W. P. KIDDER.

CARBURETER.

APPLICATION FILED OCT. 23, 1915.

1,308,595.

Patented July 1, 1919.

2 SHEETS—SHEET 1.

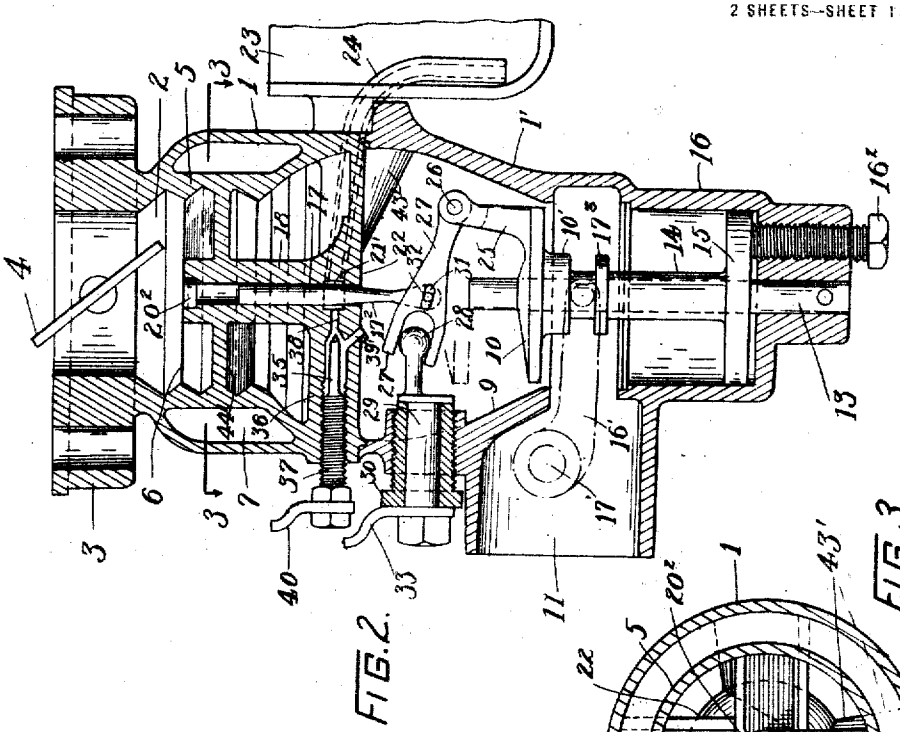


FIG. 2.

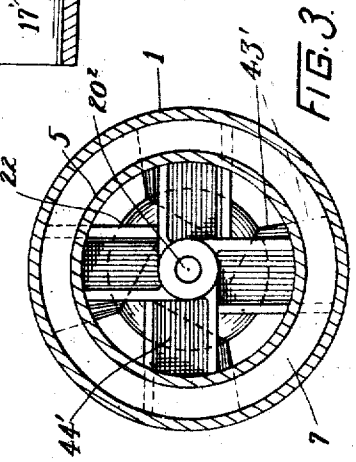


FIG. 3.

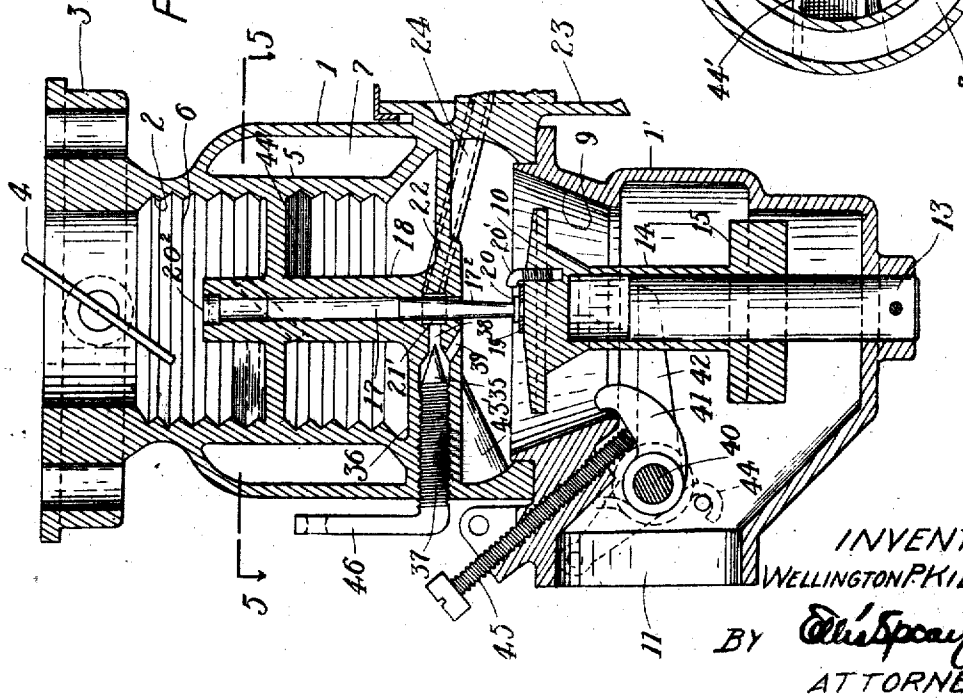


FIG. 1.

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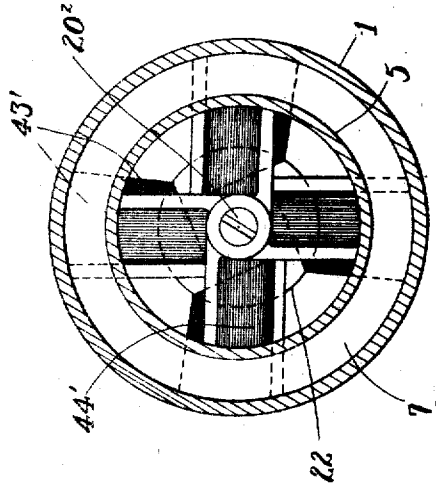


FIG. 5.

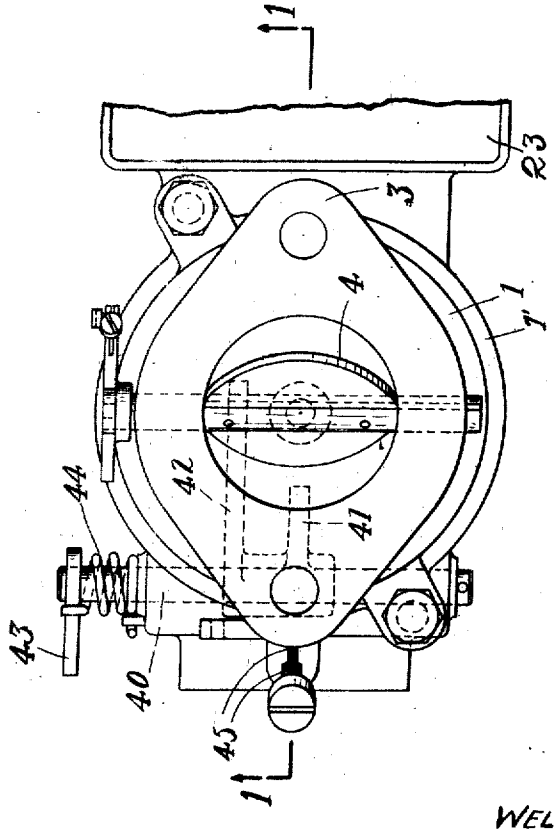


FIG. 4.

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CARBURETER.

1,308,595. Specification of Letters Patent. Patented July 1, 1919.

Application filed October 23, 1915. Serial No. 57,589.

To all whom it may concern:

Be it known that I, WELLINGTON P. KIDDER, a citizen of the United States, residing at Jamaica Plain, Boston, Massachusetts, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters for internal combustion engines and particularly to the regulation of the fuel and air intake according to the needs of the engine.

One of the objects of the present invention is the provision of a carbureter whereby the fuel valve of a cylindrical and tapered form, will not only be relieved of the lateral vibratory effects of the air valve, but will have ample lateral freedom to find its own alinement in its guide. This permits a substantial reduction to be made in the diameter of the fuel valve for the same capacity of discharge thus reducing the weight of the valve and permitting a looser fit, thereby eliminating to a maximum degree the tendency of the fuel valve to wear or bind in its guide. It should be explained that in such valves, the difference that exists between the area or diameter of the cylindrical stem and the mean area or diameter of the tapering portion, becomes relatively less with an increasing size of valve, as the diameter is in proportion to the circumference. According to the present invention it is contemplated to change the ratio of proportion between the size of the cylindrical stem and the mean size of the taper, and to adapt to a given taper a cylindrical stem which is smaller in diameter than that which it would usually have in practice. By thus reducing the cylindrical diameter of the stem there is not only effected a decrease in the weight which is a factor of wear, but the ratio of relative difference in size is increased, so that a greater margin of metal is obtained which may be worn away without affecting the efficiency of the valve.

Another feature of my invention consists in the provision of means for holding the air valve at a variable elevation from its seat for idling, and for depressing the valve from its nearly closed or idling position to a position nearer the air inlet constituting a choking position and for momentarily holding said valve in said choking position while starting cold. This depressing movement is effected through connections to the dash controlled by the operator.

The invention further contemplates a more thorough and efficient atomization and vaporization of the mixture whereby the mixture will be broken up and delivered to the engine in a form complete for immediate explosion.

These and various other features which will appear more fully hereinafter are secured in the carbureter of the present invention. The construction and operation of my carbureter will be more particularly disclosed in the specification which follows. In the drawings forming a part of that specification I have shown as illustrative of my invention two constructions which have been found satisfactory and efficient in use. Throughout specification and drawings like reference numerals are employed to indicate corresponding parts, and in the drawings:

Figure 1 is a vertical section through one form of carbureter in accordance with my invention and showing particularly the arrangement whereby the fuel valve is relieved of the vibration of the air valve and the arrangement for securing the idling and choking adjustments thereof.

Fig. 2 is a similar view of a modification illustrating an arrangement for varying both the ratio of feed and the degree of relative movement of the air and fuel valves.

Fig. 3 is a transverse section on the line 3—3 of Fig. 2.

Fig. 4 is a plan view of the carbureter shown in Fig. 1, and

Fig. 5 is a transverse section on the line 5—5 of Fig. 1.

In both embodiments of my invention the numeral 1 indicates the cylindrical outer shell of the carbureter. The shell 1 is deflected inwardly at its upper end to provide a restricted passage 2 for the mixture and terminates in an annular flange 3 with which the intake to the engine connects. The delivery of the mixture through the restricted passage 2 is controlled by the usual throttle valve 4 operated from the dash.

Set within the shell 1 is an intake sleeve 5. The inner wall of this sleeve is preferably corrugated as indicated at 6 to assist in subdividing the mixture and delivering it to the engine in a form best suited for immediate combustion. The shell 1 and sleeve 5 define an annular space or jacket 7 with which connection may be made for heating the carbureter from the exhaust of the engine.

Secured to the base of the shell 1 by screws

or other suitable fastenings is a casting 1^1 forming the base of the carbureter. The casting is formed as a dished flange 9 at its upper end. The flange 9 incloses the path of movement of an upwardly opening automatic air valve 10 which is effectively disposed to control the passage of air from the lateral air intake 11 into the carbureter.

In both embodiments the air valve 10 is loosely guided on a fixed post 13, the lower end of which is fast in the base of the casting 1^1. This may conveniently be effected by providing the air valve with an integral depending extension 14 which guides on the post 13. In the form of Fig. 1 the base 15 of the sleeve 14 acts as a counterweight for the valve, and provides a ledge or bearing surface for the valve depressing finger 42 which finger holds the valve down to act as a choker in starting cold, as will presently appear. In the device of Fig. 2 the base 15 forms the movable piston of a dash pot cylinder 16. This cylinder is simply an extension of the casting 1^1. In this form a stop screw or equivalent device 16^2 is provided to limit the movement of the piston 15. This screw therefore permits initial adjustment of the air valve from without the carbureter shell.

In this embodiment, Fig. 2, the air valve 10 is loosely engaged by a rocker lever 16^1 mounted on a rock shaft 17^1, connected in any suitable manner with the dash, whereby the automatic action of the air valve may be partially interrupted or controlled by hand from the dash when desired. The free end of the rocker lever is engaged between a collar 17^3 on the sleeve 14 and the depending hub 10^1 of the air valve.

In both embodiments, the weight of the air valve 10 is sufficient to provide desired uniform suction without the use of springs.

The stem 17, Fig. 1, is poised lightly on the top face of the air valve, so as to be operated by and in the automatic operation of the air valve, and is anchored so as not to rise away from contact with the air valve while having ample freedom for lateral play, whereby to find its own alinement in its guide 18. The structure for so mounting this stem consists preferably of a flat seat portion 19 fast to a collar 20 on the lower end of the stem 17. The member 19 seats on the top face of the air valve, as clearly shown in Fig. 1, and a hook or equivalent device 20^1 fixed in the air valve adjacent the edge of the member 19 serves to prevent complete disconnection of the valve 10 and stem. This device 20^1 is so arranged, however, as not to interfere with the normal rise and fall of the stem with the air valve, or to unduly limit the lateral play of said stem.

In this manner the stem 17 may be made of very small diameter and hence be very light in weight for a given capacity of discharge. The fit of the stem 17 in the guide 18 may consequently be quite loose, thus reducing tendency to wear or stick, while allowing greater freedom of movement in the automatic tendency of the stem to find its alinement in its guide.

The air valve of Fig. 1 is capable of adjustment for both idling and choking positions. In its idling position, the air valve is held at a variable elevation from the flange 9. In its choking or suction increasing position, the air valve is depressed, by connections operable from the dashboard, from its nearly closed or idling position to a position nearer the flange 9 and held momentarily in said position while starting cold. The idling adjustment of the air valve is effected by means of a rock shaft 40 journaled transversely in the casting 1^1 and having fast thereto a short supporting finger 41 projecting into the path of movement of the air valve near its edge. The air valve rests on the free end of this finger in its idling position. The finger 41 is held up against an adjusting screw 45 set through the casting 1^1 by a coil spring 44 coiled around the rock shaft 40. This spring is of sufficient strength to resist the weight of the air valve in its idling position. By adjusting the screw 45, the position of the finger 41 when raised may be varied, and hence the idling elevation of the air valve changed.

The choking adjustment of the air valve is effected by means of a second and longer depressing finger 42 fast on the rock shaft 40 to one side of the supporting finger 41 and adapted to be swung down into contact with the ledge or base portion 15 of the air valve by a rocking movement of the shaft 40 effected by the operator from the dash through any suitable intervening connections, partly indicated at 43, Fig. 4, thereby holding down the air valve for a choker to increase the suction while starting cold, the spring 44 yielding to allow the depressing finger 42 to hold the air valve down.

The main inlet of fuel is controlled in both forms by the tapered portion 17^2 of the valve stem 17 which is arranged coaxially with the air valve 10 and has its stem portion vertically guided in the guide 18 fixed within the shell 1. The guide 18 in both embodiments has an intake 21^1 chambered out near its base 22 and communicating with a float chamber 23 by any suitable connection 24. The upper end of the guide may be closed by a suitable cap screw 20^2.

The valves 10 and 17^2 in Figs. 2 and 3 are connected to each other to move together upon operation of the rocker lever 16^1 by intermediate connections adjustable either by hand or from the dash, and permitting certain relations of the two valves whereby any desired feed of fuel may be secured to suit the volume of air in all positions of the

air valve. These connections comprise an arm 25 fast on the air valve 10 and having pivoted to it at 26 one end of a rocker lever 27. The opposite end of the lever 27 is forked as indicated at 27^1 to receive a ball pivot 28 carried eccentrically on a stem 29 rotatable in a bearing in an adjusting screw bushing 30 set through the shell 1. The fork 27^1 is of sufficient width to permit the ball pivot 28 to pass through its entire course while still resting between the ends of the fork. The adjustment of the screw bushing may be held by any convenient locking device (not shown).

The lever 27 is slotted between its ends as indicated at 31 to receive a pivot stud 32 at the lower end of the needle valve 17^2. This form of connection affords a slight play at the pivot permitting the valve 17^2 to swing vertically upward with the vertically upward swing of the arm 25.

The adjustment of the valves 10 and 17^2 is usually made at the factory when the carbureter is assembled. This adjustment may be varied according to the individual needs of the particular motor upon which the carbureter is installed by rotating the eccentric stem in its bearing to vary the horizontality of the rocker lever 27 whereby to increase or decrease the separation of the valves 10 and 17^2 and thus vary the richness of the mixture, or by removing the lock device for the screw bushing 30 and adjusting said screw bushing in its bearing in the shell 1, vary the relation of the ball 28 in its socket 27^1 and thus change the ratio of movement of the two valves. When the proper adjustments have been found, the screw bushing is locked against rotation in its bearing. It will be noted that these adjustments may all be made from without the carbureter. This obviates the necessity of dismantling the instrument in order to vary the relation of the two valves.

These connections therefore permit two adjustments of the valves 10 and 17^2. By rotating the eccentrically mounted ball pivot 28 through the stem 29, the pivot is raised or lowered, thereby adjusting the fuel valve to a leaner or a richer mixture relative to the air valve capacity, according to the direction in which the stem is rotated. By rotating the screw bushing 30, the short arm length of the rocker lever 27 is shortened or lengthened, causing the fuel valve to rise a longer or shorter distance relative to the distance of rise of the air valve. This adjustment changes the ratio of movement of the two valves so that if, for example, the mixture is correct at low throttle position, but is too rich when opened up, the fuel valve may be caused to move a less distance, owing to the shortening of the short arm and of the rocker lever by means of the screw bushing, and thereby decreases the fuel discharge when the fuel valve is opened or vice versa. These adjustments therefore permit any desired feed of fuel to suit the volume of air in all positions.

The eccentric adjustment of the ball for varying the richness of the mixture may be effected either by hand or from the dash through the lever 33 attached at one end to the stem 29 and at its other end with any suitable connection (not shown) to the dash.

In addition to securing these adjustments, the intermediate connections 25, 27, 29 permit the diameter of the needle valve 17^2 to be materially reduced because this valve is relieved of the lateral jar of the air valve and obviates the necessity for an accurately close guided fit of the stem 17 of the valve 17^2 in the guide 18, thus reducing the friction and resultant wear on the stem and preventing all tendency of the stem to stick in the guide.

In the operation of this embodiment, when the automatic air valve 10 is raised by the action of the air being sucked into the carbureter through the air intake 11 by the engine, it swings the rocker lever 27 on its pivot, thereby raising the needle valve 17^2 to open the port 21^1 and permit a fuel discharge in proportion to the volume of air subject to such adjustments of the connections 27, 28, 29 as may have been made.

Under some circumstances, it is desirable to make all initial factory adjustments of the automatic fuel valve, particularly in the simpler arrangement of my invention shown in Fig. 1, slightly too lean at the time of installation and to later adjust the flow of fuel to suit the particular motor on which it may be installed. I provide for this adjustment in both forms of my present invention by a secondary fuel valve 35 supplementary to the automatic fuel valve 17^2.

The auxiliary fuel valve 35 may be a simple needle valve adjustable in the bore of a horizontal extension 36 at the base of the guide 20 by a threaded stem 37 and controlling a port 38 at said base disposed for communication with the fuel inlet port 21^1. When the valve 35 is manipulated to open the port 38, additional fuel flows through said port into the bore of the extension 36 and is discharged through a discharge port 39 in said extension down onto the air valve 10 which acts as a spreader for both the main and supplemental fuel discharges of the auxiliary valve 35. When once opened to the proper degree to permit additional fuel discharge for correcting to suit the individual needs of the motor, any leanness or insufficient flow of fuel through the automatic fuel valve 17^2, the valve 35 may be secured in its adjusted position by any suitable check nut or equivalent locking device.

In some cases where it is desired to temporarily effect a considerably greater open-

ing of the valve 35, as for a priming charge, I may attach a lever 46 to the valve stem 37 and connect said lever by any suitable connections (not shown) with hand control at the dash.

In both forms of my carbureter, I provide for imparting a reverse helical whirling action to the mixture as it passes up through the carbureter. This may conveniently be effected by arranging within the mixing chamber near its base a set of fins 43^1 all inclined in the same direction, which gives to the mixture a rotary whirl in one direction, and near the upper end of the mixing chamber a second set of oppositely inclined fins 44^1 which reverse the mixture and impart an oppositely rotating tendency to it. These reverse fins with the corrugations 6 serve therefore to more thoroughly atomize the mixture as it passes to the intake of the engine. The fins may be sweated, or preferably cast integral with the shell.

Various other modifications in the form and construction of my device may be resorted to within the limits of the appended claims.

Attention is here called to my co-pending application, Serial No. 5354, filed February 1, 1915, in which are shown and claimed certain features shown but not claimed in this application.

What I therefore claim and desire to secure by Letters Patent is:—

1. In a carbureter, an intake for air and an intake for fuel, valves controlling said intakes and arranged one above the other in coaxial relation, and means at opposed portions of said valves anchoring said valves against permanent separation and permitting limited relative movement of one of said valves laterally.

2. In a carbureter, an intake for air and an intake for fuel, valves controlling said intakes and seated end to end one upon the other in coaxial relation, and means anchoring said valves against permanent separation and permitting limited relative movement of one of said valves both vertically and laterally.

3. In a carbureter, an air valve, a fuel valve, an independent guide for each of said valves, said fuel valve having one end supported on the adjacent face of said air valve coaxially thereof and having a limited lateral freedom relative thereto.

4. In a carbureter, an air valve, a fuel valve, an independent guide for each of said valves, said fuel valve resting on the opposed surface of the air valve and being connected to said air valve coaxially thereof and having a limited lateral freedom relative thereto.

5. In a carbureter, an air valve, a rock shaft, a finger thereon disposed for engagement with said valve, means normally maintaining said finger in raised position, and adjustive means disposed in the path of said finger to limit the movement thereof.

6. In a carbureter, an air valve, a rock shaft, a finger thereon disposed for engagement with said valve, a spring normally maintaining said finger in raised position, a second finger on said shaft disposed to engage said valve by movement in the opposite direction, and an adjustable device disposed in the path of said first named finger to limit the movement thereof.

7. In a carbureter, an intake for air and and intake for fuel, reciprocal valves coaxially arranged and controlling said intakes, independent alined guides for said valves, and an operative connection between said valves allowing one of said valves limited movement in two directions between said guides.

8. In a carbureter, an air valve, a fuel valve resting at one end on the adjacent face of the air valve, and means anchoring said valves against permanent separation but permitting relative lateral movement of one of said valves.

9. In a carbureter, a casing for an air intake, an air valve disposed for restrictive control of said intake, a tapered throat adjacent said intake and inclosing the path of movement of said valve, a fuel intake, a tapered fuel valve, thereon and disposed in substantial axial alinement with said air valve and resting on said air valve and operated thereby, the taper of said throat and said fuel valve having a predetermined relative proportionment, the said air and fuel valves being independently guided in said casing.

10. In a carbureter, an air valve, a superposed fuel valve operated thereby, alined guides for said valves, and means anchoring opposed portions of said valves against permanent separation but permitting relative lateral movement of said fuel valve.

11. In a carbureter, an air valve, a fuel valve supported upon and operated by said air valve, independent alined guides for said valves, and means anchoring said valves against permanent separation but permitting relative lateral movement of said fuel valve.

12. In a carbureter having an air intake, an air valve controlling said intake, a pivoted support adapted to position said air valve at variable distances from said air intake, means normally maintaining said support in valve-supporting relation, and means operative to overcome said supportive means and move said valve closer to its seat.

13. In a carbureter having an air intake, an air valve controlling said intake, a pivoted support adapted to position said air valve above said air intake, a spring normally maintaining said support in valve-

supporting relation, means for varying the tension of said spring to adjust said support, and means to overcome said spring and move said valve closer toward said air intake.

14. In a carbureter having an air intake, an air valve controlling said air intake, a pivoted valve supporting device having a supporting surface disposed in the path of said valve, and a spring of a strength sufficient to resist the weight of said valve and acting against said supporting device to normally position said supporting surface in the path of said valve.

15. In a carbureter having an air intake, an air valve controlling said intake, a pivoted support adapted to position said valve above said air intake, a spring normally maintaining said support in valve supporting relation, means for varying the tension of said spring to adjust said support, and means to overcome said spring and move said valve closer toward said air intake.

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

WELLINGTON P. KIDDER.

Witnesses:
VICTORIA LOWDEN,
AGNES V. O'CONNELL.