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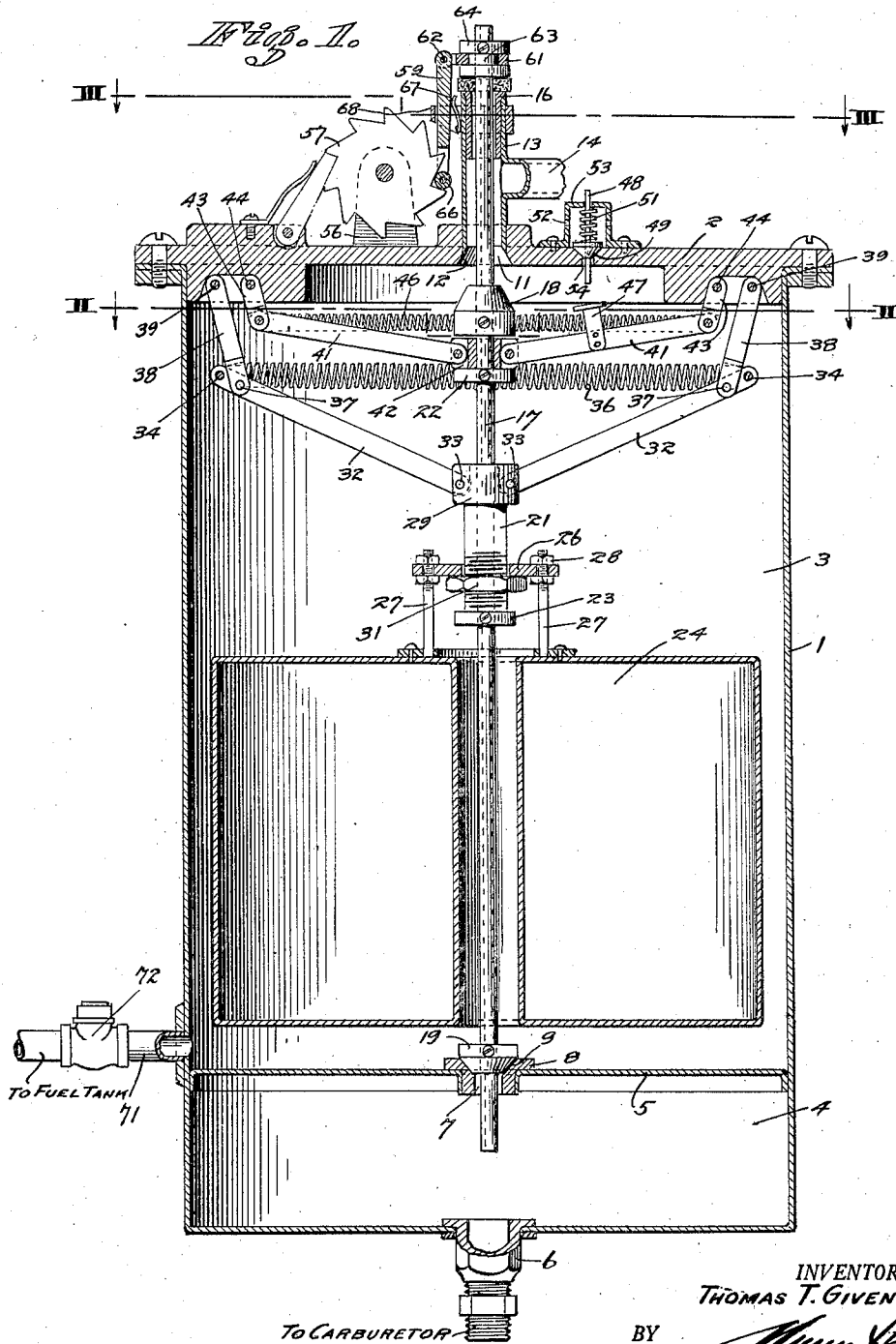
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COMBINATION VACUUM TANK AND REGISTERING DEVICE

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

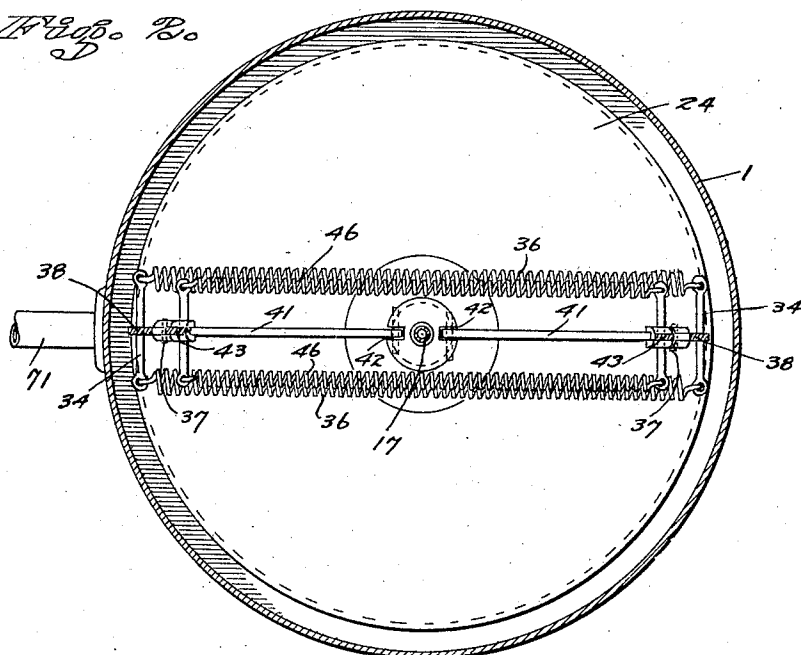
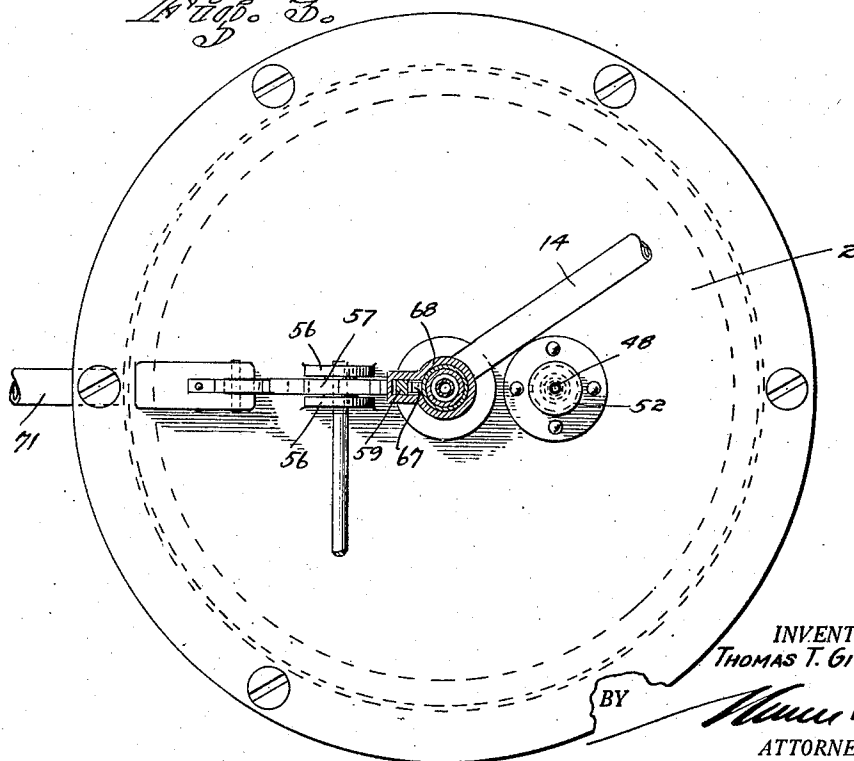


Fig. 3.



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COMBINATION VACUUM TANK AND REGISTERING DEVICE.

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The present invention relates to improvements in vacuum tanks for motor vehicles. While the interposition of the vacuum tank between the main fuel reservoir and the carburetor is a well known expedient and is used for the purpose of bringing a certain quantity of the fuel into an operative position relative to the carburetor allowing the fuel to run into the carburetor by gravity, it is proposed in the present invention to provide certain improvements which allow predetermined measured quantities to be fed and which, furthermore, allow the quantities to be registered so as to allow the owner of a car to keep account of the amount of gasoline or other fuel used, which account may be kept for the whole life of the car or for a single trip and which may further be utilized to indicate the amount of gasoline in the main tank by deducting the quantities delivered to the carburetor from the total amount present in the main tank at the beginning.

It is particularly proposed in the present invention to solve the problems involved in a device of this character by structural features comparatively simple and particularly well adapted to be always kept in good condition, as will appear from the following description.

The preferred form of my invention is illustrated in the accompanying drawings, in which

Figure 1 shows a vertical section through my device.

Figure 2 a horizontal section taken along line II—II of Figure 1.

Figure 3 a horizontal section taken along line III—III of Figure 1.

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 may be cylindrical in form and covered by the top plate 2 is divided into an upper chamber 3 and a lower chamber 4 by the horizontal partition 5. An outlet 6 is provided in the bottom of the lower chamber, which latter will be referred to as the receiving chamber and communicates by means, not shown in the drawing, with the carburetor of an internal combustion engine. A discharge aperture 7 is provided in the partition 5 and a gland 8 sup-

ported in said aperture forms a valve seat 9. A second port 11 forming a valve seat 12 is provided in the top plate 2 in axial alignment with the exhaust port 7 and communicates with a short pipe 13 from which latter a horizontal pipe 14 branches off to connect with the suction side of the internal combustion engine. A gland 16 rests on the top edge of the pipe 13 and allows the valve stem 17 to be guided therethrough, which latter is sufficiently long to extend through the two ports 12 and 7 into the lower chamber 4. The latter stem is hollow and has fixed thereto the two valves 18 and 19 mounted for operative engagement with the two valve seats 9 and 12 respectively, in such a manner that when the valve stem is raised the upper valve 18 engages with the valve seat 12, while, when the stem is lowered, the valve 19 engages with the seat 9.

A sleeve 21 is slidable on the valve stem within the upper chamber and is adapted for engagement with either one of two collars 22 and 23 fixed to the stem so as to cause the stem to rise when bearing against the upper collar 22 and to cause the stem to drop when bearing on the lower collar 23. A float 24 surrounds the valve stem and is movable relative thereto to a limited extent, a collar 26 slidable on the sleeve being fixed relative to the float by means of bolts 27, the operative length of which can be adjusted by means of nuts 28. The latter collar moves between the head 29 of the sleeve 21 and a nut 31 threaded thereon, the nut allowing the length of travel of the float relative to the sleeve to be adjusted.

The head 29 of the sleeve has two links 32 pivoted thereto, as shown at 33, so as to extend in opposite directions, the extreme ends 34 of the two links being interconnected by means of two springs 36 straddling the stem 17 and tending to pull the two ends together. Intermediate points 37 of the links 32 are supported by links 38 pivoted in the cover plate 2, as shown at 39. The springs serve to urge the head 29 of the sleeve 21 away from the plane of the springs, either upwardly or downwardly, while the float is relied on for causing the head 29 to pass the plane of the springs in either direction, the springs locking the head in either end position.

A second locking arrangement of similar character is provided above the one just described and comprises the links 41 pivoted

at their inner ends to a smaller sleeve 42 arranged between the upper valve 18 and the collar 22 and at their outer ends to swinging links 43 pivoted in the cover plate, as shown at 44. The extreme ends of the two links 41 are connected by the springs 46 and one of the two links has a projection 47 extending therefrom which latter is adapted to push the stem 48 of a small valve 49 upwardly against the opposition of a spring 51, and thereby allows atmospheric air to enter the upper chamber through port holes 52 in a cap 53 and through the port 54.

On top of the cover plate 2 there is rotatably supported between the standards 56 a ratchet wheel 57 of a registering device. The ratchet wheel is actuated to turn clockwise by means of the bar 59 pivoted to the ring 61, as shown at 62, the ring being freely revoluble in a groove 63 of a cam 64 fixed to the stem 17 near the upper end thereof. The bar 59 carries at its lower end a roller 66 engaging with the ratchet teeth of the wheel 57 and is urged into said engagement by a spring 67 while a band 68 prevents the bar 59 from swinging out too far.

A pipe 71 connects the upper chamber with the main supply tank of gasoline and is provided with a check valve 72 preventing back flow.

The device operates as follows:

Commencing with the position as illustrated in Figure 1, we may assume that the float is in its extreme lowermost position which would imply that the upper chamber is nearly empty. It will be seen that at this time the upper valve 18 is removed from its seat 12 while the lower valve 19 is seated and the vent valve 49 is also seated. The suction of the internal combustion engine creates a vacuum within the upper chamber 3 and causes gasoline to be drawn into the same from the main supply tank through the pipe 71. This causes the float 24 to rise and the rising motion is communicated to the head 29 of the sleeve 21 a little later. As the rising motion continues, the links 32 spread and cause the springs 36 to expand until the head 29 of the sleeve 21 rises above the central plane of the springs whereupon the springs begin to contract and force the head still further upwardly so that the latter bearing on the collar 22 pushes the valve stem 17 upwardly engaging the valve 18 with its valve seat and lifting the valve 19 from its seat, so that now the lower port is opened and the upper port is closed.

While pushing the stem upwardly, the springs 36 also push the sleeve 42 upwardly and cause the same to pass the central plane of the springs 46 which contract thereafter and lock the valve stem in its position so that at this time both of the spring arrangements cooperate in locking the valve stem. One of the upper links 41 in being

swung upwardly opens the vent valve 49 through its projection 47.

At this time the upper valve is closed while the lower valve and the vent valve are open, that is, no further suction takes place, atmospheric air is allowed to enter the upper chamber and at the same time the upper chamber is allowed to discharge into the lower chamber through the lower port 7. The receiving chamber may not be able to accommodate all the gasoline stored in the upper chamber so that the level of gasoline in the upper chamber may sink only gradually as the gasoline is used up by the carburetor. As the float sinks its collar 26 will engage with the nut 31 and cause the sleeve 21 to come down again and to pass the central plane of the springs 36. The collar 26 has sufficient play relative to the sleeve 21 to allow the latter to move downwardly with the quick motion caused by the contraction of the springs 36 without being compelled to force the float into the gasoline. Gradual using up of the gasoline by the carburetor causes the float to continue its downward motion and in due time, that is, when a minimum level of gasoline in the upper chamber is reached, the sleeve 21 engages with the lower collar 23 on the stem and forces the latter downwardly. It should be remembered that up to this time the stem has been maintained in its raised position by the upper springs 46, and it is only after the sleeve 21 forces the collar 23 and thereby the stem 17 downwardly that the position of the stem is changed whereby the lower valve 19 is seated and the upper valve 18 removed from its seat. The lowering of the valve stem causes the sleeve 42 of the upper locking arrangement to pass the central plane of the upper springs 46 and also disengages the projection 47 from the valve stem 48 of the vent valve so as to allow the latter to close under the influence of its spring 51. At this time we then have the same situation as at the beginning, that is, the lower valve is closed, the upper valve is open, and the vent valve is closed, so that the suction of the engine is allowed to draw a new quantity of gasoline into the upper chamber while sufficient gasoline is accumulated in the lower chamber 4 to feed the carburetor during the time that the upper chamber fills up again. During this time the hollow stem 17 allows air to enter the lower chamber. It will be noted that the device becomes active in either direction only at certain stated times, that is, when the level of the gasoline reaches a maximum and a minimum respectively and that the quantity allowed to enter each time must necessarily be the same during each operation. I preferably adjust the tank to admit one-tenth of a gallon at a time and the adjustment may be made to a nicety by manip-

ulating the nut 31, the position of which determines the time at which the float effects the closing of the lower valve and the opening of the upper valve.

Each reciprocal motion of the stem in the same direction means the delivery of a quantity of gasoline to the carburetor so that if all the downward strokes or all the upward strokes of the stem 17 are registered and counted the amount of gasoline used by the carburetor may be ascertained.

I wish to call particular attention to the fact that all the actuating means for the valve stem are arranged to operate on the same in a strictly endwise direction so that there is little danger of valve or valve seats being worn off prematurely in certain spots. The valve stem is furthermore arranged to indicate through the position of its upper end the condition of the tank. A further advantage is that the arrangement of the valve stem relative to the parts actuating the same is such that the valve stem is freely revolvable, which allows of easy cleaning and grinding of the valves and valve seats.

I claim:

1. A vacuum feed tank of the character described having a fuel intake port, a fuel discharge port, a suction port axially alined with the latter, a stem extending through the latter two ports having valves thereon adapted to close one or the other of the two ports and a float slidable relative to the stem having means associated therewith for manipulating the stem so as to close the suction port when reaching a maximum elevation and to close the discharge port when reaching a minimum elevation, the said means being arranged to become active only at the stated times and to lock the stem until acted on in an opposite sense.

2. A vacuum feed tank of the character described having a fuel intake port, a fuel discharge port, a suction port axially alined with the latter, a stem extending through the latter two ports having valves thereon adapted to close one or the other of the two ports, a sleeve mounted on the stem with limited freedom of sliding motion adapted to operate the stem for closing the suction port when reaching a maximum elevation and for closing the discharge port when reaching a minimum elevation, a float manipulating the sleeve and means for locking the stem in either port closing position until affected in an opposite sense.

3. A vacuum feed tank of the character described having a fuel intake port, a fuel discharge port, a suction port axially alined with the latter, a stem extending through the latter two ports having valves thereon adapted to close one or the other of the two ports, a sleeve mounted on the stem with limited freedom of sliding motion adapted to operate the stem for closing the suction

port when reaching a maximum elevation and for closing the discharge port when reaching a minimum elevation, a float manipulating the sleeve and means for locking the stem in either port closing position until affected in an opposite sense, said means comprising links pivoted to the sleeve to extend in opposite directions, swinging links supporting the free ends thereof and elastic means connecting their free ends allowing the sleeve to pass the plane of said means but urging the same away from the plane in either direction.

4. A tank of the character described having an intake port, a suction port, a stem with a valve thereon adapted to be seated in the port for closing the same when the stem is raised, an element slidable on the stem made to raise the same when reaching a certain point, a float operating the element, links pivoted to the element to extend in opposite directions, swinging links supporting the free ends thereof and elastic means connecting their free ends allowing the element to pass the plane of said means but urging the same away from the plane in either direction.

5. In a device of the character described, a reciprocable stem having valves at opposite ends, a float control adapted to operate the stem for rendering one or the other of the valves active when the float reaches one of two extreme positions and locking means operated by the float holding the stem in an active position while the float travels from one extreme to the other, said means comprising elastic means urging a given point of the stem away from a median plane in either direction and yielding to the action of the float forcing the said point through the median plane when the float reaches an extreme position in combination with adjustable means allowing the action of the float to be timed.

6. In a device of the character described, a receiving chamber, a collecting chamber surmounting the same, an intake valve for the collecting chamber, a discharge valve between the two chambers, a vertical stem operating both valves so as to simultaneously open one valve and close the other, a float control for the stem maintaining the intake valve open and the discharge valve closed while a measured quantity of fuel collects in the collecting chamber and thereafter opening the discharge valve and closing the intake valve so as to allow the fuel to be discharged into the receiving chamber while preventing the intake of fuel.

7. In a device of the character described, a receiving chamber, a collecting chamber surmounting the same, an intake valve for the collecting chamber, a discharge valve between the two chambers, a vertical stem operating both valves so as to simultaneously

open one valve and close the other, a float control for the stem maintaining the intake valve open and the discharge valve closed while a measured quantity of fuel collects in the collecting chamber and thereafter opening the discharge valve and closing the intake valve so as to allow the fuel to be discharged into the receiving chamber while preventing the intake of fuel, the stem being hollow and connecting the receiving chamber with the atmosphere so as to allow fuel to be withdrawn therefrom without creating a vacuum. 10

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