

June 15, 1926.

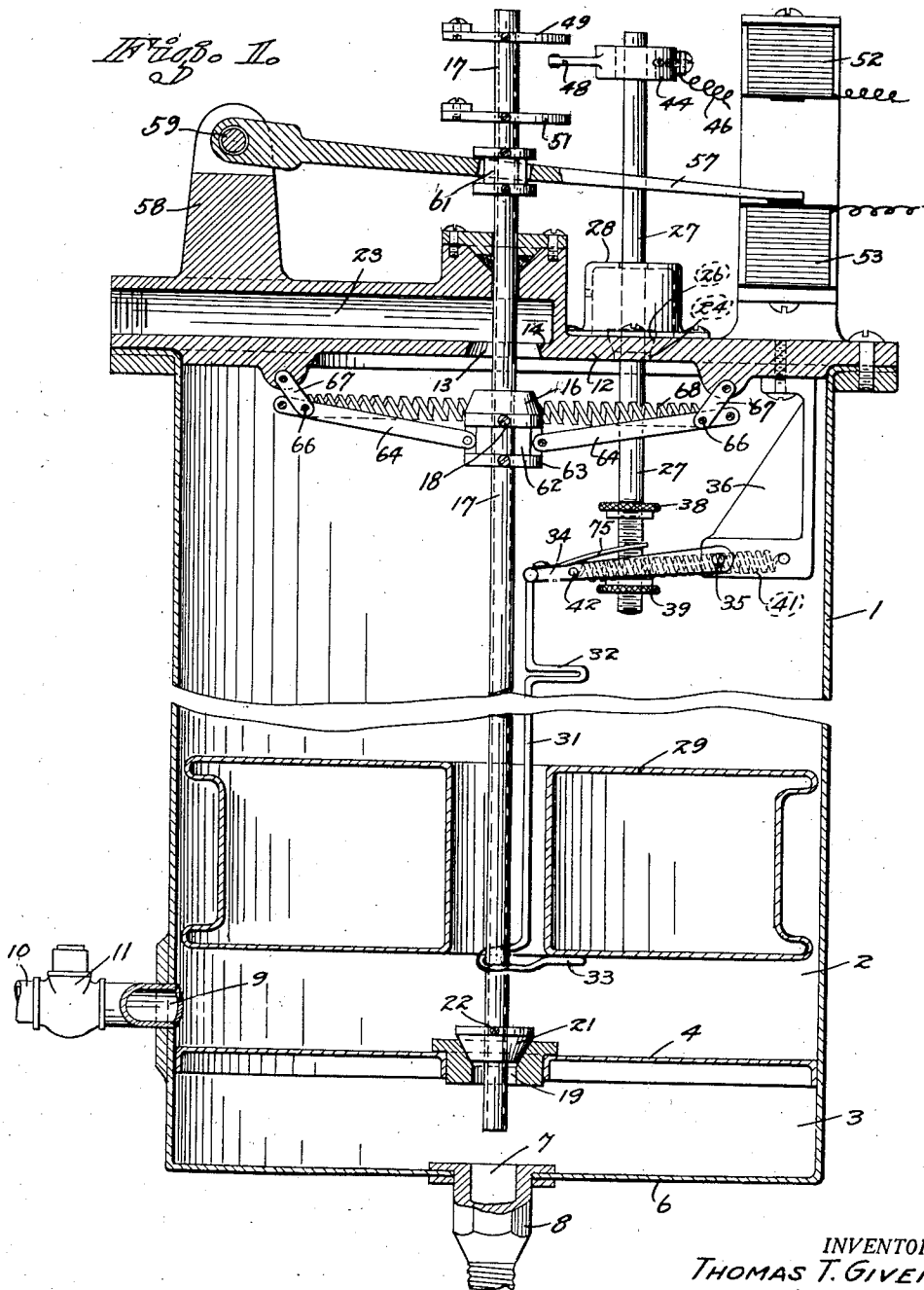
1,589,068

T. T. GIVENS

COMBINATION VACUUM TANK AND REGISTERING DEVICE

Filed Feb. 2, 1925

2 Sheets-Sheet 1



INVENTOR.
THOMAS T. GIVENS
BY *Wm. H. Co.*
ATTORNEYS.

June 15, 1926.

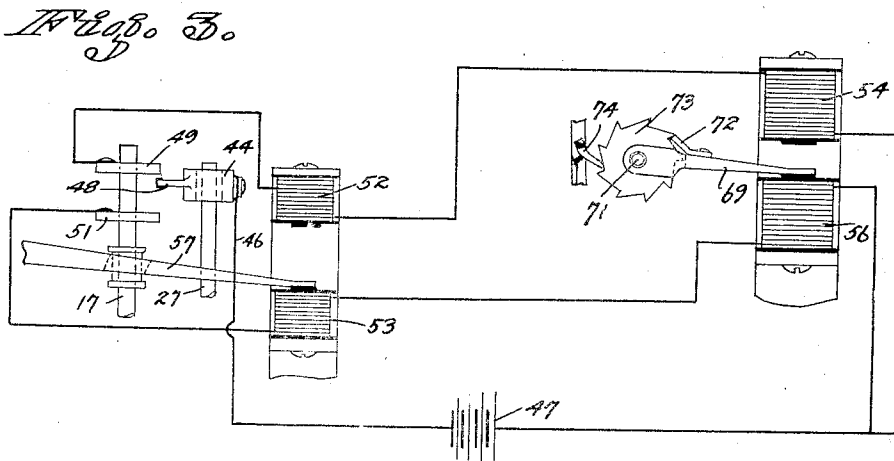
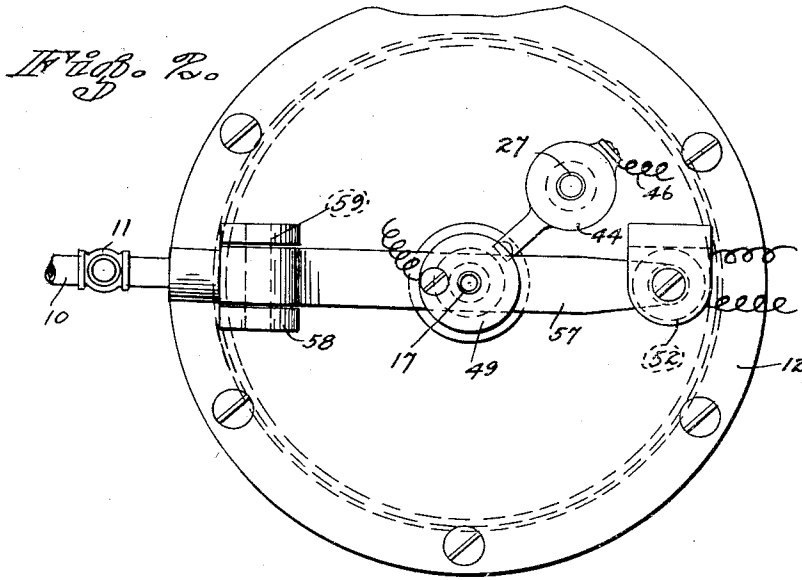
1,589,068

T. T. GIVENS

COMBINATION VACUUM TANK AND REGISTERING DEVICE

Filed Feb. 2, 1925

2 Sheets-Sheet 2



INVENTOR.
THOMAS T. GIVENS
BY *Wm. H. Co.*
ATTORNEYS.

Patented June 15, 1926.

1,589,068

UNITED STATES PATENT OFFICE.

THOMAS T. GIVENS, OF MERCED, CALIFORNIA.

COMBINATION VACUUM TANK AND REGISTERING DEVICE.

Application filed February 2, 1925. Serial No. 6,481.

The present invention relates to improvements in vacuum tanks for automobiles, and its particular object is to provide means allowing gasoline to be fed to the carburetor in measured quantities and allowing the quantities to be counted in a registering device, so that the operator of the automobile can tell at all times how much gasoline has been used. The device described in the present application is similar to that described in my co-pending application Serial No. 756,041, filed December 15th, 1924, the principal difference being that in the present invention I use electric means for operating the principal valves as well as for operating the wheels of the register. In this connection it is proposed to cause a float to open and close one of the valves of the vacuum tank when reaching a maximum or minimum elevation while the valve renders active electrical circuits for effecting a registering opening or closing of the other valves and for simultaneously effecting a registering of each operation.

It is proposed to provide means allowing the electrical circuits after having performed their respective functions to be broken automatically so that current is withdrawn from a source of energy only when action is required and not during the intervals.

Further objects and advantages of my device will appear as the specification proceeds.

The preferred form of the invention is illustrated in the accompanying drawing, in which—

Figure 1 shows a vertical section through my device.

Figure 2 a top plan view of the same, and Figure 3 a wiring diagram.

While I have shown only the preferred form of the invention, I wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

The tank 1 which preferably is cylindrical in form is divided into an upper chamber 2 and a lower chamber 3 by means of the partition 4. The bottom 6 of the tank is provided with a port 7 and a fitting 8 for connection with the carburetor of the internal combustion engine in connection with which my device is to be used. A second port 9 in the side wall of the tank above the partition 4 communicates through a pipe 10 and a check valve 11 with a supply of gasoline.

In the top plate 12 of the tank there is provided a central opening 13 with tapering wall, as shown at 14, to provide a seat for the valve 16 secured on the hollow stem 17 by means of a set screw 18. In axial alignment with the perforation 13 there is provided a similar perforation 19 in the partition 4 to accommodate the valve 21 secured to the stem by means of the set screw 22, the valves 16 and 21 being spaced on the stem 17 in such a manner that only one can become operative at one time. The upper perforation 13 communicates through the passage 23 with the suction side of the internal combustion engine and the lower opening 19 communicates with the lower chamber 3.

A vent hole 24 is provided in the cover plate 12 and is adapted to be closed by a valve 26 mounted on the valve stem 27 which extends into the tank for a considerable distance. A perforated cap 28 is mounted on top of the plate to protect the vent opening.

The vent valve is operated by means of a float 29 which operates at maximum and minimum liquid elevations a rod 31 by bearing on arms 32 and 33 respectively and this latter rod manipulates a link 34, one end of which is pivoted in a stationary bracket 36, as shown at 37, the link being made to straddle the stem 27 and to operate the stem by bearing on one of the two nuts 38 and 39 for raising or lowering the same. The link 34 is also acted on by two springs 41 disposed on opposite sides of the same and fastened to the free end of the link as shown at 42 and to a stationary point 43 rearwardly of the pivot 37, the springs serving to pull the link 34 upwardly or downwardly respectively as soon as it passes the center line of the pivot 37 and the spring support 43 and also tends to hold or lock the link 34 in either end position irrespective of any change in the position of the float.

At the upper end of the stem 27 there is mounted a collar 44 connected by the wire 46 to one side of a source of energy, such as the battery 47. The collar has a contact element 48 thereon which latter extends into the space between two contacts 49 and 51 secured on the hollow valve stem 17, it being understood that both the valve stems 17 and 27 are made of insulating material. The relative position of the contact 48 relative to the contacts 49 and 51 is such that when the valve stem 27 is raised by the float reaching

a maximum elevation, the contact 48 engages with the contact 49 and thereby closes a circuit including the upper one of two electro-magnets 52 and 53, the upper one of a second set of electro-magnets 54 and 56 and the source of electrical energy 47, so that thereby the electro-magnet 52 is energized and pulls toward it an arm 57 pivoted at one end in standards 58 as shown at 59 and engaging in its central portion with a grooved collar 61 fast on the hollow stem 17 so that the latter stem is raised for seating the valve 16 and for unseating the valve 21. The raising of the stem 17 breaks the contact between the elements 48 and 49 so that the electrical circuit is opened immediately after it has performed its function.

The initial momentum imparted to the hollow stem 17 by the pull of the electro-magnet 52 on the arm 57 is therefore relied on alone for effecting a change in position of the stem 17 and for maintaining the latter in its raised position the link and spring arrangement shown immediately under the top plate is used. The latter comprises a sleeve 62 revolvable on the stem 17 and held against longitudinal motion by the valve 16 and a collar 63, two links 64 pivoted to the sleeve at diametrically opposite points having intermediate points 66 pivotally supported in links 67 suspended from the top plate and having their extreme ends joined by a pair of springs 68 tending to draw the two ends together. In the position shown in Figure 1, the sleeve 62 is disposed below the plane of the springs and when the stem is raised the sleeve is forced through the said plane against the resistance of the springs and thereupon forced upwardly by the springs so that the valve 16 is engaged with the seat 14 and maintained in that position by the springs.

This upward motion of the stem 17 opens the valve 19 in the partition 4 and allows the contents of the tank to be drained into the lower chamber 3 as far as the capacity of the latter admits of such drainage. The gasoline in the tank thus becomes available for the carburetor and when the level of the gasoline in the tank reaches a minimum, the bottom of the float strikes the arm 33 of the rod 31, pulling the latter and with it the link 34 downwardly until the latter engages with the lower nut 39 on the stem 27 and pulls the latter downwardly for closing the valve 24. When the stem 27 is pulled down sufficiently far to close the valve 24, the contact 48 engages with the contact 51 and thereby energizes the circuit of the lower electro-magnet 53 so that the latter becomes energized and pulls the arm 57 and the stem 17 downwardly whereby the valve 19 is closed and the valve 13 is opened while at the same time the contact between the elements 48 and 51 is broken so that the flow

of current stops. While moving downwardly the sleeve 62 on the stem 17 has to pass through the center plane of the springs 68 and is now held in its lowermost position by the tension of the said springs.

The two electro-magnets 54 and 56 are connected in series with the two electro-magnets 52 and 53 respectively and operate an arm 69 pivoted on the shaft 71 of any suitable registering device, the arm having a pawl 72 thereon for advancing a ratchet wheel every time the arm 69 is pulled upwardly. A second pawl 74 holds the ratchet 73 against reversed motion. From the ratchet rotary motion may be transmitted in any suitable manner to the wheels of a registering device, not shown in the drawing.

The operation of the device is as follows:

Commencing with the position of the various elements as illustrated in Figure 1, a vacuum is created in the tank by the suction of the engine through the opening 13 which causes gasoline to be drawn in through the opening 9, the vent opening 24 being closed by the valve 26. The entering gasoline causes the float 29 to rise until the latter engages with the arm 32 on the rod 31, lifting the same and with it the link 34 until the latter is forced past the center line of the points 37, 43 and forces the stem 27 upwardly through the nut 38. The valve 26 is thereby lifted from its seat while, at the same time, contact is established between the elements 48 and 49 which closes the circuit including the electro-magnet 52. The latter upon being energized raises the arm 57 and through the same the stem 17, forcing the sleeve 62 past center and closing the valve 13 and opening the valve 19 while also breaking the contact between the elements 48 and 49. At this stage air is allowed to enter the tank from the atmosphere while the suction valve is closed and the gasoline stored in the tank is allowed to flow through the opening 19 into the lower chamber 3. The float sinks with the level of the gasoline in the tank but all the other elements retain their respective positions until the upper chamber is drained of gasoline sufficiently to allow the float 29 to bear on the lower arm 33 of the rod 31 pushing the same downwardly. This operation causes the free end of the arm 34 to be pulled downwardly which latter pull is transmitted to the stem 27, closing the valve 26 and establishing contact between the elements 48 and 57 whereby the lower electro-magnet 53 is energized and the stem 17 pulled downwardly so that now the valve 21 becomes seated while the valve 16 is unseated. The downward motion of the stem 17 breaks the contact between the elements 48 and 57 and de-energizes the electro-magnet 53, the tension of the springs 68 serving to hold the stem 17 in its last mentioned position.

At this stage the vent valve 26 is closed, the suction valve 16 is open and the discharge valve 21 is closed so that now the suction of the engine may draw further gasoline into the upper chamber of the tank.

The two electro-magnets 54 and 56 cause the arm 69 to be reciprocated in the same manner as the arm 57 and thereby operate the ratchet wheel 73 and through the same the operating wheels of a suitable registering device.

If it should be found necessary to provide means for holding the vent valve 26 in its raised position during the short period that the float 29 bears down on the arm 33, preparatory to forcing the valve 26 on its seat, a small spring 75 may be fastened to the end of the link 34 so as to bear on the underface of the nut 38 during the initial period of the downward movement of the arm 34. As soon as the arm moves past center to urge the lower nut 39 downwardly, the spring 75 becomes disengaged from the upper nut 38.

It should also be understood that my valve arrangement with its operating mechanism could be used generally in connection with any device for delivering a liquid in measured quantities and would be applicable also where gravity feed is used. In the latter case it would only be necessary to close the pipe 10 and to connect the passage 23 directly with the liquid to be dispensed. The valve mechanism would operate in the same manner.

I claim:

1. In a device of the character described, a tank having an intake port, a discharge port, a suction port and a vent port and valves for the ports, float controlled means for mechanically operating the vent valve at maximum and minimum levels of liquid in the tank and electrical means becoming active upon the operation of the vent valve for effecting operative movements of the suction and discharge valves respectively.

2. In a device of the character described, a tank having an intake port, a discharge port, a suction port and a vent port and valves for the ports, float controlled means for operating the vent valve at maximum and minimum levels of liquid in the tank and electrical means becoming active upon the operation of the vent valve for effecting operative movements of the suction and discharge valves respectively, and made to become inactive immediately thereafter.

3. In a device of the character described, a tank having an intake port, a discharge port, a suction port and a vent port and valves for the ports, float controlled means for operating the vent valve at maximum and minimum levels of liquid in the tank and electrical means becoming active upon

the operation of the vent valve for effecting operative movements of the suction and discharge valves respectively and made to become inactive immediately thereafter in combination with mechanical means for maintaining all the ports in their respective positions until positively actuated for reversal.

4. In a device of the character described, a tank, a vent valve therein, means operated by the vent valve for alternately filling and emptying the tank and float controlled means becoming active at maximum and minimum float elevations for operating the vent valve, said means comprising a valve stem extending into the tank having two stops thereon, a link pivoted at one end to the tank at the other end straddling the stem between the stops and float actuated means operating the free end of the link.

5. In a device of the character described, a tank, a vent valve therein, means operated by the vent valve for alternately filling and emptying the tank and float controlled means becoming active at maximum and minimum float elevations for operating the vent valve, said means comprising a valve stem extending into the tank having two stops thereon, a link pivoted at one end to the tank at the other end straddling the stem between the stops and float actuated means operating the free end of the link in combination with means for maintaining the stem in either end position until positively reversed.

6. In a device of the character described, a tank, a vent valve therein, float controlled means becoming active at maximum and minimum float elevations for operating the vent valve, a suction port and a discharge port in the tank having valves associated therewith and a common operating element for the latter valves allowing one to be closed while the other is open and electric means rendered active by the opening and closing of the vent valve for manipulating the operating element, the latter element having means associated therewith for maintaining the same in either operative position until positively forced into the other operative position.

7. In a device of the character described, a tank, a vent valve therein, float controlled means becoming active at maximum and minimum float elevations for operating the vent valve, a suction port and a discharge port disposed in axial alinement having valves associated therewith and a common stem for the valves allowing one to be closed while the other is open and electric means rendered active by the opening and closing of the vent valve for manipulating the operating element.

THOMAS T. GIVENS.