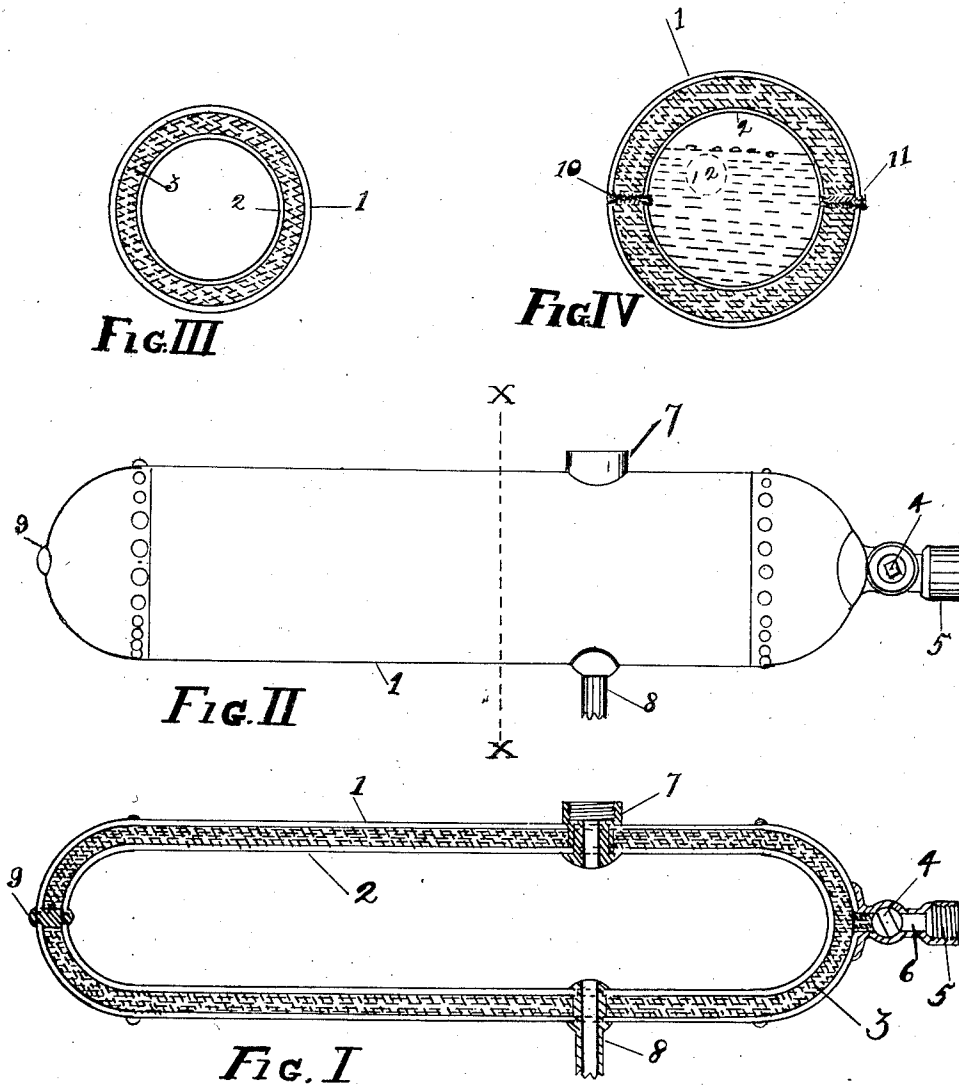


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WAR AEROPLANE FUEL TANK.
APPLICATION FILED FEB. 7, 1917.

1,349,290.

Patented Aug. 10, 1920.



WITNESSES

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WAR-AEROPLANE FUEL-TANK.

1,349,290.

Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed February 7, 1917. Serial No. 147,170.

To all whom it may concern:

Be it known that I, GEORGE J. MURDOCK, a citizen of the United States, and resident of Newark, in the county of Essex, and State of New Jersey, have invented certain new and useful Improvements in War-Aeroplane Fuel-Tanks, of which the following is a specification.

This invention relates to fuel tanks for war aeroplanes or motor cars. The objects of my invention as herein set forth are to provide means for preventing the escape of motor fuel contained in the tank through holes made by missiles such as bullets. Hitherto gasoline fuel tanks have been pierced by bullets in air battles allowing the gasoline to escape on to the aeroplane where it has been set on fire by the engine exhaust or other exposed flame. The development of steel bullets, and other high power ammunition has reached a point where the weight of a tank thick enough to resist penetration has become excessive. My invention is designed to produce a tank so constructed as to not only prevent the escape of the fuel when punctured, but also to be comparatively light in weight.

Referring to the accompanying drawings: Fig. I is a longitudinal sectional view showing the outer metallic shell or casing retaining resilient material under compression on all sides of the inner shell or casing which contains the gasoline.

Fig. II is a side elevation of the same. Fig. III is a cross section taken on the line X, X, of Fig. II.

Fig. IV is a similar cross section illustrating the conditions that exist after a bullet has been fired through the tank.

Referring to Fig. I, the inner shell 2 is supported within the outer shell 1 by means of a stud 9, and by the pipes 7, and 8 which form respectively the ducts through which the gasoline is introduced into the tank 2, and through which it runs by gravity to the carbureter of the engine. On one end of the container shell 1 is welded a steel, flanged, tubular fitting 6 leading into the space between the two shells, and having a valve 4 located so that said tubular passage may be opened or closed. The outer end of said fitting terminates in a threaded part 5 for a purpose that will be hereinafter explained.

Between the shell 1, and the outer wall of the gasoline containing tank 2 a resilient material 3 preferably vulcanized rubber is

retained under pressure. The resilient material, such as rubber, is preferably in the form of particles or granules, and I prefer to form these granules by punching them out of sheets of rubber that have been vulcanized so as to obtain the maximum of elasticity with a minimum of solubility in gasoline. After the rubber has been punched I believe it best to coat the outside of the particles so formed with powdered talc by revolving the material in a tumbling barrel. Coating the particles of rubber with talc causes the small pieces of rubber to slide by each other, and also prevents adhesion to the sides of the tank or shell when under pressure. To fill the space between the shells with the rubber, the unit is placed in a vertical position with the end 5 at the top. The small pieces of rubber are then introduced through the passage 6, and open valve 4 into the space between the shells 1 and 2. When said space is entirely filled I believe it the best method with my present knowledge, to fill a pump barrel having a screw plunger with the pieces of rubber prepared as above described. The nose of the barrel is then screwed into the thread 5, and the screw plunger revolved in a manner known to those skilled in the art so as to force the rubber particles out of the pump barrel, and into the space between the shells 1 and 2, thereby putting the mass of rubber particles into a high state of compression. The valve 4 is made of steel, and has a sharp edge so as to cut off the remaining rubber in the tubular passage 6, and prevent the rubber particles contained between the gasoline tank 2, and the outer shell 1 from being forced out by the expansion of the rubber particles. The force pump is then unscrewed from the end 5, and removed.

It will be noted that the end of the tank to which the valve casing 6 is attached is rounded and preferably the opposite end of the tank is also rounded. This permits the rubber particles to pass readily into the tank at one end, to pass down between the outer and inner shells of the tank to the other end, and to fill the space between these shells at the end of the tank opposite the valves. If the ends of the tank were at right angles to the sides, there would be difficulty in filling the space between the shells with rubber particles and a consequent difficulty in securing the degree of compression of the rubber particles which is necessary.

Having described the best way to make my invention with my present knowledge, I will now describe the manner in which it is used.

5 Referring to Fig. 4 it will be assumed for the purposes of this specification that the tank 2 has been filled with gasoline, the induction hole 7 closed by a suitable stopper, and that the tank is, through the pipe 8
10 (Fig. 1), in operative connection with the carbureter, and engine. If now a bullet is fired through the unit it may enter at 10, pass through the outer shell, the rubber under pressure, the inner shell, and the gasoline therein. The projectile in its passage
15 through the outer and inner shell and the rubber may carry small particles of rubber with it into the tank. After passing through the gasoline the projectile strikes the opposite wall of the gasoline tank, and having pierced this passes through the rubber again, and outer shell. As rubber floats
20 on the surface of gasoline the small pieces forced into the tank by the bullet immediately rise to the surface of the fluid as indicated at 12, while the holes 10, and 11 are instantly closed against the passage of the gasoline by the resilient character of the rubber under pressure, which not only
30 closes the path made by the bullet through the rubber, but also plugs up the holes made in the metallic shells. Many holes may likewise be pierced through the unit each being closed in like manner.

35 As the gasoline for the engine is taken from the bottom of the tank, and the rubber that has been carried in by the bullets floats on the surface it cannot stop up the passages through which the gasoline is led to the engine, and the entrance of rubber into the induction pipe may be further prevented by strainers such as are commonly used. It may also be wise to
40 provide the pipe 8 with the connections leading from the tank to the engine with protection in the manner herein described as applicable to the fuel tank. The rubber jacket around the gasoline tank also provides an efficient insulation against extremes of heat or cold when flying at high
50 or low altitudes, thus allowing more uniform, carburation of the fuel.

The filling which I use is composed of particles of soft, resilient rubber, such as
55 particles of rubber sponge, and this form of rubber I have discovered swells upon being moistened with gasoline. I have found by actual test that when this tank is punctured by a bullet, the rubber will be forced
60 into the puncture and form a smooth plug projecting through the perforation about three-eighths of an inch. The smooth plug is caused entirely by the swelling of the rubber which has become moistened with
65 gasoline by the puncture of the tank. This

action is assisted by the static pressure on the rubber.

It is obvious that changes in construction, and proportion of the various parts may be made without departing from the essential character of this invention. I therefore do not confine myself in these or any other unessential particulars.

What I claim is:

1. A fuel tank of the character described 75 having spaced imperforate walls, and a filler for said space of elastic material compressed between said walls whereby to cause said material to close a puncture caused by the passage of a projectile through the tank. 80

2. A fuel tank of the character described 80 having spaced, imperforate walls, and rubber under compression filling said space, said rubber acting to close a projectile puncture after the passage of a projectile 85 through the tank.

3. A fuel tank having spaced walls, the space between said walls being filled with particles of elastic material, the entire filling being under compression. 90

4. A fuel tank having spaced walls, and a filling between said walls consisting of particles of rubber under compression.

5. A fuel tank having outer and inner walls, an elastic filling disposed between 95 said walls and under compression and acting to close a projectile puncture after the passage of a projectile through the tank, and means for fixedly spacing said walls from each other and holding the walls 100 against distortion by the compressed material within.

6. A fuel tank of the character described including inner and outer walls of thin sheet metal, a filling disposed between said 105 walls and consisting of particles of rubber, the filling being under a high degree of compression, and means for holding said walls in spaced relation against the pressure of material between the walls and including tubing leading from the exterior of the tank into the interior thereof. 110

7. A fuel tank of the character described comprising inner and outer walls, and a filling of elastic material disposed between 115 said walls and under compression and acting to close a projectile puncture after the passage of a projectile through the tank, the tank being provided with a valved opening through which said filling may be disposed in the space between the walls. 120

8. A fuel tank of the character described comprising spaced inner and outer walls, a filling of rubber disposed between said walls and under compression, and means for admitting filling and permitting its compression comprising a valved pipe connection to the outer wall. 125

9. A fuel tank of the character described comprising outer and inner walls spaced 130

from each other, a filling of rubber particles disposed between said walls under compression, and means whereby said filling may be inserted into the space between said walls comprising a valved inlet.

10. A fuel tank of the character described comprising outer and inner walls spaced from each other, a filling of rubber particles disposed between said walls under compression, means whereby said filling may be inserted into the space between said walls comprising an inlet, and a valve rotatably mounted in conjunction with the inlet and having a sharp edge.

11. A fuel tank consisting of inner and outer walls disposed in spaced relation to each other, a filling disposed between the walls and formed of particles of rubber, the rubber filling being under compression, one end of the tank being rounded whereby to permit the particles to pass over said rounded ends into the space between the walls forming the side of the tank, an inlet pipe opening into said rounded end of the tank, and a valve in said pipe, the inlet pipe permitting the introduction of the rubber particles.

12. A self puncture-sealing tank includ-

ing outer and inner imperforate walls, and a filling of material entirely filling the space between said walls, said filling being elastically compressible and expansible whereby to permit a compression of the material upon the passage of a projectile through the walls and an immediate expansion of the material upon an exit of the projectile, to thereby plug the passage left by the projectile.

13. A self puncture-sealing tank including inner and outer imperforate walls, and a filling of material entirely filling the space between said walls, said filling being elastically compressible and expansible whereby to permit a compression of the material upon the passage of a projectile through the walls and a subsequent expansion of the material upon an exit of the projectile to thereby plug the passage left by the projectile.

Signed at Newark, in the county of Essex and State of New Jersey this 6th day of February A. D. 1917.

GEORGE J. MURDOCK.

Witnesses:

J. P. MURDOCK,
WM. J. MURDOCK.