June 20, 1944. J. J. BLUM 2,351,804

CONTAINER

Filed April 10, 1942

Fig. 1.

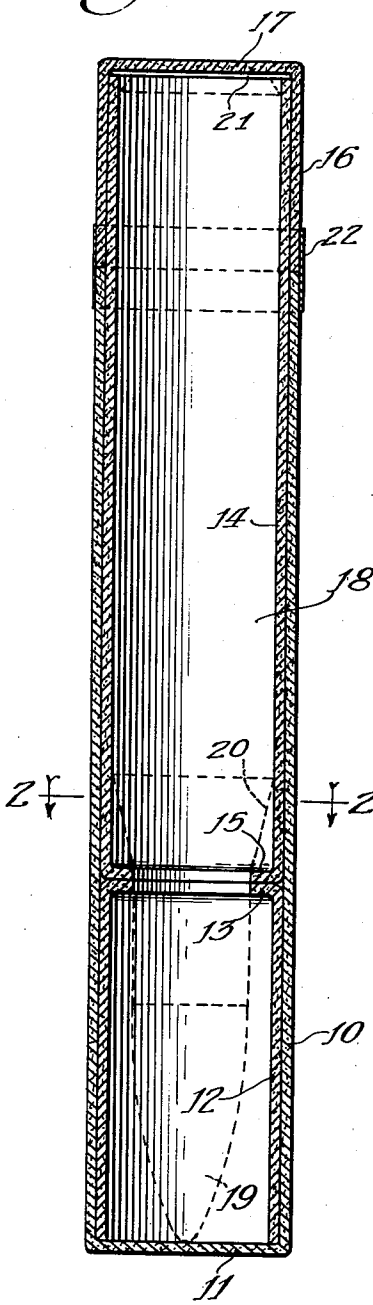


Fig. 6.

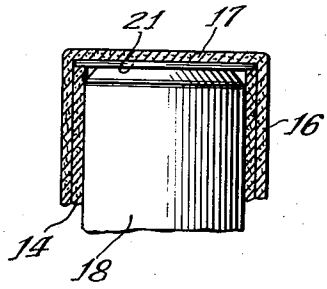


Fig. 2.

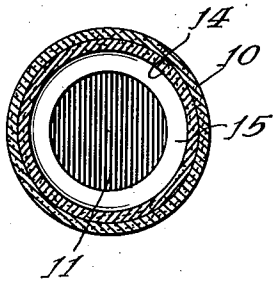


Fig. 3.

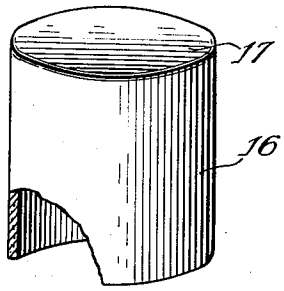


Fig. 4.

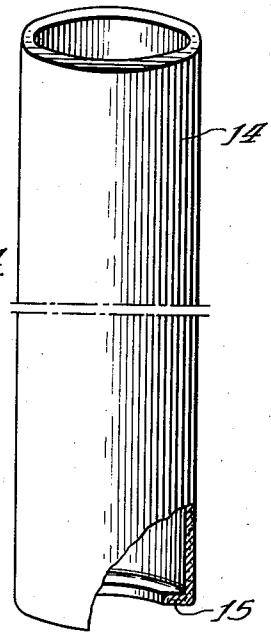
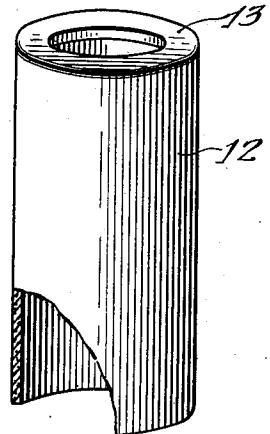


Fig. 5.



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UNITED STATES PATENT OFFICE

2,351,804

CONTAINER

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Application April 10, 1942, Serial No. 438,460

3 Claims. (Cl. 206—3)

This invention relates to a novel protective container, and particularly to a preformed seamless, waterproof container, composed essentially of fibrous material and a thermoplastic binder.

In particular my novel container comprises a tubular outer body or envelope portion having an integrally formed bottom, and a complementary cap or cover provided with an integrally formed top, the whole being composed of fibrous pulp and a thermoplastic binder having good waterproofing qualities, the respective parts being consolidated and compressed under heat to form a dense, rigid body wherein the binder and fibers are uniformly distributed in an interlocking engagement.

Among the particular uses for which my novel preformed container is adapted is in connection with the packing, storage, and shipment of ordnance materials, that is, my container is particularly adapted for protection during transit and storage of all sizes and types of artillery, naval and aircraft ammunition, bombs and fuses.

The containers heretofore used for such purposes were made of various types of paper board spirally wound on a mandrel, and to all intent and purpose similar to tubes wound of fibrous material used for mailing tubes and the like constructed fibrous cans and containers. Closure of such containers in use is effected by means of a cap at either end made of tin-plated sheet metal or the like material, which is clamped or crimped to the open ends of the paper or fibrous tube. For the purpose of making such tubes moisture repellant common practice has been to resort to such expedients as immersing the mailing type tube container subsequent to packaging in hot paraffin, asphalt, etc. It will be obvious to those skilled in the art that such treatment by impregnation does not impart uniform qualities nor does it permit of a high degree to impregnation with the moistureproofing agent, that it does not improve the structural qualities of the container, and that due to the present emergency the use of tin-plate due to the shortage thereof must be avoided or entirely eliminated.

It is therefore an object of my invention to provide a novel container suitable particularly for the uses hereinbefore set forth which is formed of cheap and abundant materials, is economical to manufacture, which is devoid of metals of any kind and yet withal due to the composition and method of manufacture thereof is waterproof to a high degree, is of a dense composition and rigid construction and has good resistance to a high range of conditions of both climate and storage.

Other objects relating to the component materials, the method of formation and composition, the resultant physical and structural characteristics, the details of construction and arrangement of parts will be apparent upon a consideration of the following specification and drawing which for the purpose of illustration diagrammatically illustrates one specific form of container construction adapted for packing a 37 mm. shell, although it will be understood that in its broader aspect my novel container is not restricted to all of the details shown or to the specific use illustrated.

Fig. 1 is a longitudinal section of my novel container and the assembled component parts thereof.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the container cap, with parts broken away.

Fig. 4 is a perspective view, with parts broken away, of the inner liner and cap retaining member 14.

Fig. 5 is a perspective view with parts broken away of the relatively short tubular positioning and supporting member 12.

Fig. 6 is a fragmentary sectional view of the top portion of the container illustrated in Fig. 1, and a fragmentary view of the flange end of a packed shell.

Referring to the drawing, 10 indicates the outer tubular envelope or body of my novel container provided with an integrally formed bottom closure 11. Within the tubular outer body portion 10 and resting on the bottom 11 thereof, is nested a relatively short tubular positioning and supporting member 12 provided with an integrally formed inwardly projecting annular flange 13. Additionally nested within and telescopically engaged with the outer tubular body portion 10 is a second tubular liner member 14. This tubular member 14 is likewise provided with an integral inwardly projecting flange 15 similar to the annular flange 13, the openings being the same or of substantially the same diameter, the tube 14 being positioned within the outer body 10 in a manner whereby the flange 15 abuts against and coincides with the flange 13 of the lower member 12. The tube 14 is of a length such that when it rests upon the relatively shorter tube 12, its open end extends beyond and outwardly of the lip of the outer tube 10. For the purpose of closing the container body, a cap 16 is provided having an integrally formed top 17, the

depth of the tubular portion of the cap 16 being at least equal to the length of the outwardly projecting portion of the liner tube 14, whereby the cap 16 is retained in position and permitted to have its edge come in close contact and engagement with the open outer edge of the tube 10.

In forming the component parts of my novel container, I form the preliminary bodies thereof by the well known method of accretion felting, utilizing a mixture of fibrous pulp and a thermoplastic binder which binder may be one or more of the various synthetic or natural thermoplastic binders or resins and is preferably of various types of synthetic or natural bitumens or mixtures thereof, the fibrous material being preferably paper stock and for the present purpose waste paper stock is suitable. In general in accordance with one well known process, there is first formed a preliminary mass of slightly wet fibers and binder, and after an intimate admixture of the fiber and binder is formed in a suitable device such as a Werner-Pfleider mixer, water is added and the mass transferred to a beater to reduce it to the form of a workable pulp, after which further water is added to form an aqueous pulp of about 2% solids consistency. In forming my fibrous-bituminous composition, I may employ a pre-mix, of 30 to 50% and preferably 40% of waste paper stock by dry weight, together with 50 to 70 and preferably 60% of bituminous material.

The resulting dilute stock is then deposited by a conventional accretion method on foraminous forms by either vacuum or suction to build up the parts to a desired thickness and of their approximate shapes, after which they are removed from the forming members and placed in ovens and thoroughly dried. After such drying, they are subjected to repressing treatment to bring them to definite shape and dimension. This is accomplished by subjecting the parts to pressure in dies heated from about 250 to 350° F. and preferably about 325° F. and at a pressure of from about 500 to about 1000 pounds per square inch, depending upon the component materials and the resultant desired finish.

A preferred composition composed of approximately 40% waste paper stock by dry weight and approximately 60% of bitumen, accretion felted, oven dried and then pressed and consolidated in dies at a temperature of about 325° F. and a pressure of from about 500 to about 1000 pounds per square inch, will withstand a strain of about 3 pounds per point per square inch, or a pressure of approximately 375 pounds per square inch for a part of ⅛ inch thickness.

The resultant finished products are thoroughly waterproof and will not warp or deteriorate after long exposure to the elements. They will also retain their shape at temperatures ranging up to about 175° F. and are not appreciably affected as to size either by heat or cold at temperatures ranging from about freezing to about 125° F.

Due to the fact that this material is thermoplastic and waterproofed with an inert substance, it will not become brittle except at sub-zero temperature, and exhaustive tests have shown that it will not absorb moisture above approximately 5% regardless of atmospheric humidity, and like water immersion test indicates that there is no greater water absorption.

As illustrated in the drawing, and particularly in connection with the specific form of my novel container illustrated thereby, the dotted lines in Fig. 1 illustrate a 37 mm. shell packed in my container. It will likewise be evident that the container illustrated in the drawing and the specific insert portions thereof are specifically adapted for the packaging of the illustrated shell. Thus the length of the container is substantially that of the shell and the inner diameter of the liner 14 is substantially that of the shell casing 18 at its largest diameter. The widths of the flange 13 of the relatively short positioning member 12 and the width of the flange 15 of the liner member 14 are such as to permit passage therethrough of the projectile portion 19 of the shell and the portion thereof engaged by the collar of the casing. The respective flanges 13 and 15 are sized in a manner whereby they snugly fit and limit passage of the tapered portion 20 of the shell casing. For this purpose the opening left by the flange 15 may be slightly larger than the opening left by the flange 13, and it will be readily seen that by reason of the provision of annular flanges 13 and 15, support is given to the projectile end of the shell in a lateral direction and at the same time the weight of the entire shell when the container is positioned upright is distributed over a large surface area by reason of support given by means of the flanges 13 and 15, and in this manner added protection is given to ordnance provided with detonation means in the projectile.

It will also be noted that in the event the flange end 21 of the shell is of a larger diameter than the casing portion 18, and by reason of the close fit of the liner 14 about the casing 18, the flange 21 comes to rest at the outer open end of the inner liner 14 and the shell is thereby additionally supported. When the peripheral edge of the liner 14 is made use of in such manner, the depth of the cap 16 will be slightly greater than the outwardly extending length of the liner 14 so as to permit the peripheral edge of the cap to come into close contact with the peripheral edge of the outer body portion 10. In order to fully protect the contents of the container, the meeting edges of the cap 16 and the outer body 10 may be sealed for example by means of a strip of adhesive tape 22. A container thus constructed is waterproof and is not affected by changes in temperature and humidity, and if exposed to the elements will last indefinitely and will not deteriorate. It can be wholly immersed in water and if properly sealed, the contents will not be affected in any manner whatsoever.

Although in the foregoing description of my invention I have specifically shown a container adapted for the packaging of a 37 mm. shell, it will be obvious that my invention is not restricted to the detailed construction or arrangement of parts shown, or for the packaging of the specific article of ordnance illustrated. Thus in the broader sense my invention comprises a fibrous container comprising a body portion having an integrally formed body and side walls, and a complementary cap having integrally formed top and side walls, each of the said portions being seamless and composed of a homogeneous composition of felted fibers and thermoplastic binder, preferably a bituminous binder such as asphalt. It will also be understood that although as shown in the drawing, use is preferably made of a liner member whereby the cap may be mounted in flush engagement with the main body portion of the container, and thereby facilitating accomplishment of the waterproofing seal, the cap may be of greater diameter than the con-

tainer body and extend thereover. It will also be evident that although as shown and described, my article positioning and supporting means contained within the outer container body is composed of two portions each provided with an annular flange, only the lower portion may be provided with such flange if desired. It will likewise be apparent that the component inner positioning and supporting liner members may comprise one or more than two portions, and that the positioning liner or supporting portions thereof may be of different shapes or contours to seat and laterally and longitudinally support the article which it is desired to pack and protect.

I claim as my invention:

1. A waterproof, rigid, fibrous container comprising a tubular outer body portion having an integrally formed bottom, a relatively short tubular positioning and supporting member having an integrally formed radially inwardly extending annular top nested within said body portion, and a second tubular member telescopically engaged within said body portion in abutment with said annular top and projecting outwardly from the mouth of said body portion, and a cap having an integrally formed top in engagement with and extending over the outward projecting portion of said second tubular member, each of said portions being seamless and composed wholly of a rigid dense homogeneous combination of fibrous pulp and a thermoplastic binder.

2. A waterproof, rigid, fibrous container comprising a tubular outer body portion having an integrally formed bottom, a relatively short tubular positioning and supporting member having an integrally formed radially inwardly extending annular flanged top nested within said body portion, and a second tubular member telescopically engaged within said body portion having an integrally formed radially inwardly extending annular flanged base complementary to and in abutment with said annular top and projecting outwardly from the mouth of said body portion, and a cap having an integrally formed top in engagement with and extending over the outward projecting portion of said second tubular member to the upper defining edge of and flush with the surface of the tubular outer body portion, each of said portions being seamless and composed wholly of a rigid dense homogeneous combination of fibrous pulp and a thermoplastic binder.

3. A waterproof, rigid, fibrous container comprising an outer tubular body portion having an integrally formed bottom and complementary cap of equal cross-section having an integrally formed top, and means nested in and telescopically engaged with said container for supporting said cap, comprising a relatively short tubular member positioned at the base of said body portion and having an integrally formed radially inwardly extending annular flanged top and a second tubular member having an integrally formed radially inwardly extending annular flanged bottom complementary to and in abutment with said annular top and projecting from said body portion into said cap, each of said component portions being composed wholly of a consolidated homogeneous combination of fibrous pulp and a bituminous binder.

JEROME J. BLUM.