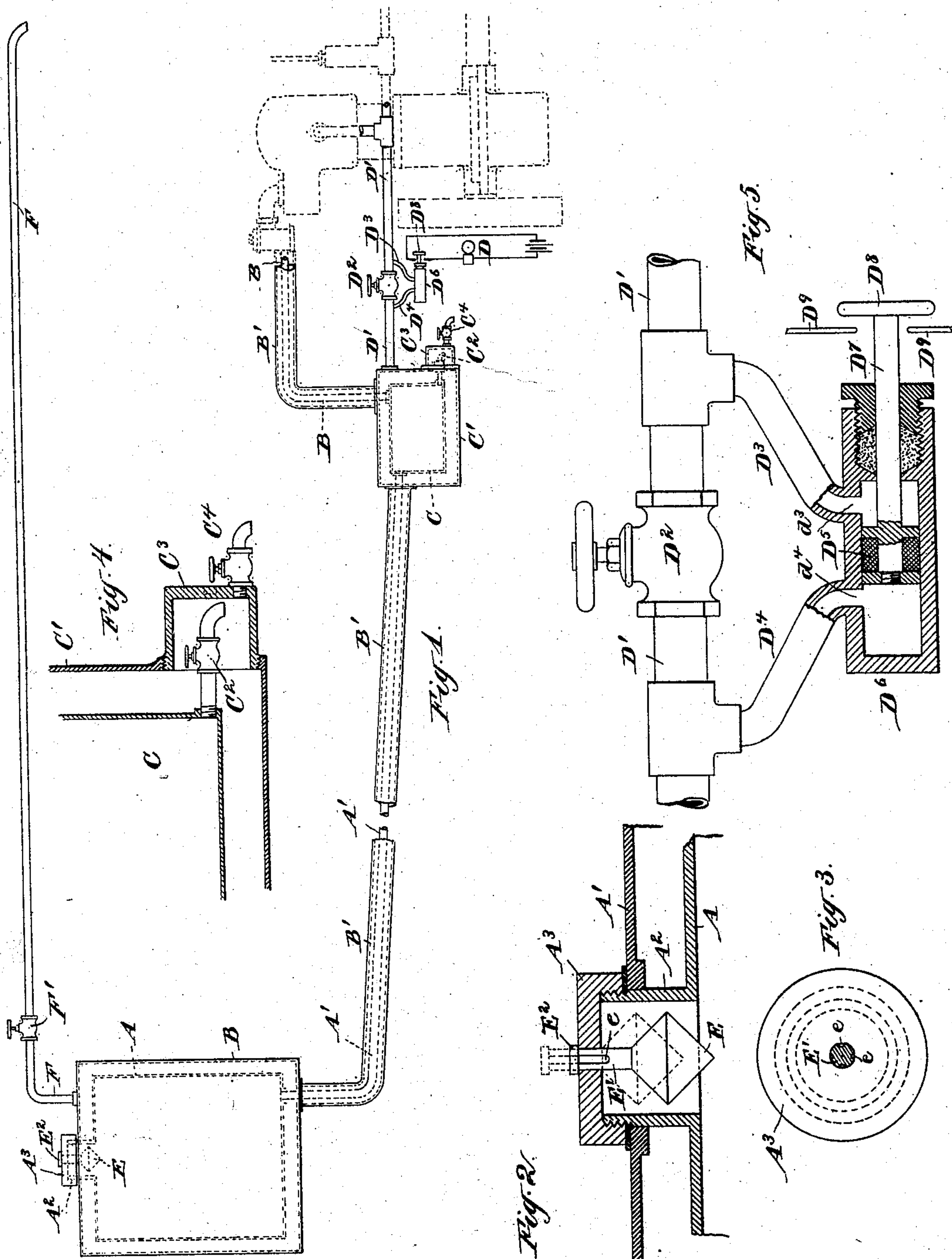


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C. J. CAMPBELL & T. F. HALL.
SYSTEM OF STORING AND DELIVERING LIQUID FUEL.

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UNITED STATES PATENT OFFICE.

CLIFFORD J. CAMPBELL AND THOMAS F. HALL, OF NEW YORK, N. Y.

SYSTEM OF STORING AND DELIVERING LIQUID FUEL.

No. 806,634.

Specification of Letters Patent.

Patented Dec. 5, 1905.

Application filed April 29, 1905. Serial No. 258,005.

To all whom it may concern:

Be it known that we, CLIFFORD J. CAMPBELL and THOMAS F. HALL, citizens of the United States, and residents of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Systems of Storing and Delivering Liquid Fuel, of which the following is a specification.

10 The invention relates to means for preventing the escape of liquid fuel from the containing-tank and its connections in installations in which liquid fuel is employed, as in motor-boats and analogous situations.

15 The invention is based on the principle of surrounding the fuel-tank and its connected piping with a jacket of heavier liquid, as water, under a slightly excess pressure, whereby any leaks in the fuel-supply side of the system
20 will admit water thereto instead of permitting an outward flow of the fuel.

The main object of the invention is to thus prevent the escape of gasoline or other hydrocarbon from the tank and piping to the
25 atmosphere and the consequent formation of explosive mixtures of gas or hydrocarbon vapor liable to accidental ignition.

Another object is to provide means for permitting a moderate accumulation of such water in the gasoline side of the system and for
30 trapping the same; and a further object is to provide an alarm which shall automatically indicate such leakage.

35 The invention consists in certain novel features and arrangements of parts by which the above objects are attained, to be hereinafter described.

40 The accompanying drawings form a part of this specification and show the general arrangement of the system and preferred forms of details.

45 Figure 1 is a side elevation of the tank and its connections. The dotted lines show so much of a motor as is necessary in describing the operation. Fig. 2 is a vertical section, on a larger scale, through a portion of the top of the tank; and Fig. 3 is a corresponding plan view, partly in horizontal section. Fig. 4 is a vertical section, partly in elevation, showing a portion of the leakage-trap. Fig. 5 is
50 a section, partly in elevation, on a still larger scale, showing a mechanism for actuating the alarm.

55 Similar letters of reference indicate the same parts in all the figures.

The system comprises a tank A, adapted to

contain gasoline, a pipe A', leading therefrom to a motor or other point of delivery, a casing B, inclosing the tank, with a space between, and a pipe or jacket B', similarly inclosing the
60 delivery-pipe A', with means for introducing liquid, as water, under a pressure in excess of that in the tank to such casing and jacket, whereby any leaks in the tank or delivery-pipe will admit water thereto instead of per-
65 mitting gasoline to escape therefrom, and in the most complete development of the invention a trap C, having a casing C', is included at a low point in the system, in which the water thus admitted may accumulate without af-
70 fecting the flow of gasoline, and also an alarm D, actuated by the reduction of pressure in the casings and jacket due to leakage of the water.

The tank A has a neck A² projecting above
75 the top of the casing B and is screw-threaded to receive a closing-cap A³, in which is an opening receiving the stem E' of a float E, held in position by a head E². The upper
80 portion of the stem is grooved, as at e, to admit air to the interior of the tank, and thus prevent the formation of a partial vacuum and permit the gasoline to flow freely from the tank.

The delivery-pipe A' from the bottom of
85 the tank and the jacket B' therefor from the bottom of the casing are preferably at a slightly-downward inclination, and at a low point the pipe A' enters the upper part of a receptacle or trap C, inclosed in a casing C',
90 to which the jacket B' is joined. The delivery-pipe A' is continued from the top of the trap to the motor or other point of delivery, and the inclosing jacket B' is similarly continued from the top of the casing C'.
95 A draw-off cock C² is provided near the bottom of the trap C, inclosed in a removable bonnet C³, forming part of the casing C', which is also provided with a tap C⁴, through which water in the casings and jacket may be drained.
100

At any convenient point in the trap-casing C' is connected a water-supply pipe D', through which water is received from a pump, stand-pipe, or other means of inducing a pressure
105 in excess of that in the gasoline-tank and its delivery-pipe and which may be the circulation-pump for the water-jacket of the motor or other convenient source of moderate pressure. In the water-supply pipe D' is a valve
110 D², located between branches D³ D⁴, leading to opposite faces of a piston D⁵ in a cylinder D⁶. The piston has a stem D⁷, extending

through a stuffing-box and carrying a head D^8 , adapted by its movement in one direction to complete an electric circuit and ring an alarm-bell D.

5 From the top of the tank-casing B extends a relief-pipe F, controlled by a valve F' and serving to permit the casings and jacket to be filled with water through the pipe D'.

The operation of the system is as follows:
 10 The relief-valve F' is opened and also the supply-valve D^2 , and water is admitted to the spaces between the casings and jacket and their inclosed tank, pipes, and trap until such spaces are completely filled, as will be indicated by the flow from the pipe F. The relief-valve is then closed and also the supply-valve D^2 . The piston D^5 then lies between the ports d^3 d^4 with its head D^8 out of contact with the wires D^9 . Thus conditioned any
 20 leak in the tank A, pipe A', or trap C does not permit gasoline to escape, but will simply admit water to the interior of these portions, where it mingles with the gasoline therein; but by reason of the difference in gravity the
 25 water immediately seeks the lowest point in the system—the trap—and accumulates therein. This escape of water reduces the volume imprisoned in the jacket and casings, causing the piston D^5 to follow by reason of the pressure on its opposite face, due to the pump or
 30 other head or atmospheric pressure alone, and brings the head D^8 into contact with the wires D^9 , rings the alarm, and thus calls attention to the leak. The motor will continue to run under these conditions until the trap
 35 C is nearly filled with water, and if it be inconvenient to attend to the leak at the time the casings and jacket may be drained through the tap C^4 , the bonnet C^3 removed, and the
 40 water drawn from the trap C through the cock C^2 , and these parts being again replaced and a new supply of water introduced, as before, the motor may continue to run until the trap is again flooded, thus permitting the boat
 45 or other vehicle to run until a convenient place is reached at which to make repairs. The tap C^4 also serves usefully in draining the system to prevent damage by freezing. The float E serves, as before stated, to allow
 50 the entrance of air as required and also to close the vent and avoid the escape of gasoline when the level of the gasoline rises too high, due to motions of the vessel in which the system may be installed or other causes.
 55 Instead of depending on gravity for the flow of gasoline to the delivery-point the tank may be closed and the gasoline delivered by the pressure of air forced into the tank. In such case the water-pressure in the casings must
 60 be correspondingly raised to be slightly in excess.

The system prevents the unnoticed leakage of gasoline and the danger of the accumulation of gas or vapor therefrom mixed with air
 65 in explosive proportions in confined spaces.

Leaks are immediately indicated; but unless they be large the motor may be safely run until opportunity is offered for repairs.

Modifications may be made in the forms and proportions as found necessary or desirable in
 70 installing the system under various conditions, and parts may be used without the whole. The alarm mechanism may be omitted or other forms substituted for the electric bell shown. The water-supply may be from any source
 75 and the pressure obtained by any suitable means. Instead of gasoline alcohol or any of the usual hydrocarbons may be used as fuel, and other liquids may be used instead of water to maintain the desired excess pressure
 80 around the tank and its connections.

We claim—

1. In an apparatus of the character described, a tank, a casing inclosing said tank, with a space between them, a delivery-pipe
 85 from said tank, a pipe inclosing said delivery-pipe and connected to said casing, and means for supplying to such space and inclosing pipe liquid under pressure in excess of the pressure in said tank and delivery-pipe.
 90

2. The system of storing and delivering liquid fuel described, the same consisting of a tank adapted to contain such fuel, a delivery-pipe therefrom, a trap in said pipe, a casing
 95 inclosing said tank and pipe and trap with a space between them, and means for supplying a liquid of greater specific gravity than such fuel to said space at a pressure greater than that in said tank, pipe and trap, whereby such
 100 heavier liquid admitted by leaks to said tank, pipe or trap will accumulate in the latter below the liquid fuel therein.

3. The system of storing and delivering liquid fuel described, the same consisting of a tank adapted to contain such fuel, a delivery-pipe therefrom, a trap in said pipe, a casing
 105 inclosing said tank, pipe, and trap with a space between them, and means for supplying a liquid of greater specific gravity than such fuel to said space at a pressure greater than that
 110 in said tank, pipe, and trap, whereby such heavier liquid admitted by leaks to said tank, pipe or trap will accumulate in the latter below the liquid fuel therein, and an alarm actuated by the lowering of the pressure in such
 115 space due to such leaks.

4. The system of storing and delivering liquid fuel described, the same consisting of a tank adapted to contain gasoline or analogous liquid fuel, a delivery-pipe therefrom, a casing
 120 inclosing said tank and pipe with a space between them, a pipe adapted to supply water under pressure to such space, a valve in said water-pipe, a cylinder, a piston therein, a branch from said water-pipe on each side of
 125 said valve and entering said cylinder on opposite faces of said piston, and an alarm actuated by the movement of said piston, whereby a change in pressure in said water-pipe on opposite sides of said valve when the latter
 130

is closed, will move said piston and indicate such change.

5 The system of storing and delivering liquid fuel described, the same consisting of a tank adapted to contain gasoline or analogous liquid fuel, a delivery-pipe therefrom, a trap at a low point in said pipe, a casing inclosing said tank, pipe, and trap with a space between them, means for supplying water or other liquid of greater specific gravity than said fuel to said space at a pressure greater than that in said tank, pipe, and trap, a draw-off tap for said trap, and a drain-cock for said casing.

15 6. The system of storing and delivering liquid fuel described, the same consisting of a tank adapted to contain gasoline or analogous liquid fuel, a delivery-pipe therefrom, a trap at a low point in said pipe, a casing inclosing said tank, pipe, and trap with a space between them, means for supplying water or other liquid of greater specific gravity than said fuel to said space at a pressure greater than that in said tank, pipe, and trap, a draw-off tap in said trap and within said casing, and a removable bonnet on the latter for permitting access to said tap.

25 7. The system of storing and delivering liquid fuel described, the same consisting of a tank adapted to contain gasoline or analogous liquid fuel, a delivery-pipe therefrom, a trap at a low point in said pipe, a casing inclosing said tank, pipe, and trap with a space between

them, means for supplying water or other liquid of greater specific gravity than said fuel to said space at a pressure greater than that in said tank, pipe, and trap, a draw-off tap in said trap and within said casing, a removable bonnet on the latter for permitting access to said tap, and a drain-cock for said space.

40 8. The system of storing and delivering liquid fuel described, comprising a tank adapted to contain gasoline or analogous liquid fuel, a delivery-pipe therefrom, a casing inclosing said tank and pipe with a space between them, means for supplying water or other liquid of greater specific gravity than said fuel to said space at a pressure in excess of that in said tank and pipe, whereby leaks in said tank and pipe will admit such water thereto, an air-vent in the top of said tank, and a float-valve controlling said vent and arranged to permit air to flow freely therethrough to and from said tank and to prevent the escape of liquid fuel through said vent.

55 In testimony that we claim the invention above set forth we affix our signatures in presence of two witnesses.

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Witnesses:

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