

V. R. WILL.
SUCTION OPERATED GAS SAVING VALVE.
APPLICATION FILED MAR. 5, 1921.

1,413,089.

Patented Apr. 18, 1922.

Fig. 1

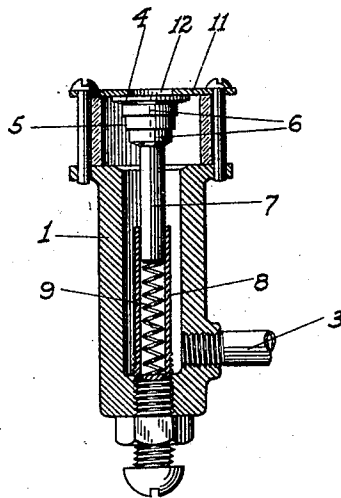


Fig. 2

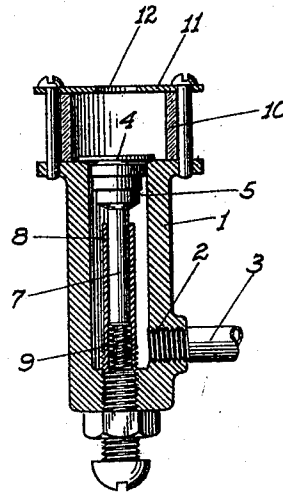
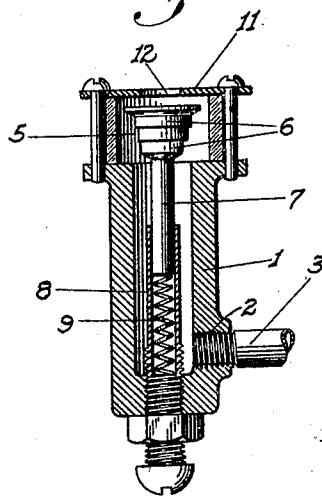


Fig. 3



INVENTOR.
Victor R. Will
BY *Campbell Watson*
ATTORNEY

UNITED STATES PATENT OFFICE.

VICTOR R. WILL, OF LODI, CALIFORNIA.

SUCTION-OPERATED GAS-SAVING VALVE.

1,413,089.

Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed March 5, 1921. Serial No. 449,900.

To all whom it may concern:

Be it known that I, VICTOR R. WILL, a citizen of the United States, residing at Lodi, county of San Joaquin, State of California, have invented certain new and useful Improvements in Suction-Operated Gas-Saving Valves; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the characters of reference marked thereon, which form a part of this application.

This invention relates to improvements in gas saving devices for use with internal combustion engines of all kinds, and particularly those of automobiles, the form of the device shown in the present invention being particularly an improvement over what is shown in my copending application for patent on "Gas saver," filed January 2nd, 1920, Serial No. 348,877.

After exhaustive experiments with this former type, I discovered that while theoretically the device should function perfectly, in actual practice the action of the moving valve member or plunger was erratic, the tendency of the same being to either stay wide open or entirely closed so that it was impossible to automatically maintain the plunger in any intermediate position between the two extremes, such as is desirable to obtain a perfect air and fuel mixture under all conditions.

The principal object of the present invention therefore is to provide a valve member so constructed that the necessary auxiliary air will actually be admitted to the engine in proportion to the vacuum in the manifold, which vacuum bears a distinct relation to the speed of the engine as set forth in the aforementioned co-pending application.

Another object is to provide a valve member whose action, while to a certain extent automatic, may be caused to function when otherwise it would lie inactive, by a sudden movement of the carburetor throttle regardless of the actual and sustained speed of the car, the purpose of which will be fully evident hereinafter.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purposes for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of

parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views.

Fig. 1 is a sectional view of the device, showing the position of the movable valve member when the engine is dead.

Fig. 2 is a similar view, showing the position of the valve when the engine is running idle, at normal idling speeds.

Fig. 3 is a similar view showing the position of the valve when the throttle is suddenly opened, or the engine is under load and moving its car at speeds of twenty-five miles per hour or more.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes a tubular casing, closed at its lower end, but provided with a tapped hole 2, in its side to receive a pipe 3 leading to the intake manifold of the engine.

The upper face of the casing is faced to form a seat for the flange 4 of a valve member 5, said member, under the flange, having a plurality of steps of decreasing diameter, as shown at 6, terminating in a stem 7 which is slidable in and guided by a sleeve 8 screwed into the casing from the lower end, said sleeve being adjustable from the exterior of the casing. In the sleeve and bearing against the lower end of the stem is a tension spring 9.

Seated on the casing 1 and projecting a certain distance thereabove, is a transparent ring or sleeve 10, preferably of glass, covered by a flat cap 11 provided with a central orifice 12 in alinement with the valve-flange 4 and of smaller diameter than the latter, the ring 10 making substantially air tight connection with its cap and the casing, and the latter being preferably positioned on the dash or instrument board of the car, so as to be within sight and reach of the driver.

The operation of the device is as follows:

Referring to Fig. 1, when the engine is not running, the air pressure on the outside of the casing and in the pipe 3 are normal and equalized, and the valve 5 is therefore raised by the pressure of the spring 9, which is approximately five pounds, to bear against the cap 11 and close the orifice 12.

Then when the engine is turned over, and is run idle at normal idling speed, the valve 5 is forced to the other extreme of its travel, as shown in Fig. 2, and then seats on the top

of the casing, still closing communication to the pipe 3, though of course for a very short period of time, during the actual travel of the valve, such communication to the pipe 3 has been made.

The above action takes place on account of the fact that when the engine is running idle or the car travelling at a slow speed, the throttle is very nearly closed, resulting in a considerable vacuum in the intake manifold which cannot be reduced by drawing air through the carbureter, since as stated, the throttle thereof is maintained nearly closed. Consequently, the exterior atmospheric pressure bears on the valve head 4, forcing it downward. Now, while the valve 5 raises to the cap 11 with only a five pound pressure, it takes approximately fifteen pounds to lower it to its closed position on account of the fact that between the two extremes of position of the valve, a certain amount of air is free to flow past the valve and into the pipe 3, tending to equalize the air pressures on both sides of the valve, and it requires this excess pressure of ten pounds to actually close the valve against the spring pressure and above, incidentally, is about what vacuum will be had with a normal engine under the conditions stated. Once the valve is closed or on its lower seat, the vacuum in the engine must be reduced to approximately five pounds before the spring can act to again open it.

Such a vacuum condition will only be obtained when the engine is racing if idle, or when under load and moving the car at high speed, or say thirty miles per hour and over.

It is desirable however to admit auxiliary air to the engine at speeds intermediate between the very low and high as given above, which cannot be done ordinarily unless the car or engine first attains the high running speed mentioned. Such driving conditions however are very often impractical if not impossible, as for instance when driving through a city street or a crowded or difficult highway, when a speed of not over fifteen or twenty miles must be adhered to.

If however the engine clutch is momentarily thrown out, and a sudden twitch or wide-open movement given to the throttle, the engine will race, and vacuum conditions in the engine will, for the time the throttle is left open, be the same as if the car were actually travelling at high speed. In other words, the vacuum will be reduced sufficiently to cause the valve to be raised from its lower seat. Now if the car is again started, and the speed held at ten miles per hour or over, the valve will remain open, the extent of the opening depending on the speed and vacuum conditions of the engine, and it will not again close until said vacuum reaches fifteen pounds or thereabout, which will not

be had unless the speed drops below ten miles per hour.

The steps 6 of the valve aid materially in keeping the valve open and functioning, since the depth and diameter of each successive step is accurately designed and proportioned to the size of the opening in the casing so that a certain and constant volume of air can pass by the steps during a vertical movement of the valve equal to the depth of a step, the raising of the valve with the decrease of vacuum causing successively smaller steps to align with the casing opening, allowing a greater volume of air to pass by to the engine, until, as the engine speed approaches its maximum and the vacuum is correspondingly decreased and the excess air requirements of the engine become greater, the valve is wide open, as shown in Fig. 3, the air-passage area between the cap 11 and valve head 4 being approximately equal to the space or area between the casing opening and the lowermost valve-step.

The purpose of the glass tube or ring is to enable the operator to see the action of the valve, so that he may then accurately adjust the sleeve 8 so that the valve seats under whatever speed is thought most desirable for the particular engine to which the device is attached.

By means of my device, adjusting of the carbureter when travelling at high altitudes, where the air is "thin" and the pressure materially reduced, is eliminated, since the valve may be quickly and easily adjusted to suit the needs of the engine under such conditions.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. A gas saver comprising a tubular casing provided with a horizontal seat intermediate its ends, an air intake above the seat and an outlet to an engine manifold below said seat, a valve adapted to rest on the seat or to close the intake, a spring acting on said valve to normally hold it against said intake, and means formed with the valve whereby different volumes of air may pass by the valve seat to the outlet, depending on the position of the valve relative to its seat, each volume being constant during a predetermined extent of movement of the valve.

2. A gas saver comprising a tubular casing provided with a horizontal seat intermediate its ends, an air intake above the seat and an outlet to an engine manifold 5 below said seat, a valve having a head adapted to bear on the seat or to close the intake, a spring acting on the valve to normally hold it against the intake, and steps formed with the valve below the head, each step having a predetermined depth and being smaller than the one immediately above. 10

In testimony whereof I affix my signature.

VICTOR R. WILL.