

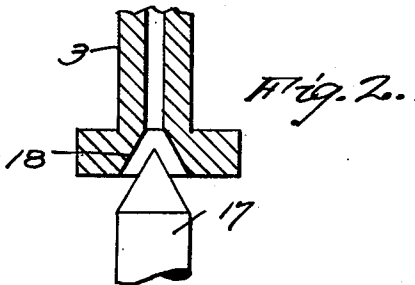
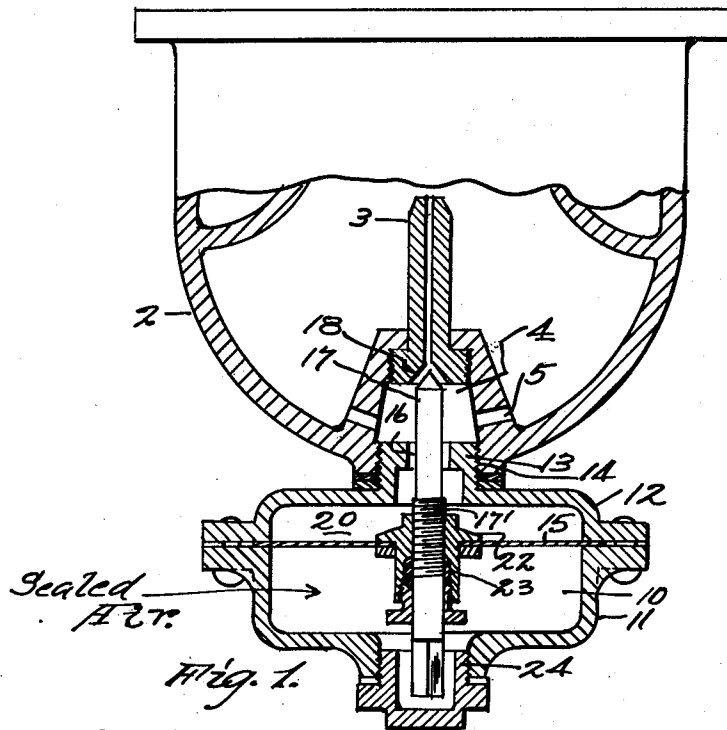
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ALTITUDE COMPENSATING CARBURETOR

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ALTITUDE COMPENSATING CARBURETOR

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2 Claims. (Cl. 261—39)

This invention is an automatic, fuel regulating carburetor and functions in such action under control of variations in the static pressure of the atmosphere without impedance of other mechanical contrivances.

It is well known that liquid vaporizing carburetors are set or adjusted to give a suitable rate of liquid fuel flow to the jet nozzle more or less in accordance with the atmospheric environment or natural static pressure. That is a carburetor is adjusted for one fuel supply at a range in elevation of use of from say sea level to four thousand feet elevation. For ordinary service in this range no change is made in the adjustment. But if the carburetor is to service a motor working at altitudes of from four to ten thousand feet regularly then the carburetor is adjusted to reduce the ratio liquid fuel to the jet, for unless so adjusted the spray is too much enriched as the altitude increases from sea level up to ceiling limit for any given motor service.

In the mountainous parts of the country it is not practical to regulate the carburetors of industrial motor-vehicles which ascend and descend range after range in a day's run. In California a truck may run from Death Valley (at minus sea level) to Convict's Lake at seven thousand, eight hundred fifty-three feet, in a hundred-fifty mile drive. From this it will be seen that adjustment of liquid fuel supply would be advantageous.

It is an object of this invention to provide not only a means for the accomplishment of such a desired change of supply of liquid, but further to provide for the entirely automatic regulation of the supply or feed of liquid to the jet nozzle solely by the utilization of the pressure changes of the atmosphere as this is statically natural according to altitude.

Further, an object of the invention is to provide means for the ready and easy setting of this automatic control device so that maximum efficiency of a motor is to be had according to the normal mean of the altitude changes met in the general service runs of the motor as of a vehicle, or for proper adjustment of a more or less stationary-place motor. For instance if a motor is used on a vehicle ranging in use-altitudes from sea level up to a mile altitude then the control device is adapted to be easily set to the mean of that range in altitude for economy of gasoline, or if a motor is used in a range of from 5000 feet to 12,000 feet the automatic device is easily set to the mean of this range in heights. However the instrument is constructed and designed to automatical-

ly function in ceiling to seal level range without such refinement of mean altitude adjustment.

Another object of the invention is to provide an altitude compensating means which may be incorporated in a carburetor when originally produced at a factory or may be produced in the form of an attachment which may be readily substituted or attached in place of the usual bottom drain plug of conventional carburetors.

And, importantly, an object of the invention is to provide an automatic compensator in this art wherein the parts are so constructed and arranged as to be entirely free from frictional engagement, the presence of which is very objectional as destructive of the high degree of sensitivity required in an automatic compensator.

The invention consists in certain advancements made in this art as set forth in the ensuing disclosure and having, with the above, additional objects and advantages as hereinafter developed, and whose construction, combinations, and details of means, and the manner of operation will be made manifest in the description of the herewith illustrative embodiment; it being understood that modifications, variations and adaptations may be resorted to within the scope, spirit and principle of this invention as it is claimed more particularly hereinbelow.

Figure 1 is an axial section of portion of a conventional carburetor with which the compensator has been combined.

Figure 2 shows a variant angle of the point and seat therefor of the compensator needle.

The bowl 2 of the carburetor is provided with an interchangeable or detachable jet nozzle 3 leading from a sub-chamber 4 receiving liquid fuel by ways of small ducts 5 from the bowl, in which liquid level is controlled in any well known or suitable manner not needed to be shown here. Such old jet nozzle lets a more or less constant stream of liquid pass into the Venturi passageway of the carburetor at all elevations with the consequence that when the air is rare, as at the upper altitudes in atmosphere then the mixture is too rich for effective combustion in the motor, and there is a direct waste of liquid fuel.

By the present invention there is provided a sealed air pocket 10 formed in a drum 11 having a cap 12 with a threaded nipple 13 to screw into the usual tapped, drain hole 14 of the bowl 2. The drum pocket 10 is closed on one side by a flexible partition or diaphragm 15 suitably clamped between the drum 11 and its cap 12.

The nipple 13 has an axial aperture 16 and in this there is a concentric valve or needle mem-

ber 17 preferably free of any contact with the bore or aperture 16 to avoid friction when the needle functionally reciprocates. The upper end of the needle valve member 17 is suitably formed to close nearly onto an opposite seat 18 provided on the adjacent end of the nozzle 3, which is stationary.

The needle member 17 is suitably affixed axially to the diaphragm and any axial movement thereof is translated to the needle and axially reciprocates it.

It will be observed that the liquid in the bowl may freely flow through the nipple aperture 16 to the drum chamber cell 20 so that whatever pressure of air exists in the main bowl basin will be set up on the diaphragm 15, plus the slight additional weight of the head of fuel liquid. Such bowl pressure is considered to be that of the atmosphere at the various levels from the sea upward.

Therefore, if the air pocket 10 is sealed off when the carburetor is at sea level then there is in the pocket one atmosphere of pressure, say fifteen pounds per square inch, and the same obtains in the liquid bowl and on the liquid fuel; in consequence of which the diaphragm 15 is in balance as to pressure in the pocket and in the bowl. If now the needle point is standing open to a set degree from its jet nozzle seat 18 and if the motor to which the carburetor may be attached is caused to rise to a noticeable altitude from sea level then the diaphragm 15 will swell from the pocket 10 and force the needle 17 in a closing movement to the seat 18 and thereby decrease the flow aperture at the seat and check back the liquid supply in accordance with the decrement of air pressure in the bowl 2 so that as less air passes to the Venturi throat less liquid fuel will be supplied and the mixture will not be over enriched. To repeat, one side of the diaphragm is subject to air pressure in the sealed pocket 10 and that power alone, whilst the other side of the diaphragm is subject to free atmospheric pressure, alone, ignoring the liquid, at the various altitudes to which the carburetor may rise or descend.

The liquid pressure may be ignored because it is negligible and also constant; it does not increase or decrease.

It is very desirable that ready access may be had to the needle and that means be provided for the easy and effective adjustment thereof as to the valve seat 18 not only to enable original adjustment for normal supply of liquid fuel but to facilitate the adjustment of the needle as may be desired when the normal use of a motor to which the carburetor is attached may be at a mean of altitudes below, say five thousand feet, or on the other hand above that level whereby to obtain most efficiency of fuel liquid.

Then, too, if the carburetor is used on a sta-

tionary-motor-plant at higher altitudes the needle can be easily set for best results acting constantly at the fixed station of altitude; and vice versa for sea-level station use.

To the end of attaining such ready adjustment of the needle 17 it is here shown as having a threaded part 17' engaging a nut 22 fixed axially on the diaphragm 15 in suitable leak proof manner and having a packing gland 23 in and through which the needle may be rotated as by the application of a wrench to its lower end when this is exposed by the removal of a cupped-plug 24 from the drum bottom. The bushing gland of the packing is to provide for effectually stopping any leak past the valve 17 which with its nut 22 is one unit assembly moving with the center of the diaphragm as this is flexed by pressure in the pocket 10 if and when the pressure in the bowl 2 sufficiently fluctuates due to change of atmospheric pressure. In other words, the needle does not reciprocate in the packing 23 in the normal function of controlling flow at the seat 18, in the nozzle end.

It is obvious that the ratio of flow at the seat 18 as to the stroke of the needle valve 17 may be fixed according to the angle of the wall of the valve seat 18 in relation to the axis of the needle; such angles being shown of different degrees in Fig. 1 and Fig. 2.

What is claimed is:

1. An altitude compensating carburetor having a bowl, a jet nozzle disposed coaxially in the bottom of the bowl to spray fuel upwardly into the bowl and the nozzle having a valve seat at its lower end, a valve member having an end to coact with the said seat for fuel control and said member having a threaded stem, a diaphragm having a packing gland in which the stem is adjustably threaded and is packed against leak, a chamber including a top section fixed to the bowl and opening about the stem into the bowl and providing for free movement of the stem, and a bottom section between which and the top section the diaphragm is marginally clamped and an air tight pocket is formed under the diaphragm to provide for actuation of the valve to compensate for variation of atmospheric pressure obtaining in the carburetor bowl so that the fuel mixture will not be enriched as said pressure falls according to the altitude at which the carburetor is in use and vice versa.

2. The device of claim 1; the said bottom section having a removable, sealed closure opposite the adjacent end of the stem whereby to facilitate adjustment of the valve in the diaphragm for function at given altitudes for normal use; the pressure in the pocket being determined as equal to atmosphere at the place and time that the closure is last closed at the pocket.

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