied as tightly as is necessary without injury to the container body, and the cushion of sealing material protects the body along the line where it is engaged by the crimped edge.

When the adhesive employed in securing together the convolutions of the main lamination of the body is water-soluble, it is desirable to provide an outer water-impervious covering to protect this adhesive and prevent the convolutions of paper from becoming separated as a result of absorption of moisture by the adhesive. This may be done by coating the exterior of the container body with paraffin or other moisture-proofing agent, preferably after the label has been printed thereon or otherwise applied thereto, or by applying a sheet of moisture proof material over the exterior of the container body. As these expedients add to the cost, it is advantageous to employ an adhesive which is not soluble in water or which becomes insoluble after setting.

I claim:

1. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of laminations of flexible sheet material wound convolutely and bound together by

intervening films of adhesive, the laminations being present only in sufficient number and the films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, at least one complete circumferential convolution of adhesive being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture and providing a barrier against passage of the contents through the wall, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed at least between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and tacky and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

2. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of a lining of flexible oil-impervious sheet material and a main lamination of relatively heavy flexible sheet material wound convolutely and bound together by intervening films of adhesive, the laminations being present only in sufficient number and the films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, at least the convolution of adhesive between the lining and the main lamination being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture and providing a barrier against passage of the contents through the wall, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed at least between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and tacky and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

3. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of a lining of flexible, oil-impervious sheet material and a main lamination of relatively heavy flexible sheet material wound convolutely and bound together by intervening films of adhesive, the sheet from which said main lamination is wound having its edges tapered and, upon winding, placed in registry to form a body having substantially uniform wall thickness throughout, the laminations being present only in sufficient number and the films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, at least the convolution of adhesive between the lining and the main lamination being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture and pro-

viding a barrier against passage of the contents through the wall, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed at least between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and tacky and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

4. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of a lining of flexible, oil-impervious sheet material and a main lamination of relatively heavy flexible sheet material wound convolutely and bound together by intervening films of adhesive, the sheet from which said main lamination is formed being cut and wound so that the grain of the sheet runs lengthwise of the container, the laminations being present only in sufficient number and the films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, at least the convolution of adhesive between the lining and the main lamination being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture and providing a barrier against passage of the contents through the wall, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed at least between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and tacky and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

5. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of laminations of flexible sheet material wound convolutely and bound together by intervening films of adhesive, the laminations being present only in sufficient number and the films of adhesive throughout the body being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture so that the resultant wall is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, said adhesive presenting a barrier against passage of the contents through the wall of the container, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

6. A container suitable for lubricating oils and

similar materials comprising a cylindrical body consisting of laminations of flexible, oil-impervious sheet material bound together by intervening films of adhesive, the laminations being present only in sufficient number and the films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, at least one complete circumferential convolution of adhesive being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture and providing a barrier against passage of the contents through the wall, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and tacky and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

7. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of laminations of flexible sheet material wound convolutely and bound together by intervening films of adhesive, the laminations being present only in sufficient number and the films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, at least one complete circumferential convolution of adhesive being of gummy, oil-impervious material retaining those characteristics indefinitely regardless of the presence of moisture and providing a barrier against passage of the contents through the wall, metal closures for the ends of the body, each closure having a circumferential channel in which an end of the body is received, the walls of the channel tightly clamping said end of the body, and films of sealing material interposed between the inner surface of the body and adjacent walls of the end closures, said material being oil-impervious, gummy, and tacky and retaining those characteristics indefinitely regardless of the presence of moisture and sealing the body against passage of the contents between the ends of the body and the end closures.

8. A container suitable for lubricating oils and similar materials which comprises a cylindrical body composed of an inner lamination of sheet material impervious to oil, an outer lamination of cellulosic sheet material, an intermediate lamination adhesively securing the inner and outer laminations together, the intermediate lamination being flexible and oil-impervious and retaining those characteristics indefinitely regardless of the presence of moisture and all said laminations extending continuously from end to end of the body, and caps crimped onto each end of the body to close the ends thereof.

9. A container suitable for lubricating oils and similar materials comprising a cylindrical body composed of laminations of flexible sheet material wound convolutely and bound together by intervening films of adhesive, the laminations being present only in sufficient number and the

films of adhesive being sufficiently thin and flexible to produce a wall which is flexible, said wall being capable of withstanding substantial distortion without being injured to the extent of permitting loss of the contents of the container, 5 at least one complete circumferential convolution of adhesive being flexible and oil-impervious

and retaining those characteristics indefinitely regardless of the presence of moisture and providing a barrier against passage of the contents through the wall, and caps crimped onto each end of the body to close the ends thereof.

FRED L. BRONSON.