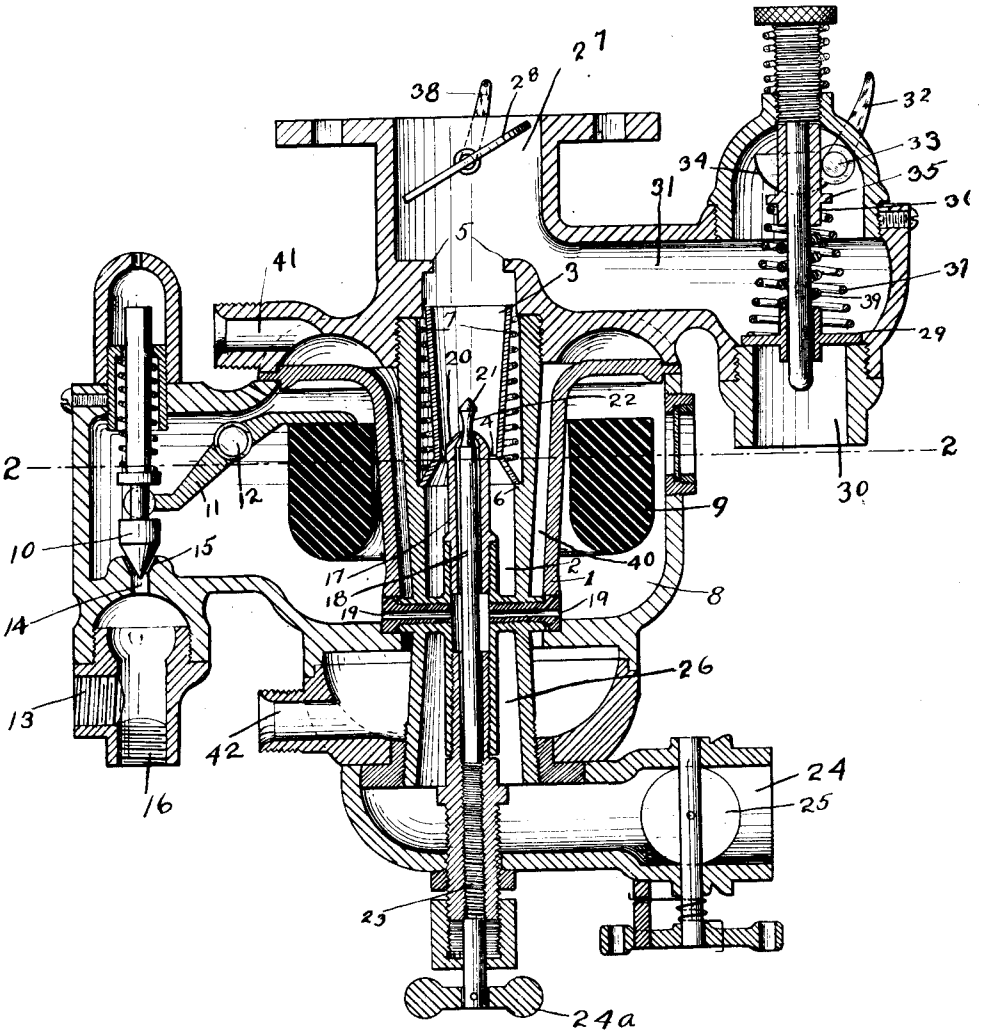
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CARBURETER.

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1,183,137. Patented May 16, 1916.



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CARBURETER.

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To all whom it may concern:

Be it known that I, THOMAS A. SWARTS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

My invention relates to the art of carbureting air and resides mainly in the provision of a carbureting device whereby a highly efficient and highly explosive mixture of air and hydro-carbon gas may be generated for supplying energy to an internal combustion engine.

It is a well known fact among workers in the art that an internal combustion engine when running at a comparatively high speed will operate on a weaker mixture of fuel than when running at a lower speed to develop the same amount of power, it being borne in mind that where referring to speeds, I have in mind engine speed and not linear speed of motor vehicles. Therefore, when an engine is started, it is well to supply a very rich mixture, but when the engine has picked up in speed, it will operate very efficiently on a weaker mixture. This fact is not new with me, but it has been recognized for some time, but the inherent weakness in supplying this weaker mixture has been to obtain a perfect commingling of the air and volatilized fluid.

My invention resides essentially in the provision of a structure for varying the strength of the mixture and at the same time obtaining a perfect mixture.

As an additional feature in this connection, I have provided a structure for automatically varying the density of the supply mixture with every change of engine speed, this automatic varying being accomplished by the suction produced by the engine itself.

Still a further object of my invention resides in the specific structure adopted for accomplishing the above results, this specific structure being defined as a combination of spray nozzle and Venturi tube, the Venturi tube being located to coöperate with the spray nozzle and being mounted to be automatically adjustable toward and away from the spray nozzle by the suction of the engine. In this manner, the air admitted to the explosive mixture with each change of engine speed, will vary by automatically moving the throat of the venturi toward or away from the nozzle as the case may be, the movement of the throat with respect to the spray nozzle, in effect, changing the cross sectional area for the admission of the incoming air as will be specifically related hereinafter.

Another object of my invention resides in the provision of means for readjusting the mixture regulating means while the engine is running. In other words, I have provided a structure for operation in conjunction with the normal mixture regulating means to readjust this regulation or its equivalent, to prevent a further corresponding adjustment under running conditions while the engine is in operation. Considered in a different light, I have provided a combination of mixture regulating means automatically operable with the running of the engine and means operating in conjunction therewith to require greater or less suction to cause a corresponding further adjustment. An instance of this is where the engine is running at a high rate of speed when only a weak mixture is necessary and the secondary regulating means may take the form of an additional air supply independent of the air passed over the spray nozzle.

Another object of my invention resides in an arrangement operating with an auxiliary air valve wherein two distinct stages of operation of this valve may be had. In other words, the air auxiliary valve is held closed by a predetermined tension for a given amount of opening and any further opening is retarded by a second tensioning means, this latter, becoming effective only after the valve has opened a predetermined distance. In this manner, where the engine is running at a high speed and under heavy duty, the mixture will not become too weak. An added feature in this connection resides also in the provision of means for regulating the tension for holding the valve closed any time this is desired and this regulation may be such that both the tensioning means may become effective before the valve has opened at all. This being the case, it would require a far greater suction to open the valve than where a portion of the tensioning means is idle and, therefore, the increased suction will react to draw in a richer mixture.

Still a further object of my invention resides in a new form of spray nozzle wherein the indrawn fluid passes through the spray

nozzle in the nature of a hollow cylindrical film as opposed to a solid stream. Means may also be provided for breaking this fluid up, such as by the provision of a baffle in the path of the incoming fluid or a flaring head carried by the needle valve of the spray nozzle itself.

Still another object of my invention resides in forming the vaporizing chamber, containing the spray nozzle and the fluid chamber, concentrically and forming the wall supporting the fluid chamber and the vaporizing chamber, hollow to form a heat jacket. When a heated medium is circulated through this hollow wall, a heat interchange is effected, a portion of this going to heat up the fluid in the fluid chamber and the remainder heating the walls over which the incoming air is caused to pass, thereby causing a more ready vaporization of the fluid.

The preferred embodiment of my invention is shown in the accompanying drawings, in which similar characters of reference designate corresponding parts, and in which the figure is a central vertical section of my carbureter.

My carbureter comprises a main body suitably shaped and formed in any desired number of pieces to facilitate its easy manufacture, a member 1 forming a portion of its body and having a vaporizing chamber 2 formed therein. This vaporizing chamber is also provided with a Venturi tube 3 of the conventional taper in both directions from the throat portion 4. The present Venturi tube, however, is not adapted to be rigidly mounted in position, but is movably mounted to move up and down and be limited in its upward movement by engaging inwardly projecting lugs 5 as is clearly shown in Fig. 3. The lower portion of the Venturi tube engages a shoulder 6 formed in the vaporizing chamber and is normally held in engagement with this shoulder by the tension exerted by a surrounding coiled spring 7.

Surrounding this vaporizing chamber 2 and concentrically formed therewith is the fluid chamber 8 carrying a float 9, the latter serving as the operating means for the inlet valve mechanism shown generally at the left of the drawing and designated 10, the lever 11 pivoted as at 12, serving as the operating connection between the two. Beneath the valve mechanism 10, I have provided a gasolene inlet 13, this inlet being in communication with the float chamber 8 by means of the aperture 14 directly below the valve seat 15. A clean-out plug 16 is also provided at a point beneath this valve mechanism to withdraw any accumulated solid matter.

Mounted within the vaporizing chamber 2 and in operative relation to the Venturi tube 3, is my spray nozzle structure, this structure comprising essentially an outer tubular member 17 and an inner stem 18 held spaced from the inner periphery of the tube. Both the tubular member 17 and the inner stem 18 may be mounted upon the carbureter as a whole in any desired manner, it being necessary only that these two members should be of a relative size that a thin annular space is formed between them, this space being in communication with the float chamber by means of transverse passages 19. The upper end of the tubular member 17 is flared inwardly as is shown at 20 to leave only a small opening through which projects the head 21 at the top of the stem 18. I have also concaved the upper portion of this stem 18 as is shown at 22, the concaved portion being normally the part disposed in the upper inwardly flared opening. The stem 18 is also vertically adjustable to govern the amount of admitted fluid by means of its threaded connection 23 and the thumb bolt 24^a. The main air inlet is shown adjacent the bottom of the carbureter and designated by the numeral 24, the amount of this opening being governed by the position of any suitable type of valve structure such as is shown at 25. After air enters the opening 24, it passes upwardly through the passage 26 where it passes around the middle in which are formed the passages 19 and thence over the spray nozzle structure and into the Venturi tube where a suitable mixture is formed and suction of the engine then draws this mixture out through the passage 27, the latter being also governed by a valve structure such as is shown at 28.

The operation of the structure thus far described is as follows: A suitable quantity of gasolene or whatever hydro-carbon may be used, is admitted by means of the valve structure 10 under the control of the float 9. Gasolene then in the float chamber will enter the transverse passages 19 and pass up into the tubular member 17. The stem 18 being of somewhat smaller size than the internal diameter of the tube 17 and being spaced from the inner periphery thereof, causes a thin hollow cylindrical film of gasolene to be formed. Suction from the engine causes air to be drawn in through the passage 24 and up through the passage 26 over the spray nozzle, which action causes an indrawing of the gasolene and vaporization thereof. The indrawn gasolene is thus presented as a thin film and because of the inwardly flared portion of the upper end of the tube 17, the gasolene is caused to impinge upon the headed portion 21 and is thus sprayed out to be absorbed by the incoming air. Reference to the figure shows the relative position between the spray nozzle and the Venturi tube 3 when this tube is in its lowermost position. The space between the throat of the venturi and the spray nozzle will permit the passage of a certain amount of air and if the suction is low due to a slow running of the en-

gine, it will be apparent that the Venturi tube will be in a lower position than when the suction is great. When the suction is great, it necessarily follows that this suction will cause an elevation of the Venturi tube toward the lugs 5 and, therefore, the sectional area for the passage of the incoming air will be increased. Therefore, the greater the suction the greater will be the amount of air passing over the spray nozzle and consequently the mixture will be weaker. Incidentally, this weakening and enriching of the mixture is accomplished automatically by the change of engine speed itself.

Under very high speeds it is desirable to have a very weak mixture and this may be accomplished by the provision of an auxiliary air valve such as is shown at 29. By the opening of this valve, air may be drawn in through the passage 30 and then through the passage 31 into the outlet passage 27, where it is caused to mix with the mixture already produced. It must be apparent that there is a peculiar action set up when this valve is opened, inasmuch as the suction upon the Venturi tube 3 will be somewhat relieved and, therefore, it will readjust itself downwardly and, therefore, when this auxiliary air valve is properly controlled, an almost perfect mixture may be had. This control may be effected from the driver's seat in any manner if desired by means of the lever 32 pivoted at 33 and carrying a cam formation 34 at its inner end. This cam formation operates upon a shoulder 35 formed on the sleeve member 36, the latter also serving as an abutment for a spring 37 bearing upon the valve 29. By operation of the cam structure 34, the tension of the spring 37 may be varied and, therefore, correspondingly varying the suction at which the valve is adapted to be opened. As stated, this control may be had either direct from the driver's seat or the lever 32 may be connected with any suitable leverage means connected to the lever 38 of the throttle valve 28.

The pressure means for holding the valve 29 closed, has been divided by me into two springs, the one being the spring 37 and the other the spring 39. The latter is preferably made short, so that it is normally idle when the valve is in a position of closure and the sleeve 36 in its uppermost position. It will thus be seen that the valve 29 will have to be opened a predetermined distance before the spring 39 becomes active to retard its opening movement, but after the spring 37 is sufficiently compressed to cause the spring 39 to become active, it requires an additional pressure to open the same any farther. It will be understood that the opening of this auxiliary air valve permits the Venturi tube to partially return to its original position and consequently after the auxiliary valve is not permitted to open farther, the Venturi tube will again begin its upward adjustment until this upward movement is intercepted by the lugs 5.

I have also made the wall separating the vaporizing chamber and the float chamber of a hollow nature such as is indicated at 40, this hollow portion forming a double wall structure for the circulation of a heating medium such as heated water, the inlet being shown at 41 and the outlet at 42. It will thus be seen that circulation of a heating medium through this double wall structure will impart a certain amount of heat through the fluid within the float chamber and also heat the interior periphery of the vaporizing chamber so that the incoming air will also be slightly heated to increase the vaporization of the fluid as it leaves the spray nozzle.

What I claim, is:

1. A carbureter comprising a spray nozzle, a Venturi tube encircling the same and mounted to be automatically adjusted toward or away from the nozzle by the suction of an engine, and means for readjusting the position of said tube with respect to said nozzle while the engine is running at high speed, said means being constructed to remain in such adjusted position for all engine speeds until readjusted.

2. A carbureter comprising a spray nozzle, a Venturi tube encircling the same and mounted to be automatically adjusted toward or away from the nozzle by the suction of an engine, and means operating in conjunction with said Venturi mounting to require greater or less suction to cause corresponding adjusting movement of said tube, said means being constructed to remain in such adjusted position for all engine speeds until readjusted.

3. A carbureter comprising a spray nozzle, a Venturi tube encircling the same and mounted to be automatically adjusted toward or away from the nozzle by the suction of an engine, and an auxiliary air valve adapted to be opened or closed to readjust the position of said tube with respect to said nozzle while the engine is running.

4. A carbureter comprising a spray nozzle, a Venturi tube encircling the same and mounted to be automatically adjusted toward or away from the nozzle by the suction of an engine, an auxiliary air valve adapted to be opened by suction, and means for varying the tension on said valve to vary its opening for a given suction.

5. A carbureter comprising a spray nozzle including a tubular member, a central stem spaced from the inner periphery of said member and projecting out through its open end, said stem having an annular groove at its projecting end to form a head, said head being of a diameter to enter the

open end of said member, a Venturi tube encircling said nozzle and mounted to be automatically adjusted toward and away from the nozzle by the suction of an engine, and an auxiliary air valve adapted to be opened or closed to readjust the position of said tube while the engine is running.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS A. SWARTS.

Witnesses:
WALTER E. L. BOCK,
A. L. PHELPS.