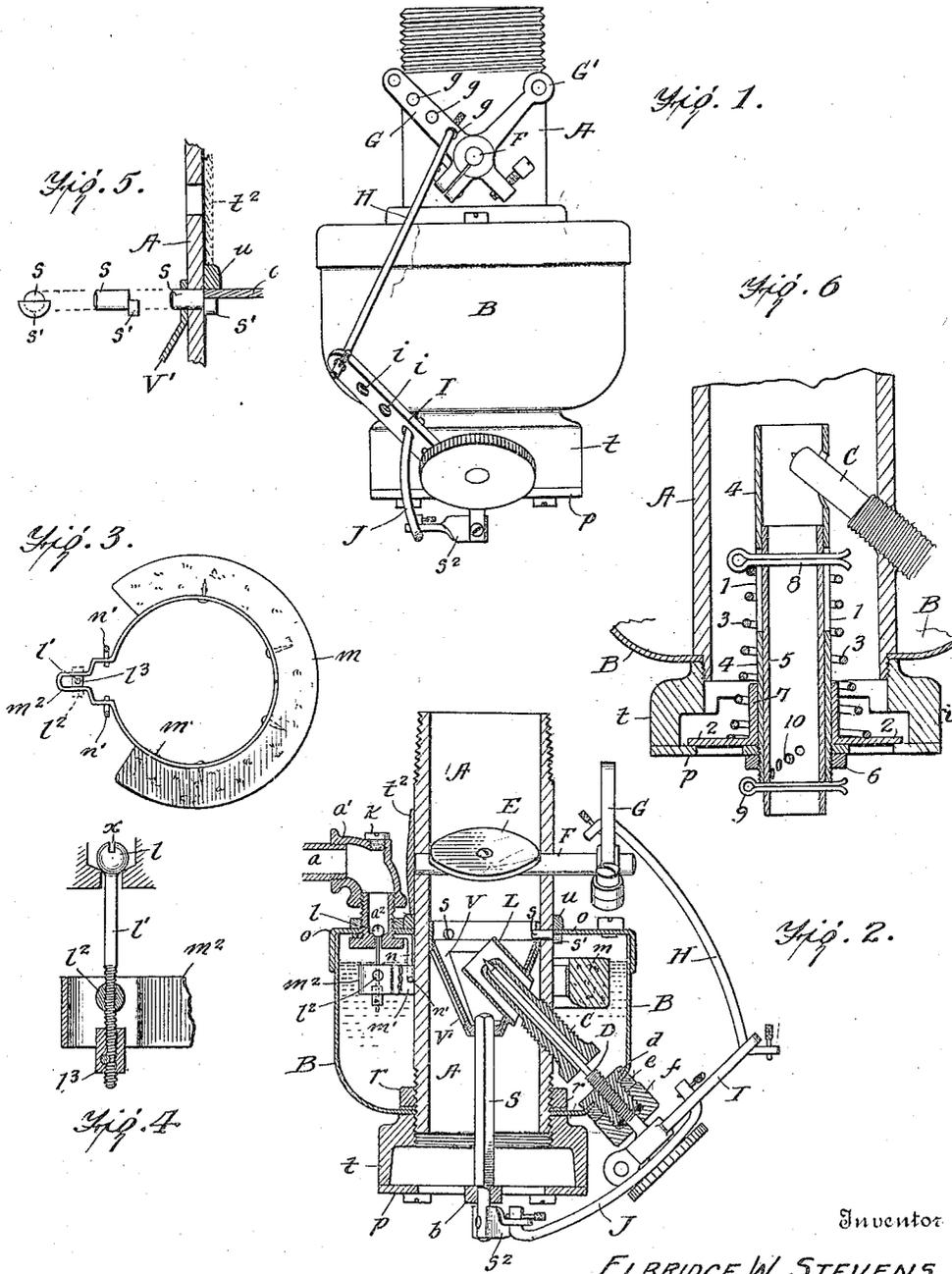


E. W. STEVENS.
 CARBURETER FOR INTERNAL COMBUSTION ENGINES.
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1,057,506.

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Witnesses

L. H. Schmidt.
 A. K. Aschmieser

Inventor

ELBRIDGE W. STEVENS,

By Edw. W. Dyer
 Attorney

UNITED STATES PATENT OFFICE.

ELBRIDGE W. STEVENS, OF BALTIMORE, MARYLAND.

CARBURETER FOR INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, ELBRIDGE W. STEVENS, a citizen of the United States, residing at Baltimore city, in the State of Maryland, have invented certain new and useful improvements in Carbureters for Internal-Combustion Engines, of which the following is a specification.

My invention is in the nature of a new carbureter for internal combustion engines, designed to provide for the proper admixture of gasolene and air under varying conditions, to provide for adjustment of the same and also for the adjustment of the inlet feed of gasolene to the reservoir, to prevent the bad effects of jolts on the carbureter float, and to build the carbureter of such standard stock material as to permit it to be very cheaply constructed and yet be exceedingly compact, simple and efficient.

To these ends my invention consists in the novel features of construction and arrangement which I will now proceed to describe with reference to the drawing, in which:

Figure 1 is a side elevation. Fig. 2, a vertical central section. Figs. 3 and 4 are, respectively, a plan and sectional view of the float feed. Fig. 5 shows details, and Fig. 6 is a sectional view of a modification of the auxiliary air valve.

In the drawing A represents the mixing chamber which is a straight pipe.

B is the reservoir for gasolene which is an annular chamber arranged outside of and concentric with the mixing chamber. It is cup-shaped of spun material with the lower edges drawn inwardly to right angular position to the tube and clamped between an inner ring *r* and an outer subjacent base *t*, said ring and base being interiorly screw threaded and engaging with an exterior screw thread on the lower end of the tube. A bottom plate *p* with air inlets through the same is connected by screws to the lower portion of the base and has a central bearing *b* for a central vertical shaft *S* extending up into the tube. This shaft is rigidly attached at its upper end to a cone-shaped valve *V* turning in and resting above a cone-shaped valve seat *V'*. This valve seat is stationarily fixed within the tube in a peculiar manner, as hereafter described, and has a plurality of openings in it corresponding to similar openings in the cone-shaped valve and partially separating the air space

below it from the mixing chamber above it. Through the side of the conical valve seat, however, a large air intake sleeve *L* is fixed in acute angular relation to the tube *A* and which is always open. Within the same is arranged the liquid fuel injection tube *C* and needle valve *D*. The injection tube *C* is screw threaded exteriorly and is screwed permanently into the main tube *A* of the mixing chamber in an acute angular relation and opens at its lower end into the lower part of the gasolene reservoir *B* and at its upper end in the sleeve *L* at a point within the mixing chamber above and within the conical valve casing *V'*. The needle valve *D* is screw threaded exteriorly at its lower end and the screw threads mesh with screw threads in a connection in the lower wall of the reservoir *B* and extends to a position exterior to the reservoir for cooperation with its adjusting members. The connection in the wall of the reservoir consists of a headed sleeve *d* whose head is within the reservoir and whose screw threaded end projects through the wall to an exterior position and has a nut *e* that clamps the reservoir wall between the nut and the head of the sleeve while a stuffing box *f* is turned onto the stem of the headed sleeve. *E* is a throttle valve arranged in the upper end of the main tube *A* between the mixing chamber below and the outlet above to the explosion cylinder. This throttle valve is a disk of a diameter corresponding approximately to that of tube *A* and fixed upon an oscillatory shaft *F* at right angles to the tube and journaled in the walls of the same.

The throttle valve *E*, needle valve *D* and auxiliary air valve *V* are connected for simultaneous and conjoint action as follows. The throttle valve shaft *F* has outside the tube *A* a rigidly attached elbow lever *G G'*, one arm *G'* of which is provided with an eye for an operating rod and the other arm *G* of which has a series of holes *g* as connecting points at different distances from the center, one of which is connected to a bowed connecting rod *H*. The lower end of the latter is in turn connected to one of a series of holes *i* in a crank arm *I* rigidly attached to the outer end of the needle valve *D*. Another of the holes in the crank arm *I* is connected to a shorter bowed connecting rod *J* whose inner end is connected to crank arm *s* on the central vertical shaft *S* of the

conical auxiliary air valve V, so that the throttle valve is on an axis at right angles to the mixing tube and the axis of the conical air valve, and the needle valve is on an axis at an acute angle to both and all three are simultaneously worked by one adjustment and the relation of the parts is such that the opening of the needle valve also opens both the throttle and the auxiliary conical air valve. While this is true, however, the operation of the conical auxiliary air valve involves no variation in the aspirating effect on the needle valve, as the latter is surrounded by a relatively large air inlet sleeve L which is permanently open and invariable in its intake of air.

The extent to which the throttle valve is opened as compared with the needle valve and auxiliary air valve is susceptible of variation to suit special conditions by simply adjusting the two bowed connecting rods H and J closer to or farther from the center of the throttle valve crank and needle valve crank.

The gasoline is fed into the reservoir B through an inlet pipe *a* which connects with an elbow coupling *a'* screwed onto a thimble *a²* in the top *o* of the reservoir. This thimble has a valve seat with a small duct in the bottom which is normally closed by a valve *l* having a depending stem *l'* that connects with and is operated by a lever bearing a float *m* resting on the surface of the gasoline in the reservoir. When the valve *l* is lifted gasoline passes down into the reservoir and when the valve descends it closes the duct and stops the inflow feed of gasoline. To give this automatic adjustment the float *m*, which, as shown, is a circular piece of cork, is connected to a spring ring *m'* surrounding the main tube A and forming a lever. At one side this spring ring is crimped together to form a loop and is fulcrumed at *n'* upon the lower pendent ends of a suspended wire support *n* which is provided with a right angular loop at its upper end that is clamped and secured between the flange of the valve seat and the cover *o* of the reservoir, so that as the float *m* descends about the fulcrum *n'* from the lowering of the oil level, the valve *l* rises and opens the duct to admit more gasoline, forming an automatic float feed. It will be seen that the float *m* is normally in close proximity and just above the inclined needle valve tube C, which forms a stop to limit its descent so that if a sudden downward jolt is given the carbureter, as frequently happens on an automobile, the float is not allowed, from its inertia, to move downward to an excessive range, but is arrested by the tube C and this prevents an undue and sudden flooding of gasoline into the carbureter. I also provide means for adjusting the feed of the inlet valve *l* as follows: In the top of the

valve *l* is formed a screw nick *x*, see Fig. 4, and on the vertical line of the same, see Fig. 2, a screw cap *k* is placed in the elbow coupling *a'* which may be removed to admit a small screw driver to the nick in the valve. The stem *l'* of the valve, see Fig. 4, is screw threaded and is tapped in a screw threaded hole in a short trunnion shaft *l²* journaled in the adjacent side *m²* of the crimped and parallel portion of the spring ring frame *m'* of the float. On the lower end of the valve stem *l'* is rigidly fixed a square block *l³* which fits between the two sides of the loop *m²* as seen in Fig. 3. With this arrangement it will be seen that by means of a screw driver the valve *l* can be turned to raise or lower it in the trunnion *l²* and as the rigid square block *l³* turns, the two springing sides of the loop expand to permit the turning of the corners of the block and at every quarter turn the springing sides of the loop snap back again to form a lock that prevents the valve from ever joggling out of adjustment.

In order to fasten the valve seat *V'* of the auxiliary air valve in position in a cheap, simple and detachable manner, see Figs. 2 and 5, I provide three or more short studs *s* of peculiar construction. Each has a head *s'* of semicircular shape of larger diameter than the body part. These studs are entered through holes in the casing tube A and also through holes in the upper part of the conical valve seat *V'*. The head *s'* keeps the stud from passing too far in, and the flat diameter of the enlarged semicircular head fitting under the cover *o* of the reservoir locks it in place without any other fittings or connections. A ring *u* on top of the cover *o* holds the latter down and a name plate *t²* holds down the ring. These parts it will be seen are all reciprocally locking in effect and no screws, rivets, or solder are required and the parts are easily dismembered and separated and are interchangeable.

In Figs. 1 and 2 the auxiliary air valve V is cone-shaped and positively and simultaneously actuated with the needle valve and throttle valve, but I do not confine my invention to the same, but may use a spring seated and suction operated auxiliary air valve, as seen in Fig. 6. In this case a fixed central tube 4 is screw threaded exteriorly in the bottom plate *p* and the needle valve tube C enters the same near the top. A ring nut 6 below the plate *p* secures the tube 4 fixedly in place. The tube 4 has near the top opposite slots 1, 1, as guides through which a cotter key 8 passes into and through an inner tube 5. A spiral spring 3 is wound around the outside of tube 4 and bears at its upper end against the key 8 and at its lower end against a disk valve 2 which closes the openings in the bottom plate *p*. The disk valve 2 has a rigidly attached sleeve 7 which embraces and slides on the

tube 4 so that when an excessive suction occurs in the mixing chamber A above, the valve 2 rises against the spring and takes in air through the openings in plate *p*. To make this valve more or less sensitive a cotter key 9 is adjusted in any one of a pair of holes 10 to put the spring under greater or less tension.

Among the advantages secured by my invention are strength, simplicity, cheapness and compactness, the mixing tube being of standard pipe, while other parts connected to it are of the utmost lightness and assembled in a self locking and inexpensive way.

My carbureter has also great flexibility or adaptability to varying conditions. This flexibility in its broadest sense not only embraces the power to furnish a gas of correct proportions to the engine at low, medium and high speed, but the carbureter is also capable of adjustment to give these perfect results upon engines differing as to bore, stroke, load and revolutions per minute, and with the same size of carbureter. Also it is the law of the gases that as the speed of the engine increases directly, the vacuum in the mixing chamber increases in much greater proportion; therefore, it is obvious that it is not only necessary to open the needle valve as the throttle is opened, but the throttle opening should be advanced in a slightly greater degree than that of the needle valve, if the proportions of fuel and air are to be kept correct, and to do this the ratio of movement of the two must be capable of variation as provided for in my invention.

I claim:

1. A carbureter for internal combustion engines, comprising a vertical tubular mixing chamber, a float feed, a throttle valve between the mixing chamber and the outlet to the engine cylinder arranged on a horizontal axis transversely to the mixing chamber, a rotary auxiliary air valve below the mixing chamber arranged on an axis longitudinally to and within the mixing chamber, a needle valve for fuel injection between the two arranged inclinedly and at an acute angle to the axes of both said valves and connections for all three of said valves for operating them with a simultaneous and conjoint action.

2. A carbureter for internal combustion engines, comprising a vertical tubular mixing chamber, a float feed, a throttle valve between the mixing chamber and the outlet to the engine cylinder arranged on a horizontal axis transversely to the mixing chamber, a rotary auxiliary air valve below the mixing chamber arranged on an axis longitudinally to and within the mixing chamber, a needle valve for fuel injection between the two arranged inclinedly and at an acute angle to the axes of both said

valves and connections for all three of said valves for operating them with a simultaneous and conjoint action, said connections being provided with means for varying the relative throw of each of said valves.

3. A carbureter for internal combustion engines, comprising a vertical tubular mixing chamber, a float feed, a throttle valve between the mixing chamber and the outlet to the engine cylinder arranged on a horizontal axis transversely to the mixing chamber, a rotary auxiliary air valve below the mixing chamber arranged on an axis longitudinally to and within the mixing chamber, a needle valve for fuel injection between the two arranged inclinedly and at an acute angle to the axes of both said valves and connections for all three of said valves for operating them with a simultaneous and conjoint action, said connections being provided with means for varying the relative throw of each of said valves and consisting of cranks on the valve stems having a plurality of holes and two connecting rods whose ends are adjustable in said holes to or from the centers of the cranks.

4. A carbureter for internal combustion engines, comprising a mixing chamber formed as a straight tube of standard pipe of uniform diameter, an annular concentric reservoir about the same made as a separate receptacle having its lower edges clamped to the mixing chamber, a float feed therein, a throttle valve at the upper end of the tube, a needle valve arranged inclinedly at an acute angle to the tube and passing both through the side of the tube and the side of the reservoir and an auxiliary air inlet valve below the needle valve.

5. A carbureter for internal combustion engines, comprising a mixing chamber formed as a straight tube of standard pipe of uniform diameter, an annular concentric reservoir about the same made as a separate receptacle having its lower edges clamped to the mixing chamber, a float feed therein, a throttle valve at the upper end of the tube, a needle valve arranged inclinedly at an acute angle to the tube and passing both through the side of the tube and the side of the reservoir and an auxiliary air inlet valve below the needle valve, all three of said valves being connected for simultaneous and conjoint action.

6. A carbureter for internal combustion engines, comprising a mixing chamber formed as a straight tube of standard pipe of uniform diameter, an annular concentric reservoir about the same made as a separate receptacle having its lower edges clamped to the mixing chamber, a float feed therein, a throttle valve at the upper end of the tube, a needle valve arranged inclinedly at an acute angle to the tube and passing both through the side of the tube and the side

of the reservoir and an auxiliary air inlet valve below the needle valve, all three of said valves being connected for simultaneous and conjoint action, and means for variably adjusting the extent of movement of said valves in relation to each other.

7. A carbureter for internal combustion engines, comprising a straight tubular mixing chamber having a throttle valve at the upper end, a conical valve and valve seat below the mixing chamber having a permanently open air sleeve through the same, and a needle valve arranged inclinedly to the wall of the mixing chamber and fixed in the same and entering the mixing chamber through the air sleeve.

8. A carbureter for internal combustion engines, comprising a straight tubular mixing chamber having a throttle valve at the upper end, a conical valve and valve seat below the mixing chamber having a permanently open air sleeve through the same, and a needle valve arranged inclinedly to the wall of the mixing chamber and fixed in the same and entering the mixing chamber through the air sleeve, and an annular fuel reservoir surrounding the mixing chamber and provided with a float feed.

9. A carbureter for internal combustion engines, comprising a mixing chamber constructed as a straight tube having an annular concentric fuel reservoir with automatic feed, a throttle valve at the top of the mixing chamber arranged on a horizontal axis, a shaft for said valve having a rigidly attached crank arm on the outside, a needle valve arranged inclinedly to the vertical with its discharge end uppermost and passing through both the mixing chamber and the fuel reservoir and provided on the outside with a crank arm and a rod directly connecting said crank arms around the concentric fuel reservoir.

10. A carbureter for internal combustion engines, comprising a mixing chamber constructed as a straight tube having an annular concentric fuel reservoir with auto-

matic feed, a throttle valve at the top of the mixing chamber arranged on a horizontal axis, a shaft for said valve having a rigidly attached crank arm on the outside provided with a series of connecting points at different distances from the center, a needle valve arranged inclinedly to the vertical with its discharge end uppermost and passing through both the mixing chamber and the fuel reservoir and provided on the outside with a crank arm having a series of adjusting points at different distances from the center and a rod directly connecting said crank arms around the concentric fuel reservoir.

11. A carbureter for internal combustion engines, comprising a straight tubular mixing chamber with concentric annular fuel reservoir, an air valve with valve seat in the mixing chamber and means for holding the valve seat in the mixing chamber, consisting of a plurality of headed studs passing through the mixing chamber and valve seat, a detachable cover for the fuel reservoir locking against the heads of the studs and a ring engaging the tubular mixing chamber and locking down the removable cover of the fuel reservoir.

12. A carbureter for internal combustion engines, comprising a mixing chamber, a throttle valve between the mixing chamber and the outlet to the engine, a fuel injection needle valve opening into the mixing chamber and entering the same at the side thereof and provided with an air inlet surrounding said needle valve, and an auxiliary air valve below the needle valve outlet made in conical shape and forming the bottom of the mixing chamber, the needle valve with surrounding air inlet being in the side of the conical auxiliary air valve.

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

ELBRIDGE W. STEVENS.

Witnesses:

SOLON C. KEMON,

J. MIDDLETON.