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FUEL TANK

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Fig. 1.

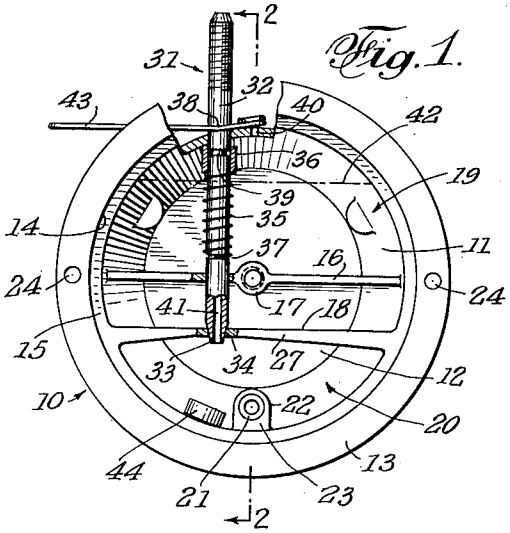


Fig. 2.

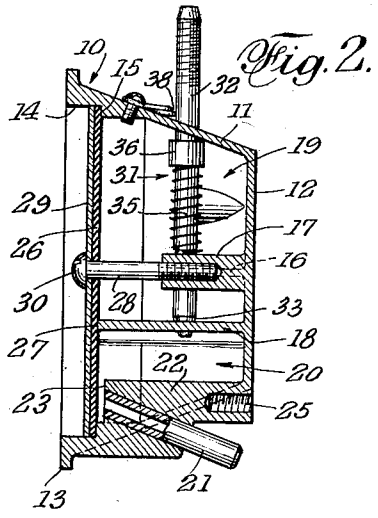


Fig. 3.

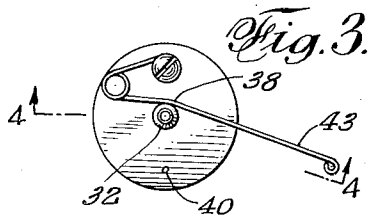


Fig. 4.

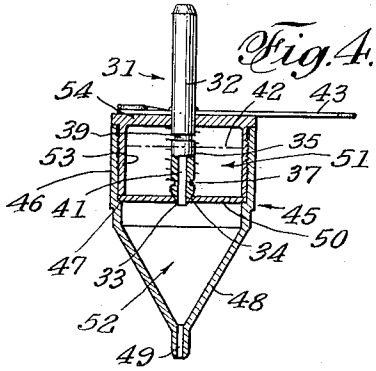
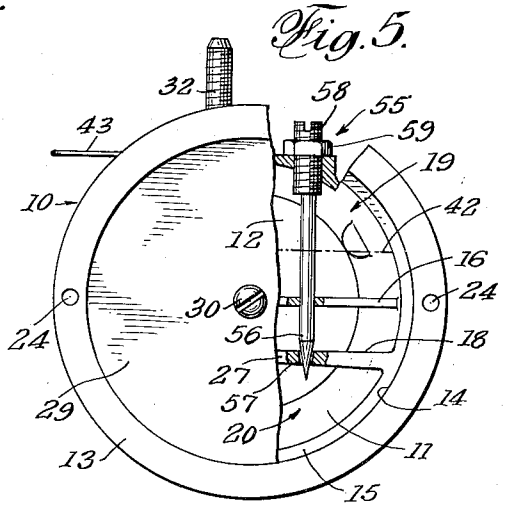


Fig. 5.



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FUEL TANK

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7 Claims. (Cl. 158—46)

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This invention relates to fuel tanks particularly for engine-powered model aircraft.

Engine-powered model airplanes, particularly in competition with other airplanes, are restricted to a certain maximum time of engine operation when started in flight. This time-restriction is particularly required when determining free flight duration. Thus, all model airplanes of one class are flown under similar conditions to determine the aero-dynamic superiority of one or more of said airplanes over the others. However, each contestant desires to have his airplane under power for the full time period allowed to thereby achieve maximum speed and/or elevation before the engine ceases operation, all toward the end of achieving maximum free flight. As an example, if twenty seconds of engine operation are permitted, a contestant desires that the engine operate for the full twenty seconds and not for nineteen or nineteen and one-half, since the additional one or one-half second may result in several more seconds of sustained free flight. Also, operation of the engine for longer than the time allowed would result in disqualification.

It will be seen, therefore, that an extremely accurate amount of fuel must be fed to the engine to insure powered flight for a determined period of time. Many attempts have been made to achieve the accuracy desired but have fallen short for several reasons, the major of which is unduly great weight, a factor fatal to maximum and sustained free flight.

Recognizing the faults in prior fuel tanks for model airplanes, it is an object of the present invention to provide a novel and improved tank that is not only efficient for the purpose intended, but is light in weight, being lighter, by two-thirds, than some prior devices.

Since a warm-up period for the engine is highly desired, fuel tanks necessarily must have a capacity considerably in excess of that amount of fuel which is required for maximum powered flight of a model airplane, so that said excess may be employed for warm-up. However, not all of such excess fuel is used up and assurance must be had that the remainder thereof will not be conducted to the engine.

Another object of the invention, therefore, is to provide a fuel tank that has a relatively large fuel capacity and in which a predetermined portion of the fuel is separated from the total amount in the tank, whereby only said predetermined portion is adapted to pass into an engine supplied by said tank.

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A further object of the invention is to provide a fuel tank, as above, that, while supplying fuel for engine warm-up, can be opened instantly to effect separation of a predetermined portion of the fuel in the tank, whereby the engine remains in continuous operation through the warm-up period and the timed period under power.

This invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes embodiments of the present invention, which are given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a partially broken front view, a sealing cover plate being removed, of one form of fuel tank according to the present invention.

Fig. 2 is a cross-sectional view as taken on line 2—2 of Fig. 1.

Fig. 3 is an end view of another form of fuel tank.

Fig. 4 is a cross-sectional view as taken on line 4—4 of Fig. 3.

Fig. 5 is a partially broken front view of a modification based on the tank shown in Figs. 1 and 2.

With more particular reference to Figs. 1 and 2, the fuel tank comprises a body 10 that is preferably cast of a light metal. Said body is formed to have a frusto-conical peripheral wall 11, a back wall 12 closing the smaller side of the body, and a front flange 13. In the plane of said flange and somewhat deeper than the thickness thereof, there is provided a concentric seat 14 that terminates at a flat shoulder 15. Centrally of the body, and across the interior thereof, there is provided a rib 16 extending from wall 12 in a direction toward but short of shoulder 15. A tapped boss 17 is formed in the middle of said rib, said boss being located on the axial center of the body.

According to the invention, the interior of the body is divided by a partition 18 into a larger upper fuel chamber 19 and a smaller lower fuel chamber 20. Said partition 18 extends from wall

12 and terminates at the plane of shoulder 15. The upper chamber 19 may vary in size and capacity, whereas the lower chamber 20 is of a size to hold a predetermined quantity of fuel.

An outlet is provided for the tank, the same comprising a tube 21 set in a boss 22, residing in the lowermost portion of chamber 20, and extending rearwardly from a front face 23 of boss 22 and outward of the body. Said face 23 is rearwardly spaced from shoulder 15 so that said tube 21 is in communication with chamber 20.

Suitable holes 24 in flange 13 are provided for mounting the tank to an airplane and suitable tapped holes 25, on the opposite side of the body, are provided for effecting connection of the tank to an engine supplied thereby.

The above-described body is provided with a sealing cover that comprises a gasket plate 26 fitting seat 14 and pressed tightly against shoulder 15 and front edge 27 of partition 18 by a screw or bolt 28 threadedly engaged in tapped boss 17. A metal plate 29, superposed on gasket plate 26, is engaged by the head 30 of bolt 28 to effect firm seating of the latter plate. Thus, chambers 19 and 20 are definitely separated against flow from one to the other except as hereinafter described.

According to the invention, the tank 10 is provided with means 31 which is primarily a valve and also comprises a filler tube for the tank and a breather for lower chamber 20. The means 31 comprises a tube 32 which, at one side of boss 17, extends through tank wall 11 and rib 16 to be held thereby in vertical alignment, said tube being slidably mounted for movement in the spaced bearings thus provided. The lower end 33 of said tube is conically formed and a preferably conical passage seat 34 is provided in partition 18 for said end as in Fig. 1. An expansion spring 35, coiled about tube 32, has one end in abutment with the inner face of wall 11 or, as shown, with a loose collar 36 strung on the tube, and the other end confined in an annular groove 37 formed in said tube. Said spring, thereby, urges tube 32 in a direction to engage conical end 33 with seat 34 and thus seat against flow from chamber 19 to chamber 20.

Tube 32 is adapted to be retained in elevated retracted position by a spring detent 38 mounted on the outer side of wall 11, and an annular groove 39 in said tube receptive of said detent when the tube is pulled against the force of spring 35.

While the sliding fit of tube 32 in wall 11 may usually afford a suitable vent for chamber 19, if desired, a separate vent 40 in the uppermost portion of said wall may be provided.

In operation:

Tube 32 is pulled to engage detent 38 in groove 39 and, thereby, unseat tube end 33. The tank is now filled through passage 41 in said tube, the fuel filling chamber 20 through seat 34 and then filling chamber 19, either full or to any desired level as indicated by line 42. The engine is now started and adjusted in the usual manner, the fuel being drawn, through outlet 21, from chamber 20 which is maintained full, however, by being replenished from chamber 19 through open seat 34. Thus, only the level 42 lowers in chamber 19.

When the airplane is ready for launching, arm 43 of detent 38 is flipped in a direction to release tube 32 and allow spring 35 to project said tube, engaging end 33 in seat 34. Chamber 19 is now isolated from chamber 20 and only the fuel in the latter may pass through outlet 21 to the engine. Consequently, said engine will operate for a period according to the amount of fuel in chamber 20 and will cease to operate upon depletion of said fuel. During the latter condition of the means 31, passage 41 of tube 32 serves as a breather or vent for chamber 20.

While chamber 20 may be made exactly to the size desired, in practice, the same is made somewhat larger and one or more filler pieces 44 placed therein to reduce the fuel capacity to the exact size desired. Such filler pieces are employed to compensate for variation in full efficiency, and once the sizes of such pieces are determined, they may be substituted accordingly.

The tank shown in Figs. 3 and 4 has a body 45 formed with a tubular part 46, in which is formed an internal shoulder 47, and a conical extension 48 that terminates in an outlet 49. A partitioning plate 50 divides said body into upper and lower fuel chambers 51 and 52, respectively, said plate being held against shoulder 47 by a flange 53 on a cap 54 threadedly connected to the body. Plate 50 is the counterpart of partition 18 of the earlier-described tank and the means 31 is operatively associated therewith in the manner described for the earlier form. Except for the smaller size, the tank of Figs. 3 and 4 is, in other respects, similar to that of the tank in Figs. 1 and 2, and will function in a comparable manner.

The modification of Fig. 5, which is shown as applied to the larger tank, may also be applied, in a similar manner, to the smaller tank. Said modification comprises a metering valve 55 by means of which a small metered portion of fuel in chamber 19 is added to the fuel supplied to the engine from chamber 20. This added fuel is supplied at a much lower rate than the rate at which the fuel in chamber 20 is diminished by the engine. Consequently, the engine will cease operation while the last few drops are yet entering chamber 20 from chamber 19.

Said valve 55 is preferably positioned parallel to tube 32 but on the opposite side of boss 17, and comprises a needle-pointed stem 56 that extends through a conical passage seat 57 in partition 18. Said stem is adjustable relative to said seat by a threaded part 58, and adjustment is retained as by a lock nut 59. Of course, by setting said stem down on its seat, metering is obviated.

While the invention that has been illustrated and described is now regarded as the preferred embodiments, the constructions are, of course, subject to modifications without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular forms of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A fuel tank of the character described, comprising a hollow body having a partition therein dividing the same into two fuel chambers one above the other, there being a passage in said partition communicating the chambers, a slidably-mounted elongated member having a longitudinal passage and extending through the upper chamber, resilient means engaged with the body and said elongated member to project one end of the latter into said first passage to close flow between the chambers and to vent the lower chamber through said longitudinal passage, de-

tent means normally releasably engaged with the elongated member to hold the same retracted and the chambers in communication, and an outlet for the fuel in the lower chamber.

2. A fuel tank of the character described, comprising a hollow body having a partition therein dividing the same into two fuel chambers, one above the other and the upper chamber being larger in capacity than the lower chamber, there being a passage in said partition communicating the chambers, a slidably mounted elongated member having a longitudinal passage and extending through the upper chamber, resilient means engaged with the body and said elongated member to project one end of the latter into said first passage to close flow between the chambers and to vent the lower chamber through said longitudinal passage, detent means normally releasably engaged with the elongated member to hold the same retracted and the chambers in communication, and an outlet in the lower chamber for fuel therein.

3. A fuel tank according to claim 1, embodying a metering valve controlling flow from one chamber to the other while the elongated member is projected to close flow between the chambers.

4. A fuel tank of the character described, comprising a hollow open-sided body, an apertured partition dividing the interior of said body into upper and lower fuel chambers, a closure for the open side of the body and sealed thereagainst to close flow of fuel between the chambers except through the aperture in the partition, a slidably-mounted elongated member having a longitudinal passage and aligned with said aperture and extending through the upper of said chambers and guided in said body, resilient means to project said elongated member into said aperture to close flow between the chambers and to vent the lower chamber through said longitudinal passage, a releasable detent normally engaged with said elongated member outside of said body to hold the same retracted and effect communication of the chambers through the aperture, and an outlet in the lower chamber for fuel therein.

5. A fuel tank of the character described, comprising a hollow open-sided body, an apertured partition dividing the interior of said body into upper and lower fuel chambers, a closure for the open side of the body and sealed thereagainst to close flow of fuel between the chambers except through the aperture in the partition, means to removably hold said closure in sealing position comprising a bolt extending through the closure from the outside and having threaded engagement with the body, a slidably-mounted elongated member having a longitudinal passage and aligned with said aperture and extending through the upper of said chambers and guided in said body, resilient means to project said elongated member into said aperture to close flow between the chambers and to vent the lower chamber through said longitudinal passage, a releasable detent normally engaged with said elongated member outside of said body to hold the same retracted and effect communication of the chambers through the aperture, and an outlet in the lower chamber for fuel therein.

6. A fuel tank of the character described, comprising a hollow open-sided body, an apertured partition dividing the interior of said body into upper and lower fuel chambers, a closure for the open side of the body and sealed thereagainst to close flow of fuel between the chambers extent through the aperture in the partition, a slidably-mounted elongated member having a longitudinal passage and aligned with said aperture and extending through the upper of said chambers, a rib in the interior of the latter chamber, said rib and a wall of said body having holes in alignment with the aperture in the partition and constituting spaced slide bearings for the tubular member, resilient means to project said elongated member into said aperture to close flow between the chambers and to vent the lower chamber through said longitudinal passage, a releasable detent normally engaged with said elongated member outside of said body to hold the same retracted and effect communication of the chambers through the aperture, and an outlet in the lower chamber for fuel therein.

7. A fuel tank of the character described, comprising a hollow open-topped body having an internal shoulder facing the open end of the body, an apertured partition plate residing against said shoulder and dividing the interior of the body into upper and lower fuel chambers, a closure for the open top of the body and having a downreaching flange extension engaged with said plate to hold the same against displacement on said shoulder, an elongated member having a longitudinal passage and extending through said closure, through the upper chamber, and in axial alignment with the aperture in the partition plate, a detent mounted on the outside of the closure and releasably engaged with the elongated member to hold the same retracted from the aperture and thereby open the latter to communicate the chambers, and resilient means, operable upon release of the detent, to project the elongated member to close the aperture and stop flow between the chambers, and an outlet for the lower chamber.

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