

Aug. 29, 1944.

J. J. BLUM

2,356,969

CONTAINER

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Fig. 1.

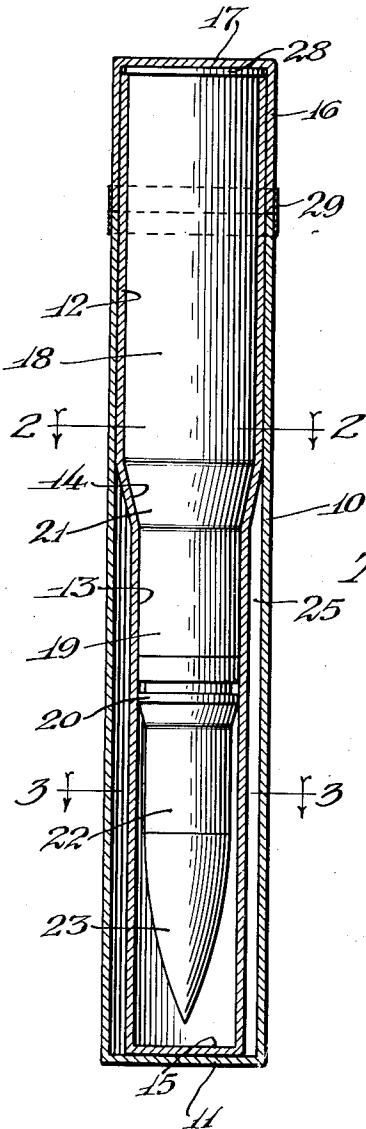


Fig. 2.

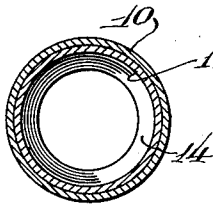


Fig. 3.

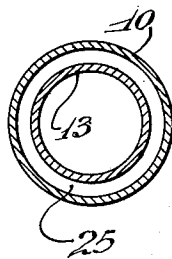


Fig. 5.

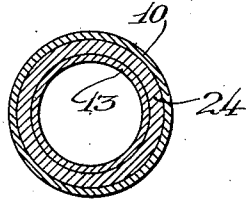
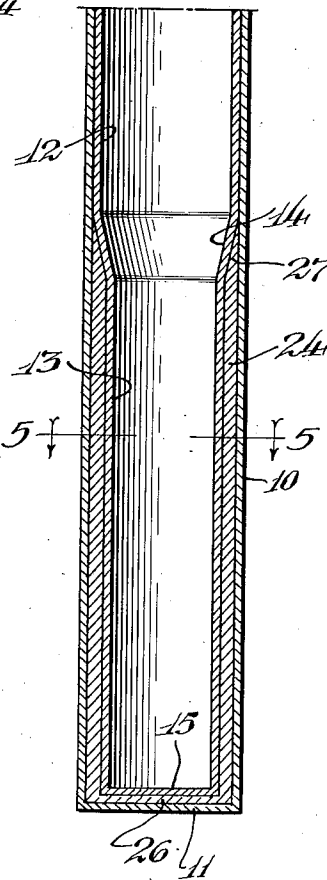


Fig. 4.



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UNITED STATES PATENT OFFICE

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CONTAINER

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7 Claims. (Cl. 206—3)

This invention relates to an improved water-proof, protective container comprising novel internal positioning and supporting liner means adapted to protect the contents against abrasion and damage, the component parts being of pre-formed seamless construction and composed essentially of fibrous material and a thermoplastic binder.

One of the particular uses to which my novel container is adapted is the packing, storage and shipment of ammunition, such as high explosive, armor piercing, canister and the like shells, and a particular object of my invention is the provision of novel internally positioning and supporting means which conforms to the major contours of the shell and gives added protection to the projectile portion of the shell and particularly the nose thereof.

Other objects and advantages of my invention reside in the component materials of the container which are cheap and abundant and devoid of metals; its economy of manufacture; its high degree of waterproofness; the molded seamless formation of the component parts and their dense composition and rigid construction, all of which result in an article having not only good physical characteristics but good resistance to a high range of conditions of both climate and storage.

In general my novel container comprises a tubular outer body or envelope portion of constant diameter having an integrally formed bottom, a complementary cap or cover provided with an integrally formed top, and a main liner member. The liner member has an upper tubular portion of a diameter adapted to snugly embrace the case portion of a shell, a lower concentric tubular portion of lesser diameter adapted to embrace the projectile and neck portion of the shell, and an intermediate integrally formed tapered shoulder portion adapted to snugly embrace the tapered shoulder of the shell case to prevent the projectile from forcing its way downward in the event that the container is dropped, and to give it lateral support against abrasion and other damage. All of the portions are composed of fibrous pulp and a thermoplastic binder having good water-resistant qualities, the respective parts each being seamless and pre-molded into form and being thereafter consolidated and compressed under heat to form dense rigid bodies wherein the binder and fibers are uniformly distributed in interlocking engagement.

Other objects relating to the details and modifications of construction and the arrangement of

parts will be apparent upon a consideration of the following specification and the drawing which for the purpose of illustration diagrammatically illustrates my novel container construction adapted for packing a 37 mm. shell.

Fig. 1 is a longitudinal section of one form of my novel container and the assembled component parts thereof with a contained 37 mm. shell.

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

Fig. 3 is a section of the container on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary longitudinal section of a modified form of construction of my novel container.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Referring to the drawing 10 indicates the outer tubular envelope or body of my novel container having an integrally formed bottom closure 11. Within the tubular outer body portion 10 and resting on the bottom 11 thereof, is telescopically positioned a relatively elongated tube—that is, a tube of greater length than the envelope 10, and comprising an upper portion 12, a lower portion 13 of lesser diameter, and an intermediate tapered portion 14, the portions 12, 13 and 14 being integrally formed, the lower end of the tubular portion 13 being provided with an integrally formed bottom closure 15. A cap 16 provided with an integrally formed top portion 17 extends over the upper end of the liner tube portion 12, the depth of the cap being substantially equal to the length of the tube portion 12 which extends outwardly of the envelope 10 so as to permit the peripheral edges of the cap portion and tube 10 to meet, after which the meeting edges may be sealed by means of the strip of adhesive tape 29.

The length of the liner tube comprising the portions 12, 13 and 14, which may be termed the shouldered neck tube, and the relative diameters of the respective portions 12 and 13 and the degree of taper of the portion 14 are for the purpose of conforming to the major dimensions, diameters and contours of the contained article herein shown for the purpose of illustration, as a 37 mm. shell. The shell comprises the case portion 18, the external diameter of which is substantially equal to the internal diameter of the liner tube portion 12; a neck or collar portion 19 and a projectile rotating band section 20 both having external diameters substantially equal to the internal diameter of the restricted portion 13 of the liner tube; and a tapered shell case shoulder portion 21 having an outer con-

tour and taper substantially equal to the inner contour and taper of the portion 14 of the liner. As illustrated it will be noted that the portion 13 of the liner tube is longer than the portions of the shell which it surrounds, and thus the projectile 22, and particularly the nose portion 23 thereof is maintained in spaced relationship to the bottom 15 of the liner tube.

The purpose of such construction and arrangement is to prevent the projectile from forcing its way downward in the event that the container is dropped, and in this way the nose of the shell is protected whether it be armor piercing, high explosive or canister. It will also be evident by reason of the provision and formation of the component portions of my shouldered neck tube that further lateral support is given not only to the entire shell case but also to the rotating band section 20 of the projectile whereby abrasion and damage thereto is prevented. It will also be evident that by reason of the provision of an integral bottom closure 15, the shouldered neck tube is given added rigidity at the lower portion thereof and is maintained in fixed tubular position, and if desired the bottom closure portion 15 and the bottom closure portion 11 of the envelope may be adhered together by means of suitable adhesive for the provision of additional rigidity.

However, if additional rigidity and support is desired, this is preferably provided by means of the modified form of construction illustrated in Fig. 4, all portions of which are generally the same as that illustrated in Fig. 1 with the additional provision of the spacer tube 24 positioned in the annular space 25 between the walls of the outer envelope 10 and the restricted liner tube or neck portion 13. If desired, although not essential, this liner tube 24 may be provided with an integrally formed bottom 26. This spacer tube 24 not only fills up the space between the walls 13 and 10, but is additionally provided with a tapered upper edge portion 27 which lies closely between the wall 10 and the tapered portion 14 of the shouldered neck tube, this tapered or feathered edge portion 27 of the spacer tube being highly compressed to give added support against deformation of the tapered portion 14, and which in turn gives added protection against downward movement and support to the contained shell.

As illustrated in Fig. 1, in the event that the flange end 28 of the shell case is of larger diameter than the case portion 12, the flange 28 may come to rest at the outer open end of the portion 12 of the inner liner and the shell is thereby additionally supported. When the peripheral edge of the portion 12 is made use of in such manner that the depth of the cap 16 will be slightly greater than the outwardly extending length of the liner portion 12, 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, and the seal completed by means of the tape 29.

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 $\frac{1}{8}$ 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.

The container thus constructed can as a result be wholly immersed in water and if properly sealed the contents thereof will not be affected in any manner whatsoever, particularly by changes in temperature and humidity, and will last indefinitely without deterioration upon exposure to the elements.

Although in the foregoing description of my invention I have shown a container for the packaging of a 37 mm. shell, it will be obvious that my invention is not restricted to the exact details of construction shown since in a broader sense my invention is adapted for the packing and protection of ammunition having component portions of more than one diameter, the portions being joined by tapered or shouldered portions, the container, or more particularly the liner thereof being constructed and arranged in a manner whereby lateral and longitudinal support is given to the article which it is desired to pack

and protect by providing the liner with contours which generally conform to the contours of the shell, and particularly whereby movement of the contained article, such as a piece of ammunition, is restricted within the container and the critical parts thereof are fully protected.

I claim as my invention:

1. A waterproof fibrous container for an article of the class described, comprising a tubular body portion, a complementary cap, a rigid co-extensive tubular liner telescopically nested therein, the said liner comprising a tapered shoulder portion and a concentric neck portion of reduced diameter and being adapted to support and position a contained article, and a rigid filler tube extending between the walls of the container body and the neck and tapered shoulder portions of said liner in reinforcing relationship therewith.

2. A waterproof fibrous container for an article of the class described, comprising a tubular body portion, a complementary cap, a coextensive tubular liner telescopically nested therein, the said liner comprising a tapered shoulder portion and a concentric neck portion of reduced diameter and being adapted to support and position a contained article, and a filler tube extending between the walls of the container body and the neck and tapered shoulder portions of said liner, each of said portions being composed of a rigid, dense, homogeneous combination of fibrous pulp and a thermoplastic binder.

3. A waterproof fibrous container comprising a body portion, a complementary cap therefor, a substantially coextensive rigid liner for positioning and supporting an article of the class described, the said liner comprising adjacent portions of different cross-sectional area integrally joined by a shoulder portion, the portion of greatest cross-sectional area being snugly embraced by said body portion, and a rigid filler member extending between the body portion and the portions of said liner of reduced cross-sectional area and providing a reinforcing support for said shoulder portion.

4. A waterproof fibrous container comprising a body portion, a complementary cap therefor, a substantially coextensive liner for positioning and supporting an article of the class described, the said liner comprising adjacent portions of different cross-sectional area integrally joined by a shoulder portion, the portion of greatest cross-sectional area being snugly embraced by said body portion, and a filler member extending between the body portion and the portions of said liner of reduced cross-sectional area, each of said

portions being composed of a rigid dense homogeneous combination of fibrous pulp and a thermoplastic binder.

5. A waterproof fibrous container comprising a body portion, a complementary cap therefor, a substantially coextensive liner for positioning and supporting an article of the class described, the said liner comprising adjacent portions of different cross-sectional area integrally joined by a shoulder portion, the portion of greatest cross-sectional area being snugly embraced by said body portion, and a filler member extending between the body portion and the portions of said liner of reduced cross-sectional area, each of said portions being composed of a rigid dense homogeneous combination of fibrous pulp and a bituminous binder.

6. A waterproof fibrous container comprising a seamless tubular body portion of constant diameter and having an integrally formed bottom, a seamless complementary cap of like diameter having an integrally formed top, a rigid seamless liner tube substantially coextensive with said body portion and said cap, the said liner tube comprising an upper portion having an external diameter substantially equal to the internal diameter of the body portion and cap, a lowermost concentric portion of reduced diameter provided with an integrally formed bottom, and an intermediate tapered shoulder portion, and a rigid filler tube extending between the wall of said tubular body portion and the portion of reduced diameter and tapered shoulder of said liner tube.

7. A waterproof fibrous container for a shell of the class described, comprising a seamless tubular body portion of constant diameter and having an integrally formed bottom, a seamless complementary cap of like diameter having an integrally formed top, a rigid seamless liner tube substantially coextensive with said body portion and said cap, the said liner tube comprising an upper portion having an external diameter substantially equal to the internal diameter of the body portion and cap, a lowermost concentric portion of reduced diameter provided with an integrally formed bottom, and an intermediate tapered shoulder portion, adapted to conform to a like shell case contour and to limit downward movement of the shell longitudinally of the container and to hold the nose of the shell projectile in spaced relationship to the bottom of the liner, and a rigid filler tube extending between the wall of said tubular body portion and the portion of reduced diameter and tapered shoulder of said liner tube.

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