Dec. 18, 1923. 1,477,686

W. P. BRAENDER

CONTAINER

Filed Oct. 18, 1918

Fig. 1,

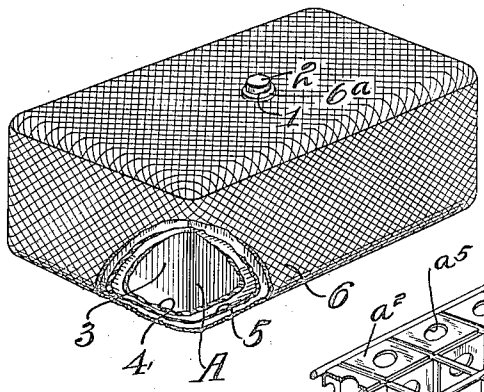


Fig. 5,

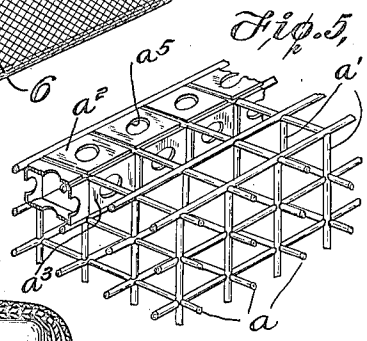


Fig. 2,

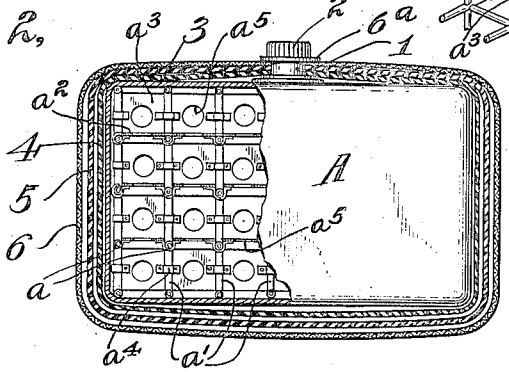


Fig. 4,

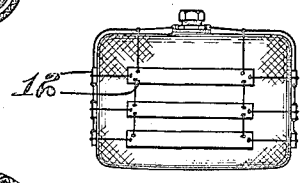
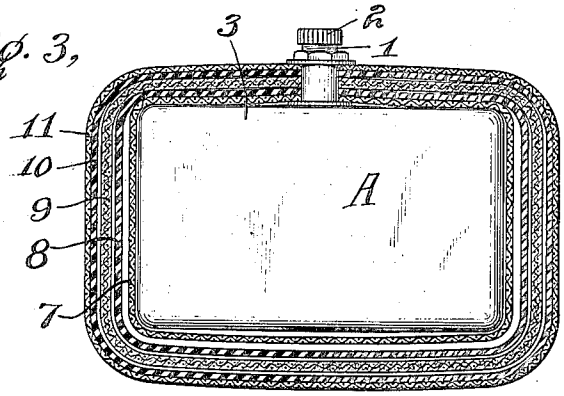


Fig. 3,



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By his Attorneys
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Patented Dec. 18, 1923. 1,477,686

UNITED STATES PATENT OFFICE.

WALTER P. BRAENDER, OF PASSAIC, NEW JERSEY.

CONTAINER.

Application filed October 18, 1918. Serial No. 258,669.

To all whom it may concern:

Be it known that I, WALTER P. BRAENDER, a citizen of the United States, residing at Passaic, in the county of Passaic and State of New Jersey, have invented new and useful Improvements in Containers, of which the following is a specification.

This invention relates to containers, such as tanks, adapted especially for holding liquids, such as oil, gasoline, and other forms of liquid fuel, and has particular application to the construction of a leak-proof or puncture-proof tank. It is to be understood, however, that the tank may be employed as a container for any material which may be found desirable.

As is well known, aeroplanes, motor cars, motor boats and the like are largely used in, and constitute important factors of modern warfare, and are usually equipped with internal combustion engines using liquid fuel, such as gasoline. This liquid fuel is carried in tanks which are necessarily, during battle, exposed to the liability of injury or destruction by gunfire. This danger is particularly present in the case of gasoline tanks of aeroplanes, for the tank may be pierced by a bullet or shell, so as to permit the gasoline to escape, and in many instances, in addition to the tank being pierced, the bullet may be of such character as to set fire to the supply of gasoline within the tank, thereby causing a disastrous fire and explosion resulting in the destruction of the machine and frequently in the injury and death of the occupants.

It is my purpose in the present instance to provide a tank for liquid fuel, such as gasoline or the like, which may be installed in an aeroplane, motor car, or motor boat, and which embraces such protective features as to be practically leak-proof against punctures made by bullets, shot and the like.

A further object of my invention is the provision of a tank of this character which is of light construction, so that it will not add materially to the weight to be carried by the machine or structure in which it is installed, and which will furthermore embody the desired features of efficiency, strength and durability.

A further object of the invention is the provision of a tank encased by protective coverings and provided with means for confining or resisting the pressure of fluid within the tank which might cause the cover of the tank to bulge outwardly or to distort under certain conditions.

In the present instance I have shown certain preferred embodiments or forms of my leak-proof or puncture-proof tank, but I wish it to be understood that I do not limit myself to all the precise details of construction set forth herein by way of illustration, as modification and variation may be made without departing from the spirit of the invention or exceeding the scope of the appended claims.

Furthermore, as above indicated, while my tank is particularly well adapted for use in connection with engine driven structures, such as boats, aeroplanes and motor cars intended for military use, I wish it to be understood that it is not limited in its useful application to this particular purpose, but may be employed under such conditions as may be deemed advantageous or desirable.

In the accompanying drawings:

Figure 1 is a perspective view of a tank embodying a preferred form of my invention, a corner portion of the tank being broken away.

Figure 2 is a view partly in vertical section taken through the tank such as is shown in Figure 1, and illustrating the interior reinforcement.

Figure 3 is a view of a tank having a modified form of protective covering which is shown in section.

Figure 4 is a view in elevation of a tank such as is shown in Figure 1 and showing side plates for confining the tank covers.

Figure 5 is a perspective view of the interior reinforcement of the tank, such as is shown in Figures 1 and 2, certain splash plate sections being omitted for the sake of clearness.

Before entering into a detailed description of the invention, I will state that in the present instance I have shown my leak-proof tank as substantially oblong or rectangular in form, that is to say, both the tank proper and its protective coverings are of such shape. However, it will of course be understood that this is merely by way of illustration, as the tank may be of any desired form or contour, either square, cylindrical, segment shape or otherwise, and that the exterior confining means may be shaped to meet the requirement of the particular form of tank upon which they are

used. In a word, I do not limit myself to a tank of any particular shape.

Referring now to the accompanying drawings in detail, the letter A indicates the tank proper which is adapted to contain the liquid fuel, such as gasoline, or the like, this tank being made as is usual, of thin, strong metal, such as sheet-steel, copper or any other metal suitable for the purpose and the tank is provided with the usual filler neck 1, closed by the cap 2. As the tank proper A is composed of very thin metal, it is desirable, although not absolutely necessary, to reinforce the same interiorly, and for this purpose I provide a reinforcing framework composed of thin, small, light rods, preferably of metal, such as aluminum, these rods running horizontally, as shown at a and vertically as shown at a', and best understood by reference to Figures 2 and 5. These rods support horizontal splash plates a^2 and vertical splash plates a^3, small clips a^4, shown in Figure 2 being employed to position the plates in position on the rods wherever needed. These splash plates are provided with holes a^5, which lighten the plates and also allow the passage of the liquid. When the tank is relatively large and made of thin metal, it is preferable to employ an interior reinforcement which may be such as described, but where the walls of the tank are of relatively strong, thick metal, or the tank is small, the interior reinforcement may be omitted. Furthermore, it is to be understood that I do not limit myself to this particular construction of interior reinforcement as the tank may be strengthened or reinforced interiorly in any suitable manner. In the form of the invention shown in Figures 1 and 2, I envelop the outside of the wall 3 of the metal tank A in a loose protective cover or layer 4 of rubber, or a rubber-like composition of material. The layer or covering 4 surrounds but is separate or loose from the tank A which is best shown in Figure 2, and I employ soapstone or other suitable substance during the molding of the cover about the tank to prevent the adhesion or sticking of the cover to the tank walls. I prefer to thus fit this cover 4 loosely about the tank and spaced apart from the walls thereof because I have discovered that when a bullet passes completely through a tank it will, in making its exit, smash the metal of the tank wall outward, thus forming small, jagged, spur-like sections, and if the rubber covering 4 were in contact with the tank wall the jagged metal would impinge against the rubber and hold open the cut made in the rubber by the bullet. When this cover 4 is separate or spaced from the tank wall, however, the jagged metal will not be forced outward a sufficient distance to impinge against the rubber and consequently the hole in the latter will quickly close through the expansion of the rubber itself. This layer or cover 4 of the rubber should possess a certain degree of elasticity, expansibility, softness and compressibility to obtain the best results, and therefore I prefer to employ slightly undercured rubber which is sufficiently soft so that it will retain tensile strength to hold gasoline should it be cut by a bullet, steel splinter or the like, striking the tank, the cut or rupture made in the rubber will have a tendency to close, especially under the action of this material swelling, which will occur by the gasoline coming in contact with the rubber substance in starting to seep or leak through the cut. The tank thus covered with the rubber layer 4, I envelop loosely in a rubber-covering or bag 5; that is to say, while this bag 5, which is also preferably composed of soft rubber, or rubber-like material, completely envelops the layer 4 of the tank, it is not attached thereto, nor contacts therewith at all points, but will fit loosely around the same, so that a space will be left between the layer 4 vulcanized on the metal tank and the rubber bag-like cover 5 enveloping the layer 4, as described. The loose bag-like layer, or covering 5 of rubber is now enveloped or encased loosely in a netting 6 of cloth, wire, or any other suitable, flexible material, the purpose of this outer covering 6 being to confine the parts encased thereby against bulging under pressure. Both the rubber coverings 4 and 5 and the netting 6 may be made to fit tightly at the neck 1 of the tank by any suitable collar or gasket arrangement shown at 6^a. In fact, any suitable means may be resorted to for fastening the various covers at the neck of the tank.

I have found by experience that a tank constructed, for instance, as shown in Figures 1 and 2, when containing gasoline, and struck or penetrated by a bullet, will exhibit peculiar puncture-proof and leak-proof tendencies. Even should the bullet, for example, strike the tank and penetrate the same, the cuts or holes made by the piercing bullet in the rubber coverings will be quickly closed or sealed by the expansibility of the rubber itself. It also seems that when the gasoline, for instance, starts to seep through the hole or cut made in the rubber, it will act upon the rubber and cause the latter to expand to a marked degree at the point where the gasoline is percolating or seeping, so that this expansion at the cut or hole will cause the rapid closing of the latter, thereby preventing the escape of the gasoline, the entrance of air, and the explosion and firing of the contents of the tank. This is especially so when I employ a plurality of coverings of rubber, spaced apart one from the other, as above described.

The outer bag or netting is employed principally to act as a pressure retainer, or

to confine the covers of the tank in proper form and shape, and thereby prevent bulging. Should the tank be penetrated by a bullet, some of the gasoline might escape to the space between the layers of rubber, and especially when the tank is partially emptied, and to prevent undue distortion of the parts due to the bulging, I employ the confining netting or bag.

In Figure 3 I have shown still another modified form of the invention, for in this instance I envelop the metal tank A in a fabric covering 7, which is loose from the wall of the tank, and in turn envelop this fabric covering 7 in a rubber cover 8, loose from the cover 7, and then enclose the cover 8 in a loose, asbestos bag or cell 9. The asbestos bag or cell is enveloped in a loose, rubber bag 10, while 11 indicates an outer netting enclosing the whole. These various layers or envelopes of material, being loose from one another and spaced apart, increase the leak-resisting qualities of the tank.

In Figure 4 I have shown a plurality of confining plates 12 located at the exterior walls of my tank, these plates further acting to prevent the bulging or distortion of the covers of the tank. These plates may be of any preferred form and character, and of any desired number, and so placed as to best act to prevent the distortion of the tank covers. Usually it is not necessary to employ such plates adjacent the top of the tanks, because although the tank may be filled when the operator is starting on a journey, yet the gasoline used in operating the engine will of course gradually cause the lowering of the bulk of gasoline within the tank, so that the upper portion of the covers is not so liable to become distorted as is the center or lower portion thereof.

I wish it to be understood in connection with the prevention of the bulging or distortion of the covers of the tank, that I may employ plates, bags or nettings with or without each other, as in some instances it may not be necessary or desirable to employ the confining plates. While I have herein shown and described certain preferred forms of my invention, I wish it to be understood that I do not confine myself to all the precise details herein set forth by way of illustration, as modification and variation may be made without departing from the spirit of the invention or exceeding the scope of the appended claims.

What I claim is:

1. A fuel tank comprising a metallic container for holding liquid fuel and an elastic casing therefor enveloping the container, the casing having walls spaced from walls of the container with an air space therebetween, the spacing being such that jagged, spur-like edges of a container wall produced by a projectile passing therethrough will be prevented from reaching the elastic casing and holding open a cut made therein by the projectile.

2. A fuel tank comprising a metallic container for holding liquid fuel and an elastic casing therefor loosely enveloping the container, the casing having walls spaced from walls of the container with an air space therebetween, the spacing being such that jagged, spur-like edges of a container wall produced by a projectile passing therethrough will be prevented from reaching the elastic casing and holding open a cut made therein by the projectile and the elastic casing being thereby permitted to expand to close the cut.

3. A fuel tank comprising a metallic container and a rubber cover or casing loosely enveloping the same so that the jagged spur-like edges of a container wall produced by a projectile passing therethrough will be prevented from reaching the rubber cover of the casing and holding open a cut made therein by the projectile, the rubber cover being thereby permitted to expand to close the cut.

4. A fuel tank comprising a metallic container and a plurality of coverings enveloping the same, said coverings having walls spaced apart from each other for providing an air space or pocket between the coverings.

5. A fuel tank comprising a metallic container and a plurality of coverings enveloping the same, said coverings having walls spaced apart from each other, walls of the inner covering being spaced apart from walls of container with an air space or pocket therebetween.

6. A fuel tank comprising a metallic container and a plurality of coverings enveloping the same, said coverings having walls spaced apart from each other for providing an air space or pocket between the coverings, one of said coverings being of rubber like material and having the property of expanding to close a cut made in the covering by a projectile.

7. A fuel tank comprising a metallic container and a plurality of coverings enveloping the same, said coverings having walls spaced apart from each other and from the walls of the container for providing air spaces therebetween and confining means located exteriorly of the coverings and associated therewith.

8. A fuel tank comprising a metallic container and a plurality of rubber coverings therefor loosely enveloping the same, the coverings having spaced apart walls for providing air pockets between the coverings.

9. A fuel tank comprising a metallic container, a rubber covering loosely enveloping the exterior wall of the container so that the jagged spur-like edges of a container wall produced by a projectile passing there-

through will be prevented from reaching the rubber covering and holding open a cut made therein by a projectile and a second wrapper covering enveloping and spaced apart from said first mentioned covering.

10. A leak-proof fuel tank comprising a metallic container and casings for the said container comprising a plurality of coverings therefor made of under-cured rubber, the said coverings having walls spaced apart from each other and from the walls of the container for providing air spaces therebetween.

In testimony whereof I have hereunto set my hand.

WALTER P. BRAENDER.