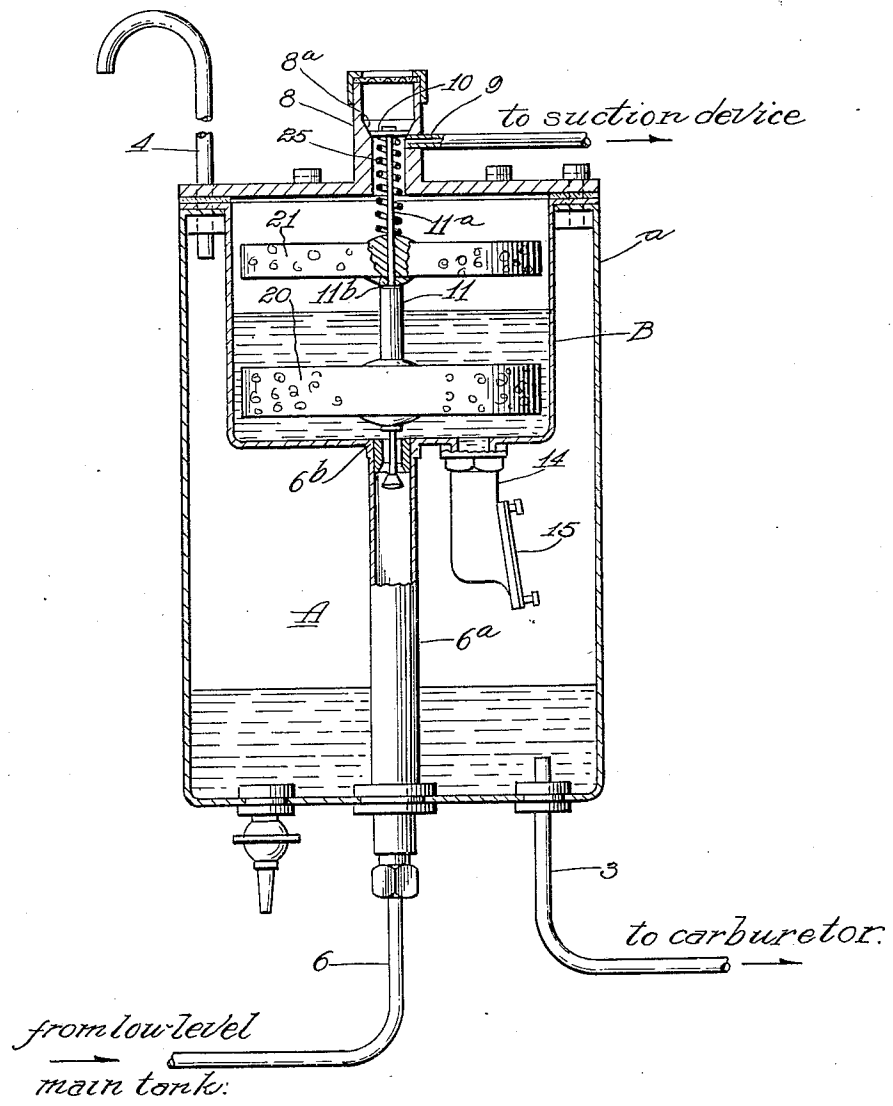
June 14, 1932. W. A. EDWARDS 1,862,667

VACUUM FUEL FEEDING DEVICE

Filed Oct. 16, 1930



Witness.
H. G. McKnight.

Inventor.
William A. Edwards.
by Burton & Burton
his Attorneys.

Patented June 14, 1932 1,862,667

UNITED STATES PATENT OFFICE

WILLIAM A. EDWARDS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO CHARLES S. BURTON

VACUUM FUEL FEEDING DEVICE

Application filed October 16, 1930. Serial No. 489,088.

This invention is designed as an improvement upon the invention disclosed in my Patent No. 1,321,296, dated November 11, 1919. It consists in the elements and features of construction shown and described as indicated in the claims.

The improvement upon the invention of my said patent consists in providing means for communicating to the atmosphere valve yielding movement for opening the valve against the suction hold thereon, by a spring in which the energy for overcoming said suction hold,—derived from the buoyancy of a float arranged to be submerged in the liquid accumulated in the vacuum chamber,—is stored up until it is sufficient to overcome the suction hold and open the atmosphere valve to the full extent instantly, as by snap action, avoiding liability of the opening movement halting with the valve open only wide enough to create a balance between the suction and atmospheric pressure, which would defeat the intended operation of the structure for fuel lifting.

The single figure of the drawing is a vertical axial section of a vacuum fuel feed tank embodying this invention.

The construction shown in the drawing which is in general as shown in my said patent with minor detail changes, will be briefly described.

It comprises an outer casing, *a*, containing the reserve fuel chamber, A, and the vacuum chamber, B, suspended in the reserve chamber by securement to the cap plate. The cap plate is arranged for closing both chambers and has a central boss, 8, in which is formed the atmosphere inlet passage, with a valve seat shown at 8^a; and having below—inwardly from—the atmosphere port and seat, connection for the suction pipe, 9. The fuel supply connection leading from the main fuel source, not shown, is indicated by the pipe, 6, connected at the bottom of the reserve chamber to a standpipe, 6^a, which extends up in the reserve chamber and is connected for delivering the fuel into the vacuum chamber at the bottom of the latter as seen at 6^b. Atmosphere access to the reserve chamber is indicated by the pipe, 4, at the top of the structure. Fuel discharge from the vacuum chamber to the reserve chamber is indicated by the fitting, 14, with the usual outwardly opening check valve, 15. The fuel delivery connection to the carbureter is indicated by the pipe, 3, connected at the bottom of the reserve chamber.

In the vacuum chamber there is provided a float member, 20, having a rigid stem, 11, extending up therefrom through the atmosphere inlet passage and through the atmosphere inlet port for engagement with the atmosphere valve, 10, above the valve seat, 8^a.

The stem, 11, is reduced in diameter at the upper part of its length, as seen at 11^a, for accommodating a second float member, 21, which is mounted slidingly on said reduced portion of the stem lodging upon the shoulder, 11^b, resulting from the reduction in diameter. Around the reduced portion of the stem above the second float member there is provided a compressible coil spring, 25, which at its normal uncompressed dimension extends up through the atmosphere port into,—or nearly into,—contact with the under side of the atmosphere valve, 10, when the float members and float stem are at the position illustrated in the drawing, with the lower first mentioned float member submerged in the liquid.

The dimensions of the lower float member, 20, are calculated to make its buoyancy sufficient to counterpoise the weight of the parts which are carried by the float, comprising the float stem, the atmosphere valve, 10, the upper float member, 21, and when they are present, the liquid fuel supply controlling valve, and the portion of the float stem which carries it, as shown below the lower float member; so that when said lower float mem-

ber is submerged, the entire float device and all the parts carried by it, tend to remain in any positon in which they may be situated, that is, either with the atmosphere valve opened or with that valve closed.

The dimensions of the upper float member, 21, are calculated so that its buoyancy when substantially submerged, is sufficient to force the atmosphere valve off its seat against the maximum suction which will be at any time operating in the vacuum chamber and tending to hold the atmosphere valve seated.

The result of this float construction, consisting of the two members, 20 and 21, vertically separated from each other in the vacuum chamber, the lower member, 20, slightly overbalancing the weight of the parts carried, is that as the vacuum chamber fills, the atmosphere valve being closed, the float members being in their lower positions, and the suction operating through the suction connection to lift the liquid from the low level source, no movement of the parts from the position shown in the drawing will occur until the liquid rises high enough to submerge the upper float member, 21, to a depth sufficient to cause the resulting buoyancy of that float member to be equal to the suction hold on the atmosphere valve; whereupon slight increase of the depth of submersion beyond that point, causing said buoyancy to exceed the suction hold on the valve, will cause the valve to be snapped immediately away from its seat; and the entire float device, comprising both float members, 20 and 21, rising the distance to which the upper member, 21, has been submerged, carrying the atmosphere valve that distance away from its seat, admits atmospheric pressure to the vacuum chamber, overcoming the suction which is admitted through a relatively small suction port, as seen in the drawing, and thereby causes the vacuum chamber to deliver its liquid contents by gravity through the fitting, 14, past the valve, 15, into the reserve chamber.

As the vacuum chamber is thus emptied, the level of the liquid falling therein, will not cause any change in the position of either float member, or the atmosphere valve until the level has fallen to a point a little below the top of the lower float member, 20, so as to unsubmerge a portion of that float member leaving it inadequate in respect to buoyancy to sustain the parts carried by it as above described. As the liquid level falls below this point the entire float device will descend as the liquid level falls; and when the atmosphere valve is near its seat, but before it reaches it, the suction pulling in the air past that valve, will suck the valve to its seat a little before it would have reached it by the lowering of the liquid depressing the float members; but said atmosphere valve being once fully seated, the full force of the suction will continue to hold it on its seat, and the vacuum being produced in the vacuum chamber by the suction through the continuously open suction connection, the liquid will be lifted from the main low level source to refill the vacuum chamber, causing the cycle of operations above described to be repeated.

In the operation as above described when the suction is very low as it is liable to be under certain engine running conditions, the suction hold on the atmosphere valve is liable to be so slight as to be broken by the buoyancy developed by the submersion of the float to so slight a distance that the distance to which the atmosphere valve will be opened, will be only enough to create balance between the suction and atmosphere pressure, with the result of bringing the apparatus to a standstill.

To prevent such result is the purpose of the spring, 25, interposed between the float and the atmosphere valve, 10; and this expedient accomplishes the result desired, because while the float is becoming submerged to the distance necessary to increase its buoyant action up to the suction hold on the valve, the spring is being compressed developing its resilient reaction to an amount corresponding to the suction hold; and when the valve breaks loose from the seat, it is lifted by the reaction of the spring from the compression which it has experienced, the distance equal to the compression, in addition to the distance which the float rises upon being released from the restraint due to the suction hold. Thus practically the distance the valve is opened is twice the distance which it would be opened without the spring.

I claim:

1. A vacuum fuel feed device comprising a chamber having a suction connection, an atmosphere inlet, and a liquid fuel supply connection; a valve to control the atmosphere inlet; a float device in the chamber arranged to be actuated by change of liquid level in the chamber, a connection by which the float operates the atmosphere valve, said float comprising two float members at different levels a substantial distance apart in said chamber, the lower float member being adapted as to buoyancy to counterbalance the weight of the valve and all parts moving with it, and the other float member being adapted as to buoyancy to overcome the suction hold on the valve; the second mentioned float member being mounted for movement vertically independently of the first mentioned float member, and a spring interposed between said second mentioned float member and the valve for communicating opening movement to the valve.

2. The construction defined in claim 1, the first mentioned float member having a rigid upwardly extending stem, the second mentioned float member being mounted sliding-

ly on said stem, the spring being coiled about said stem for guidance of the spring in its reaction on the valve.

3. The construction defined in claim 1, the first mentioned float member having an upwardly extending stem rigid with said float member extending into engagement with the atmosphere valve for opening movement of said valve; whereby the first mentioned float member contributes buoyancy for assisting in breaking the valve loose from its seat against the suction hold.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 13th day of October, 1930.

WILLIAM A. EDWARDS.