Sept. 4, 1951 T. SCHMIDT 2,566,777

TANK SEAM

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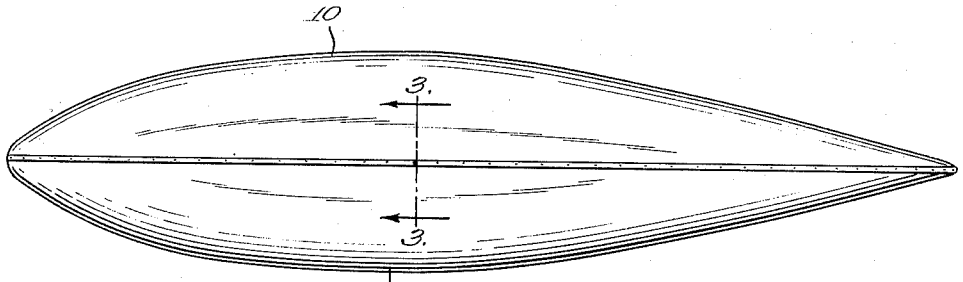


Fig. 1.

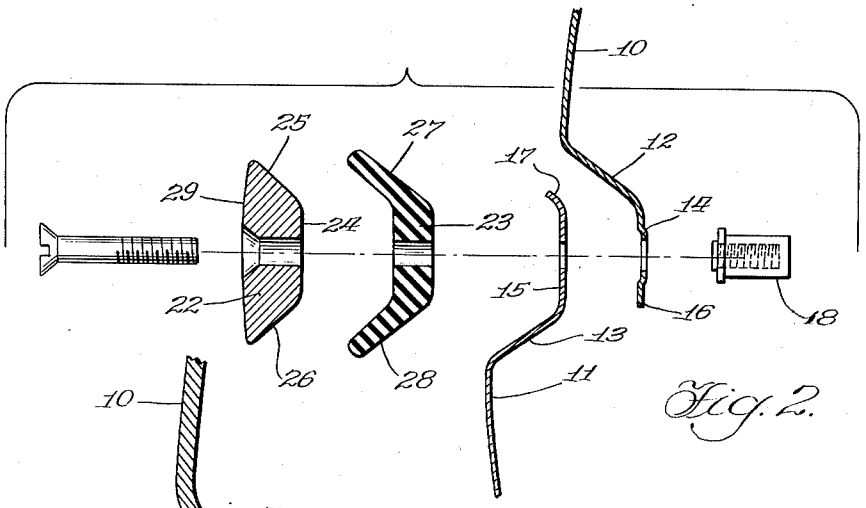


Fig. 2.

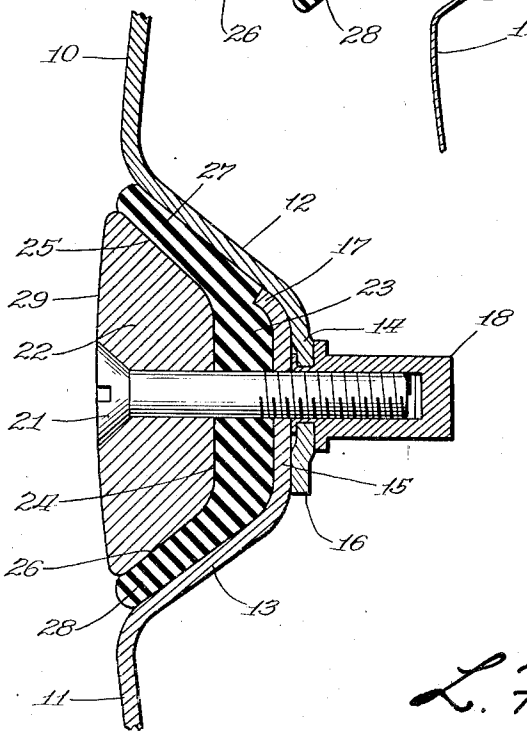


Fig. 3.

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TANK SEAM

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5 Claims. (Cl. 220—81)

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The present invention relates to containers for fluids and has for its general aim the provision of an improved gasoline tank having a novel closure seam interconnecting the different sections of the tank shell.

In the construction of portable gasoline tanks, particularly in connection with jettisonable aircraft tanks (which are commonly quite large but formed of relatively light sheet metal in streamline torpedo shape) constructions previously commonly employed to effect a closure between the different parts of the shell have shown themselves to be impractical, since they have insufficient strength to safely carry a large fuel load and are not rigid an drugged enough to withstand rough use. In addition, they ordinarily require special tools and considerable training and skill in assembly and are thus necessarily assembled at the factory rather than at the time of use.

These shortcomings of conventional devices have been known and recognized for many years, but the problem of providing a closure seam that is at once strong, rigid, leak proof and easy to assemble is a difficult one; with the result that, nothwithstanding the known need, no entirely successful solution to the problem has heretofore been forthcoming.

It is accordingly the primary object of the present invention to provide a jettisonable fuel tank for aircraft so designed and constructed that a large capacity tank may be formed of separate sections of relatively thin sheet metal, yet wherein the different sections are so shaped and united as to provide increased physical strength and rigidity but at the same time to effect a dependable and leak proof seal.

A further object of the invention is to provide, in a tank adapted to hold volatile liquids, a separate construction wherein the individual parts are so arranged and related that the tanks may be shipped to their destination in unassembled or "knocked down" condition and may be individually assembled when required. This is, of course, an obvious expedient for reducing the requirements of shipping space, but it has heretofore been impractical for aircraft tanks, since their design has been such that they could not be readily assembled into a unit having the requisite strength and freedom from leakage essential to a tank designed for this purpose.

A further object of the invention resides in the provision of a specific form of closure seam adapted to unite two or more sections of sheet material to form a sealed tank, the seam being

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of such design and construction that it may be easily assembled even by unskilled workmen, yet will afford a high degree of rigidity and mechanical strength and provide an adequate seal to prevent the escape of liquids.

Further objects will be apparent from the following description of the present preferred embodiment of the teachings of this invention, illustrated in the drawings of this specification, wherein:

Figure 1 is a side elevational view of a jettisonable aircraft fuel tank constructed in accordance with these teachings;

Figure 2 is an exploded view of the closure seam between the separate sections of the tank; and

Figure 3 is an enlarged detail sectional view of the tank seam, the view being taken substantially on the plane of the line 3—3 of Figure 1.

The body of the tank comprises two opposite sheet metal shells 10 and 11 which, in the form of the invention shown, are both of streamlined, torpedo shape, so that the assembled tank will offer minimum air resistance when suspended on the bomb rack of a military plane. It is to be understood, of course, that a tank of this character includes shackles by which it may be secured to the bomb rack and a gasoline line by which the fuel in the tank is withdrawn, but since these devices may be conventional and form no part of the present invention, they are not illustrated.

The sheet metal shells comprise a male shell 10 and a female shell 11, each of which include an inwardly offset portion such as 12 or 13 extending entirely around their marginal edges. These inwardly offset portions are preferably at an angle of about 45 degrees to the plane of junction of the shells and extend inwardly a short distance to flat joining flanges 14 and 15. The joining flanges lie in face-to-face relationship with each other, the inner flange 14 having a straight edge 16 and the outer flange 15 having an outwardly flared edge 17 bearing against the curved surface between the portions 12 and 14. The flanges 14 and 15 are pierced at regular intervals around the margin of each shell and closed tubular nuts 18 are riveted into the flange 14 to receive machine screws 21 by which the shells are held together.

The screws 21 extend through countersunk holes in a closure strip 22, so that this strip is drawn inwardly against a resilient gasket 23 in surface contact with the inwardly offset portions 12 and 13 of the shells and with the flange 15.

The closure strip 22 is preferably in the form of a metal rail, and while it is preferably formed to include a slightly convex exterior surface and smoothly rounded corners, it is of generally trapezoidal cross section, with a flat bottom surface 24 and outwardly disposed sides 25 and 26 lying approximately perpendicular to each other, so that the sides 25 and 26 are approximately parallel with the offset portions 12 and 13 of the tank shell.

The resilient gasket 23 is preferably in the form of an endless loop, and is of more or less V shaped cross section, with a flat bottom portion and outwardly flared webs 27 and 28 on each side. It has been found preferable to form the gasket 23 of a length slightly less than the distance around the tank flanges, so that it must be slightly stretched as it is put in position. By this expedient the resilient material of the gasket is maintained in a state of tension on the seam. The tension on the gasket performs a double function, since it not only tends to draw the surfaces of the gasket into firm engagement with the tank surfaces, but also because it avoids any possibility of buckling of the gasket in the groove.

The portions 27 and 28 of the gasket lie flat against the offset portions 12 and 13 of the tank shells and are clamped in sealing engagement with the shells by the angular surfaces 25 and 26 of the closure rail 22. This provides an effective seal to prevent an escape of liquid along these surfaces, and the compression of the central portion of the gasket causes the resilient material, which may be synthetic rubber, to move into close engagement around the shank of the machine screws 21, so that escape of fuel between the gasket and the outer surfaces of the screws is prevented. The engagement between the screws 21 and the pierced openings in the flange 15 are effective to prevent the shells 10 and 11 from pulling apart from each other, and the engagement of the flared edge 17 with the inwardly offset portion 12 of the shell 10 takes any compressive load between the shells. In addition, the flared edge 17 serves as a guide as the opposite shells are fitted together, so that the edge 16 of the flange 14 may easily be inserted within the flange 15.

The outer surface 29 of the closure rail 22 is substantially flush with the exterior surfaces of the shells 10 and 11, so that the seam between the shells is not apt to be damaged if the tank is dropped, rolled or otherwise roughly handled, yet the resilient material of the sealing gasket is almost entirely enclosed, so that the narrow strips of the gasket, exposed on each side of the strip 22, are well protected and not easily subject to damage. The rail 22 not only serves as a sealing member, but also lends rigidity to the structure and functions as a reenforcement of the thin sheet metal of the shells.

From the foregoing, it will be apparent that the teachings of the present invention provide a tank construction that is susceptible to assembly in the field without the use of any tools other than a screw driver, and thus make it practicable to provide a jettisonable fuel tank for aircraft which can be shipped unassembled and put together when required, with assurance that it will have both the mechanical strength to withstand rough treatment and the perfection of design necessary to prevent the escape of fluid. It follows that, by utilizing the teachings of this invention, it is unnecessary to resort to factory assembled tanks to insure against leakage, and that obvious savings in space of a "knocked down" tank may therefore be realized.

Having thus described the invention, what I claim as new and desire to protect by United States Letters Patent is:

1. In a jettisonable torpedo-shaped gasoline tank, the combination of a pair of matching male and female shells of relatively thin rigid sheet material, the male shell having an inwardly extending angular offset portion around its entire margin, with a flat edge flange along the inner edge of the offset portion; the female shell including an inwardly extending offset portion around the entire margin of the shell, with a flat joint flange having an outwardly flared edge adapted to fit over the flange of the male shell, with the flared edge bearing against the offset portion of said male shell; a sealing gasket comprising a strip of resilient, yieldable material having a flat bottom portion with outwardly flared webs; said gasket being positioned on the joining flange of the female shell with the webs bearing against the offset portions of both shells; and means comprising a metal rail of generally trapezoidal shape positioned on the gasket and having angularly disposed clamping surfaces engaging the webs of the gasket and pressing said webs against the offset portions of both of the shells to seal the joint between the shells; together with means to clamp the rail toward the flanges of the shells to compress the gasket.

2. In a jettisonable torpedo-shaped gasoline tank, the combination of a pair of matching male and female shells of relatively thin rigid sheet material, the male shell having an inwardly extending angular offset portion around its entire margin, with a flat edge flange along the inner edge of the offset portion; the female shell including an inwardly extending offset portion around the entire margin of the shell, with a flat joint flange having an outwardly flared edge adapted to fit over the flange of the male shell, with the flared edge bearing against the offset portion of said male shell; a sealing gasket comprising a strip of resilient, yieldable material having a flat bottom portion with outwardly flared webs; said gasket being positioned on the joining flange of the female shell with the webs bearing against the offset portions of both shells; and means comprising a metal rail of generally trapezoidal shape positioned on the gasket and having angularly disposed clamping surfaces engaging the webs of the gasket and pressing said webs against the offset portions of both of the shells to seal the joint between the shells.

3. In a jettisonable torpedo-shaped gasoline tank, the combination of a pair of matching male and female shells of relatively thin rigid sheet material, the male shell having an inwardly extending angular offset portion around its entire margin, with a flat edge flange along the inner edge of the offset portion; the female shell including an inwardly extending offset portion around the entire margin of the shell, with a flat joint flange having an outwardly flared edge adapted to fit over the edge of the male shell, with the flared flange bearing against the offset portion of said male shell; a sealing gasket comprising a strip of resilient, yieldable material having a flat bottom portion with outwardly flared webs; said gasket being positioned on the joining flange of the female shell with the webs bearing against the offset portions

of both shells; and means to hold the gasket against the shells.

4. In a container of relatively thin rigid sheet material, the combination of a male shell section having an inwardly extending angular offset portion at an acute angle to the plane of junction of the shells, with a flat edge flange normal to the plane of junction of the shells and extending inwardly from the inner edge of the offset portion; a matching female shell section including an inwardly extending offset portion with a flat joint flange having an outwardly flared edge adapted to fit over the flange of the male shell section with the flared edge bearing against the offset portion thereof; together with a sealing gasket comprising a strip of resilient, yieldable material having outwardly flared sealing surfaces; said gasket being positioned on the joining flange of one of the shell sections and bearing against the offset portions of both shell sections; and means comprising a metal closure strip for clamping said gasket against said offset portions to seal the joint between the shell sections.

5. In a container of relatively thin rigid sheet material, the combination of a male shell section having an inwardly extending angular offset portion at an acute angle to the plane of junction of the shells, with a flat edge flange normal to the plane of junction of the shells and extending

inwardly from the inner edge of the offset portion; a matching female shell section including an inwardly extending offset portion with a flat joint flange adapted to fit over the edge of the male shell section; together with a sealing gasket comprising a strip of resilient, yieldable material positioned on the joining flange of one of the shell sections and bearing against the offset portions of both shell sections; and means comprising a metal closure strip for clamping said gasket against said offset portions to seal the joint between the shell sections.

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