Dec. 12, 1944. M. W. HUMPHREYS 2,365,080

DROPPABLE GASOLINE TANK

Filed Aug. 2, 1943 3 Sheets-Sheet 1

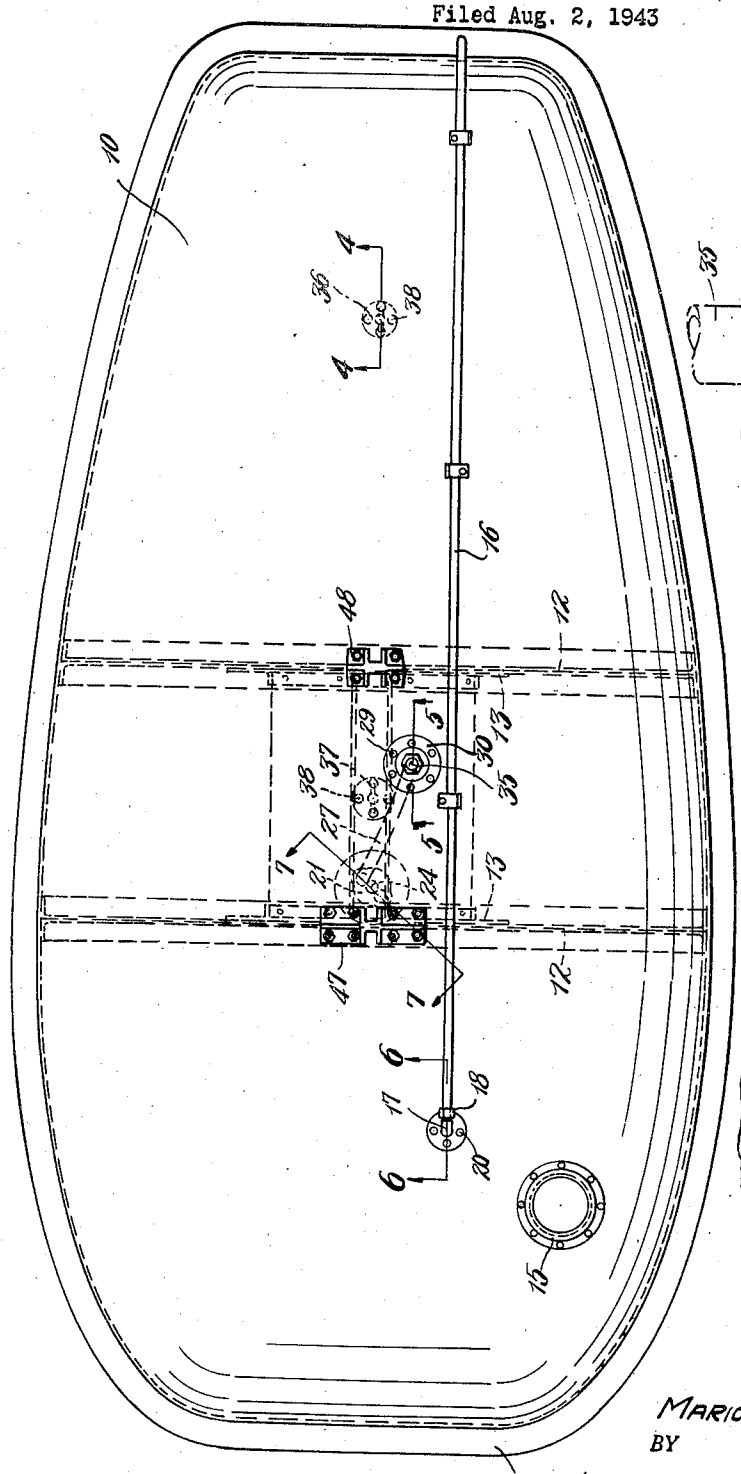


FIG. 1

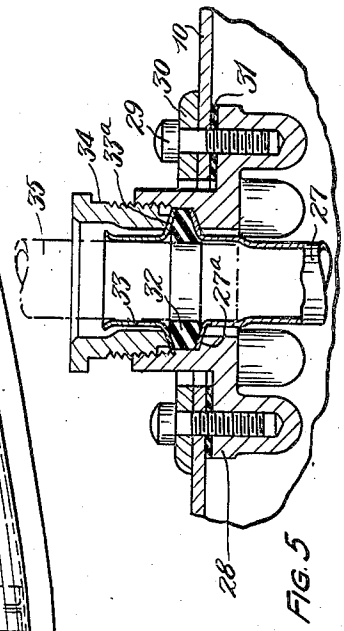


FIG. 5

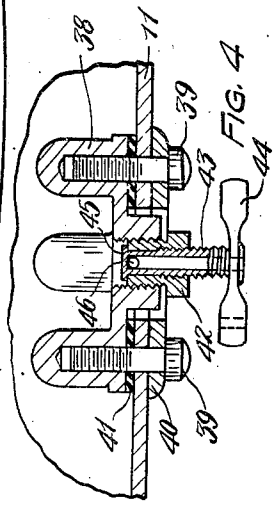


FIG. 4

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DROPPABLE GASOLINE TANK

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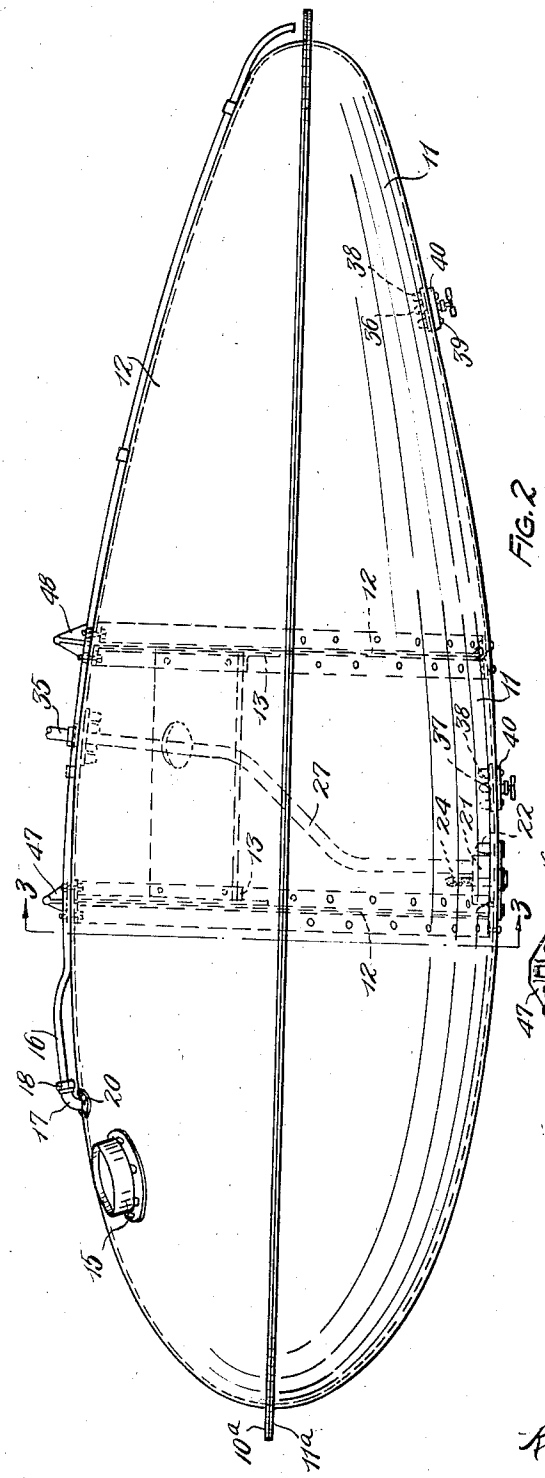


FIG. 2

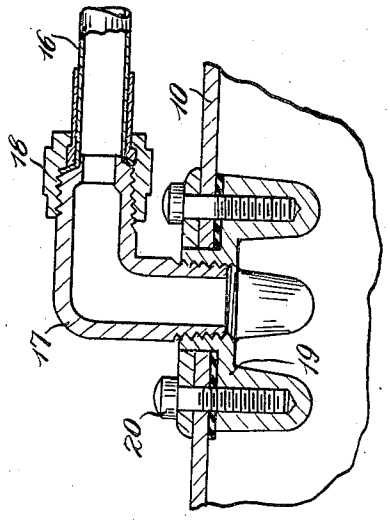


FIG. 6

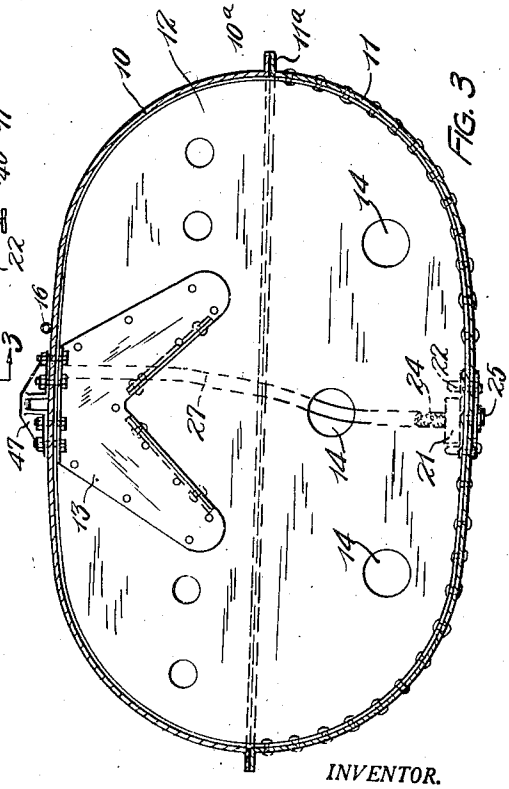


FIG. 3

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DROPPABLE GASOLINE TANK

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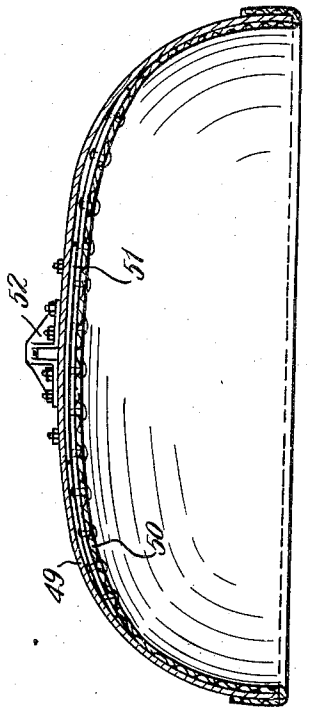


FIG. 9

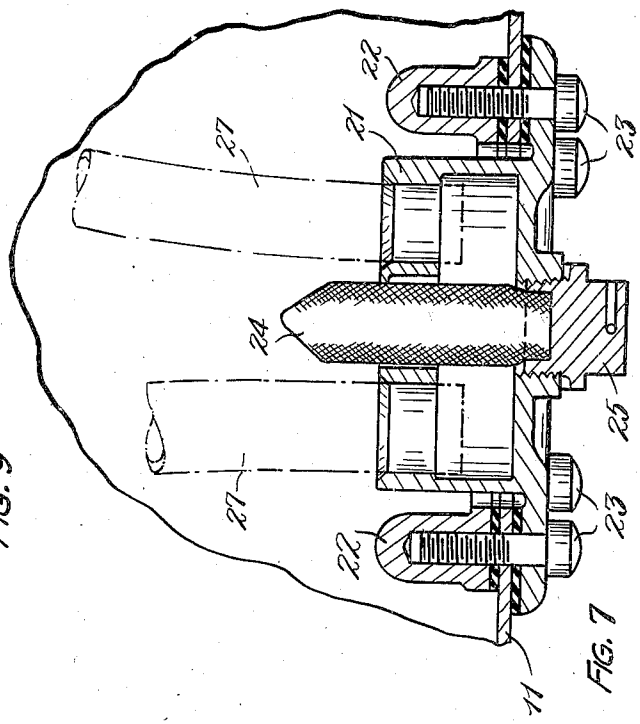


FIG. 7

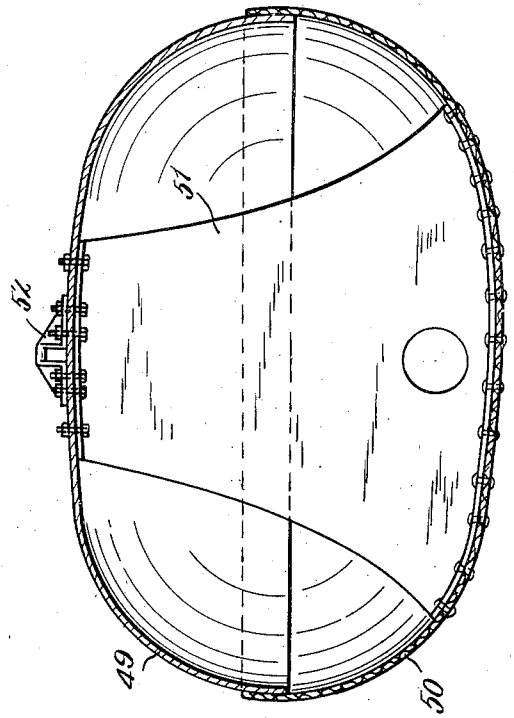


FIG. 8

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UNITED STATES PATENT OFFICE

2,365,080

DROPPABLE GASOLINE TANK

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Application August 2, 1943, Serial No. 497,027

4 Claims. (Cl. 229—4.5)

This invention relates to a so-called droppable gasoline tank adapted to be attached to an airplane and to be released and dropped if occasion should require it. Tanks are dropped from the airplane when the gasoline has been consumed and the empty tanks are no longer needed, or they may be dropped before the gasoline is consumed if it becomes necessary to lighten the load, as, for example, on the occasion of attack by enemy planes.

The particular object of the invention is to form a tank of light material so that the load added by the tank when filled will be as low as possible.

A further object is to provide a tank which is far lighter than a tank formed from metal, as, for example, sheet metal.

These objects are attained very effectively by my invention according to which the tank is formed of fibrous material, either rigid fibrous material or in part by rigid fibrous material and in part by flexible fibrous material, as, for example, flexible woven fabric.

The invention may be further briefly summarized as consisting in certain details of construction and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheets of drawings,

Fig. 1 is a top plan view of a droppable gasoline tank formed in accordance with one embodiment of the invention;

Fig. 2 is a side elevation of the construction shown in Fig. 1;

Fig. 3 is a transverse sectional view substantially along the line 3—3 of Fig. 2 looking in the direction of the arrows;

Fig. 4 is a fragmentary transverse sectional view of the drainage device at the bottom of the tank substantially along the line 4—4 of Fig. 1 on an enlarged scale;

Fig. 5 is a fragmentary sectional view of the gasoline feeding fixture at the upper half of the tank along the line 5—5 of Fig. 1 on an enlarged scale;

Fig. 6 is a fragmentary sectional view of the venting means along the line 6—6 of Fig. 1 on an enlarged scale;

Fig. 7 is a fragmentary sectional view of the gasoline feeding sump at the bottom of the tank along the line 7—7 of Fig. 1 on an enlarged scale;

Fig. 8 is a transverse sectional view of a tank showing a modified form of the invention; and

Fig. 9 is a transverse sectional view of the modified form of Fig. 8 showing how the lower half of the tank can be folded into the upper half so that a series of tanks may be nested for shipment purposes.

Tanks formed in accordance with my invention may be made in various sizes to hold from 25 to 350 gallons of gasoline.

The tank shown in Figs. 1 to 7 inclusive is produced from two fiber sheets 10 and 11 each forming one-half of the tank. The manner in which the halves of the tank are united will be explained presently. The previously prepared fiber sheets are soaked in hot water until they become pliable, this requiring from one to two hours of immersion or soaking. The sheet is then transferred to a steam-jacketed drawing die, and in this die the fiber sheet is drawn to the required depth and shape and is left in the die until all of the water has been evaporated, this requiring approximately 20 minutes. As shown, each half of the tank is an elongated shell having at its free edge a flange extending entirely around the shell. The flange for the upper half of the tank is designated 10*a* and the flange for the lower half of the tank is designated 11*a*. After the halves of the tank have been shaped in the dies, all the necessary holes in the upper and lower halves of the tank are drilled.

At least two fiber baffles 12 reenforced by steel brackets 13 are riveted to the bottom half of the tank only, as clearly shown in Fig. 3. These baffles have openings extending therethrough to permit the passage of gasoline from one side of the baffles to the other. Then the various accessories are applied including a filling opening fitting 15 through which the tank may be filled with gasoline and which is adapted to be closed in the ordinary way, as by means of a closure cap having a bayonet joint. This filling opening is in the upper half of the tank and is clearly shown in Figs. 1 and 2.

In the upper half of the tank there is also provided a vent tube 16 which is fastened to a fitting 17 shown in Fig. 6 and held in place therein by a nut 18. This fitting is screwed into a casting 19 held in place on the lower side of the upper half 10 of the tank by a series of screws 20. A portion of this casting 19 extends up through an opening in the upper half of the tank, and a suitable gasket prevents leakage of gasoline.

After the tank is applied to an airplane, gasoline is fed to the engine from a so-called sump shown in Fig. 7. This sump is formed in the lower half of the tank by a casting 21 which is held in place by an upper casting 22 and by screws 23 with suitable gaskets above and below the

fibrous material of the tank, as shown. A filter tube 24 is held in place in the sump by means of a nut 25. As shown in Fig. 7, two outlets are provided for the sump but only one will be used, depending upon the type of plane with which the tank is to be used. Gasoline is fed from the sump in the lower half 11 of the tank to an outlet member in the upper half 10 in the manner illustrated in Fig. 5 by means of a pipe 27. This outlet member, which is shown in Fig. 5, is in the form of a casting 28 which is fastened to the upper half of the tank by means of a series of screws 29 passing through an upper casting or punching 30 and through a gasket 31. The upper end of the pipe 27 is flanged at its upper end as shown at 27a, and this flange rests upon a tapered shoulder of the casting 28. A flexible gasket 32 rests upon the flange 27a and is adapted to be compressed between the flange 27a and a similar flange 33a on the lower half of a collar 33 by screwing down a hollow nut 34. The pipe 35 leading to the engine is partially shown by dotted lines in Fig. 5 and by full lines in Fig. 2. This pipe is inserted in the outlet fitting before the nut 34 is screwed down and before the gasket 32 is compressed. After the pipe 35 is applied, the nut 34 is screwed down so as to clamp the gasket 32 against the pipe and prevent leakage of gasoline, it being understood that the pipe 35 is applied when the tank is attached to the airplane.

The assembly shown in Fig. 5 can be readily attached to the upper half of the tank as the latter is lowered onto the lower half in the following manner: The entire gasoline feeding fitting shown in Fig. 5, with the exception of the screws 29 and the casting or punching 30 is applied to the upper end of the pipe 27, and as the upper half of the tank is lowered onto the lower half, this assembly is guided into the opening which is provided therefor in the upper half. Then the part 30 and the screws 29 are applied.

A second gasoline feeding assembly like that shown in Fig. 5 will be applied at another point in the top half of the tank, but this is not shown as it will be understood that it will be similar to that shown in Fig. 5. In Fig. 7 I have shown two pipes 27, one of which passes to the fixture of Fig. 5 and the other of which will pass to the other fixture not shown. It will be understood that when it is known to which type of plane the gasoline tank is to be attached, one fixture or the other will be employed, and that which is not utilized will be closed.

Two outlets are provided in the lower half 11 of the tank in case it is desired to drain the tank, these drain outlets being shown at 36 and 37. These outlets are similarly constructed and one is shown in detail in Fig. 4 to which reference will now be had. A casting 38 is provided on the interior of the lower half of the tank and this is secured in place by a series of screws 39 passing through a casting or punching 40 located on the exterior of the lower half and through a suitable gasket 41. The hollow center of the casting 38 is threaded and there is screwed into the threaded opening a hollow nut 42. A portion of the hollow nut 42 is threaded interiorly and screwed into this portion is a hollow drain tube 43 which is provided at its lower end with a handle 44. The drain tube 43 is provided at its upper end with a flange 45 and with one or more outlet openings 46, the handle 44 being applied after the drain tube 43 is inserted in the hollow nut 42. Thus when the drain tube 43 is screwed upwardly, gasoline can be drained from the tank, and when it is screwed downwardly until the flange 45 engages the upper end of the nut 42, the flow of gasoline is stopped.

The adhesion between the top and bottom halves of the tank is accomplished by the use of a suitable cement applied to the adjacent faces of the flanges 10a and 11a. After this cement is applied but before the cement is set to secure the halves of the tank together, the flanges 10a and 11a are stitched together close to the edges of the flanges with a standard wire stitching machine. These wire stitches only serve to hold the two halves of the tank in proper assembled relation until the tank is put in a press where the two flanges are pressed between two steam jacketed dies, the combination of heat and pressure completing the cementing process. The flange is then trimmed to appropriate width inside the wire stitching.

Either before or after this last mentioned step, the tank is given a waterproof coating of lacquer-like paint.

The tank is adapted to be supported on the airplane by means of two hangers 47 and 48 which are adapted to be engaged by two supporting members extending down from the plane. These members are swung inwardly to engage the hangers to support the tank and are swung outwardly when the tank is to be dropped. The hangers are secured by bolts at the top of the upper half of the tank to the metal reenforcing brackets 13 of the baffles 12. Thus the load of the tank and of the gasoline therein is transmitted from the lower half of the tank up through the baffles and to the hangers and the upper half of the tank is relieved of the gasoline load.

Coming now to the modification shown in Figs. 8 and 9, it will be seen that I have provided a tank composed of a fiber upper part 49 and a woven fabric (fiber) lower part 50. With this construction, the flanges 10a and 11a of the first described construction are omitted but the lower fabric half overlaps the bottom of the upper half 49 and the parts are thoroughly cemented together at this point. It will be noted that the fabric lower half of the tank has one or more fabric baffles 51 which are attached to hangers 52 by means of short bolts similar to those used in the first described construction. In producing the lower half of the tank, a piece of fabric is frictioned and skim-coated on both sides with "Hycar" a synthetic rubber which will withstand the effects of aromatic gasoline. This synthetic rubber coated fabric in the uncured state is laid on top of a sheet of fiber which has been properly soaked in water, and the two together are put in a steam-jacketed drawing die. Thus both the fiber and the fabric are shaped at the same time. They are left in the closed drawing die until the fiber becomes entirely dry and the synthetic rubber becomes vulcanized or cured.

To eliminate the horizontal flange on this tank and to provide a shear type joint between the upper and lower halves of the tank, the fiber and fabric halves are drawn approximately one inch below what might be termed the center of the tank with flanges such as in the first described construction, and the two halves are then trimmed at the base of the flange. However, the flange may be left on each of the tank halves for purposes of strength.

The necessary baffles and fittings are installed in the tank. The baffles are made of fabric as before stated, and are sewed or riveted to the

bottom half of the tank, the top half of the baffles being secured to the hangers **52** by short bolts, these bolts passing through reenforcing plates secured to the upper parts of the baffles. The fuel outlet line that is installed inside the tank will necessarily be a flexible member such as a fabric-"Hycar" hose or the equivalent. The other fixtures will be substantially the same as in the construction first described.

To unite the upper and lower halves of the tank, bands of suitable cement approximately 1" wide are put on the portions of the fabric and fiber halves which are to overlap. After this cement has properly dried, the two halves are joined together in the following manner: The fabric is partially pressed into the fiber half and a suitable form of jig is installed to back up the cemented seam. Then a steel band approximately 1¼" wide and .04" thick is wrapped around the overlapping cemented portions of the top and bottom halves of the tank. This steel band is put under tension by means of a suitable turnbuckle secured to the ends of the band. The band is tightened so as to produce the necessary pressure for causing adhesion of the cemented portions of both halves of the tank, and electricity of low voltage and high amperage is passed through the band, producing the necessary heat for the curing of the cement. This completes the formation of the tank.

In producing the fiber upper and lower halves of the tank shown in Figs. 1 and 2 and the upper half of the tank of Figs. 8 and 9, fiber produced from rags is employed. This material, which is produced by a process which need not be described, is delivered to the tank manufacturer in sheets of suitable dimensions and thickness. The fabric which is used in forming the lower half of the tank of Figs. 8 and 9 is preferably 24 oz. duck which has been treated as hereinbefore described.

Thus it will be seen that I have provided a relatively light fiber gasoline tank either of rigid structure as shown in Figs. 1 and 2, or one having a rigid upper half and a flexible fabric lower half which can be nested substantially as shown in Fig. 9 to facilitate shipment.

While I have shown the preferred construction and a modification, I do not desire to be confined to the precise details shown but aim in my claims to cover all modifications which do not involve a departure from the spirit and the scope of my invention.

Having thus described my invention, I claim:

1. A droppable gasoline tank for airplane use comprising a horizontally elongated body formed from upper and lower halves or portions produced from fiber in sheet form, the upper half having one or more hangers extending upwardly therefrom, and a baffle extending transversely of the tank and secured to the lower half and to each hanger in clamping engagement with the upper half.

2. A droppable gasoline tank for airplane use comprising an elongated body formed from two halves or portions produced from fiber in sheet form and having a seam extending around the tank at the perimeter, the upper half having a pair of hangers and a pair of baffles secured to the lower half and to each hanger.

3. A droppable gasoline tank for airplane use comprising two halves each formed from fiber in sheet form each having an outwardly extending flange which flanges are cemented together at their meeting edges, one or more baffles secured to the bottom half, and a hanger secured to the upper portion of each baffle through the upper half.

4. A droppable gasoline tank for airplane use comprising a top and a bottom, the top of the tank being formed from a fiber sheet drawn to concave form and the lower half being formed of flexible fabric overlapping the edge portion of said upper half and cemented thereto, one or more baffles extending from the top of the tank to the bottom thereof and secured at their lower edges to the bottom of the tank, and a hanger secured to the top of each baffle through the top of the tank.

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