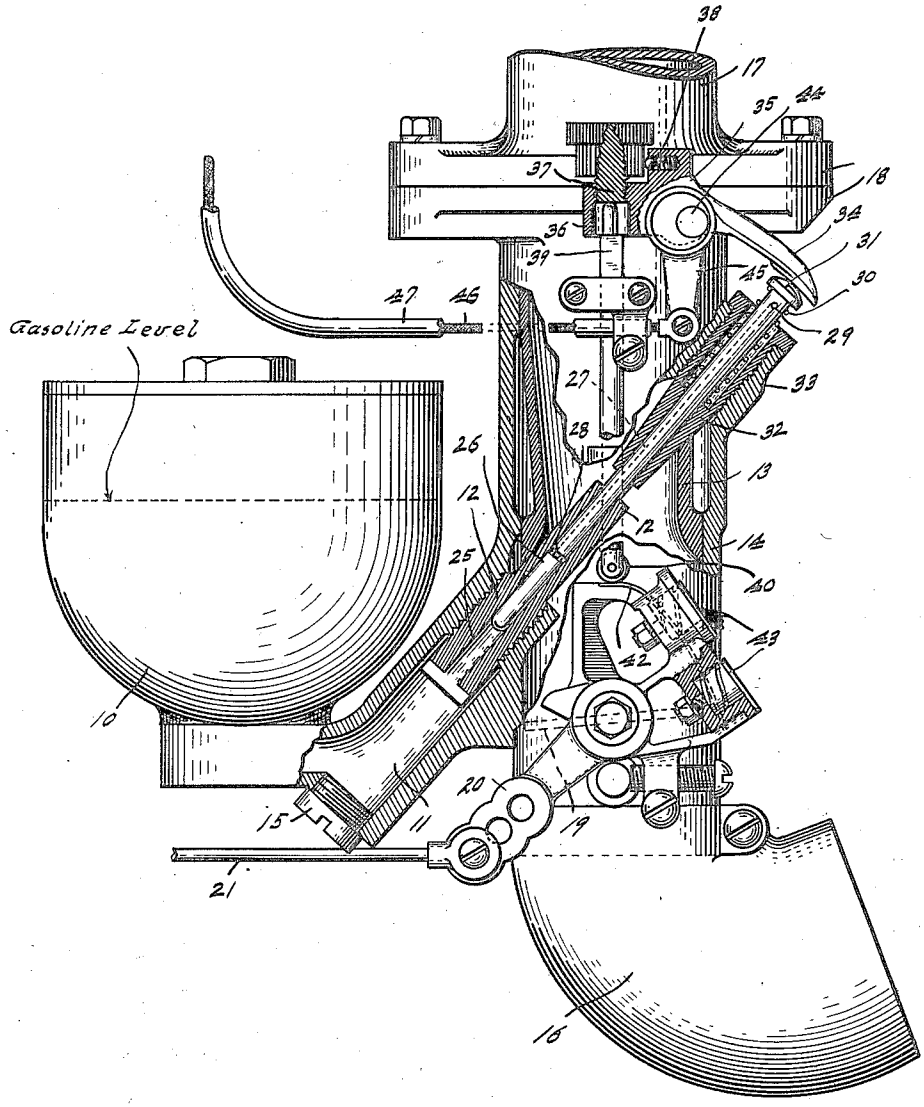
E. A. BESSOM.

CARBURETER.

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1,197,571. Patented Sept. 5, 1916.



WITNESSES:

Frank A. Fahle

Josephine Gasper

INVENTOR

Earl A. Bessom

BY

Hood & Schley.

ATTORNEYS

UNITED STATES PATENT OFFICE.

EARL A. BESSOM, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE WHEELER-SCHEBLER CARBURETER CO., OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA.

CARBURETER.

1,197,571. Specification of Letters Patent. Patented Sept. 5, 1916.

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To all whom it may concern:

Be it known that I, EARL A. BESSOM, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Carbureter, of which the following is a specification.

My invention relates to carbureters, and its object is to provide a carbureter in which for a given setting of the throttle the proportion of air and fuel remains constant for all degrees of suction, in which movements of the throttle produce corresponding movements of the fuel valve so as to maintain this proportion between the air and fuel or to vary it as desired, and in which the fuel nozzle is located in the most advantageous place for producing vaporization of the fuel.

In carrying out my invention, I place the fuel nozzle on the vacuum side of the throttle, the latter being manually controlled, provide the fuel nozzle with a very long-taper needle valve which extends a considerable distance into the fuel nozzle, so that there is considerable friction offered to the flow of fuel between the inner walls of the nozzle and the surface of the needle, whereby the flow of fuel is made proportionate to the square root of the suction rather than being directly proportionate to the suction as it would be if this friction were not present, provide an air-bleeding connection for diluting with air the fuel which flows through the narrow space between the inner walls of the nozzle and the needle, this air serving both to reduce the amount of fuel and to facilitate vaporization, and interconnect the needle of the fuel valve with the throttle so that movements of the throttle produce movements of the needle, this connection being adjustable so as to vary the position which the needle has for any given position of the throttle and also to vary the relative amounts of movement which the needle and throttle have.

The single figure of the accompanying drawing illustrates a carbureter embodying my invention, the carbureter being shown in elevation with some of the parts broken away in order better to show the construction.

Fuel is supplied from the usual constant-level fuel tank 10, shown as being at one side, through the fuel passage 11 to a fuel nozzle 12, shown as being screw-threaded into the upper end of the passage 11 and as projecting obliquely into the most contracted portion of the Venturi tube 13 which is removably mounted in the vertical air passage extending through the tube 14 which forms the main body of the carbureter. The lower end of the passage 11 is provided with a removable screw plug 15, which may be removed to permit the insertion or removal of the fuel nozzle 12, and also for cleaning purposes. The lower end of the air tube 14 of the carbureter may be provided with a curved intake fitting 16, while the upper end of such air tube discharges into the intake manifold 17 of the associated engine, the tube 14 and manifold 17 being provided with the usual coöperating flanges 18 for supporting the carbureter from the mainfold. Mounted within the air tube 14, but below the fuel nozzle 12, is a throttle 19, provided with an operating arm 20 from which an operating rod 21 extends to any usual or convenient control point.

The fuel nozzle 12 is provided with a very long-taper bore 25, here shown as tapering but one quarter inch ($\frac{1}{4}''$) to a foot, and slidable along this bore is a valve needle 26 which is correspondingly tapered and extends a considerable distance into the bore 25 from the discharge end of the nozzle 12. The passage for the fuel is between the walls of the bore 25 and the surface of the needle 26, and this passage is relatively very thin in proportion to its length, its thickness varying, though relatively slightly, as the needle 26 is moved lengthwise. By reason of this long thin passage for the fuel, considerable resistance is offered to the flow of the fuel, and by reason of this resistance the amount of fuel which flows from the nozzle 12 for any given setting of the needle 26 is proportionate to the square root of the

suction. As the flow of air is likewise proportionate to the square root of the suction for a given setting of the throttle 19, it follows that the amounts of fuel and air supplied are proportionate so long as the throttle 19 and the needle 26 remain stationary, both increasing or decreasing as the square root of the suction produced by the engine associated with the intake manifold 17. Because the fuel nozzle 12 is above or on the vacuum side of the throttle 19, the fuel is subjected practically to the engine suction, which produces better vaporization of the fuel and materially assists in maintaining substantially exact the proportion between the quantities of air and fuel supplied, and also insures more ready acceleration of the fuel flow from the nozzle on a sudden opening of the nozzle.

The needle 26 is provided with a small axial hole 27 which at its lower end communicates with a circumferential groove 28 in the surface of the needle 26, this groove being well down below the discharge end of the nozzle 12, and at its upper end communicates through a lateral hole 29 with the atmosphere. This provides for bleeding air into the fuel within the nozzle 12, and this bleeding of air reduces proportionately the amount of fuel which is supplied from the fuel nozzle 12, by diluting it with air, and also assists in the vaporization of the fuel which is supplied.

In order to maintain the proportion between the air and the fuel when the position of the throttle is changed, or if desired to cause but slight variations in such proportion as the throttle is moved, it is necessary to provide for movements of the needle 26 to correspond with those of the throttle 19. I have illustrated one connection for doing this. In this connection, the needle 26 is spring-pressed outwardly from the nozzle 12 by a compression spring 30, which bears against the under side of the head 31 of the needle 26 and is set within a counter-bore within the bushing 32 in which the needle 26 is slidably mounted, the bushing 32 being screw-threaded for mounting within a correspondingly threaded boss 33 on the side of the air tube 14. The head 31 of the needle 26 bears against the under side of one arm 34 of a lever 35 the other arm 36 of which is provided with an adjusting screw 37 which is provided with a knurled head for turning and a knurled body for coöperation with a spring-pressed ball 38 for holding the screw 37 in adjusted position, the lower end of the screw 37 bearing against the upper end of a slide rod 39 mounted to slide along the side of the air tube 14 and provided at its lower end with a roller 40 which bears upon a flexible cam 42 carried by the operating arm 20 of the throttle 19 and adjustable to different shapes by screws 43. The fulcrum of the lever 35 is an eccentric pin 44 carried by a pivoted control arm 45, so that as such control arm is moved the fulcrum pin 44 is raised or lowered to vary the position of the needle 26 while the throttle 19 remains stationary. This produces a variation in the position of the needle for all positions of the throttle, while variations in the position of the needle for individual positions of the throttle may be obtained by manipulating the screws 37 and 43. The control arm 45 is shown as being provided with a flexible operating wire 46, which extends through a guide tube 47 to any suitable control point, such as the dashboard of the automobile. By proper adjustments of the control arm 45 the ratio between the amounts of fuel and air may be varied, and by adjustment of the screws 37 and 43 this ratio may be made to remain constant or to vary slightly as desired as the position of the throttle is changed; while, as has already been stated, for given positions of the throttle and needle the ratio between the amounts of fuel and air remains constant for all degrees of suction, the actual amounts of both air and fuel varying as the square root of the suction.

When in operation it is desired to vary the supply of explosive mixture, the rod 21 is manipulated to open or close the throttle 19. As the throttle 19 is moved, the cam 42 is also moved, and the roller 40 follows the cam 42 and through the slide rod 39 and the lever 35, causes the needle 26 to move axially, the spring 30 acting to hold the head 31 of the needle against the arm 34 of the lever 35 and the roller 40 against the cam 42. By manipulating the operating wire 46, the fulcrum 44 of the lever 45 may be varied to vary the relation between the positions of the throttle and the needle for all positions of the throttle. By manipulating the screw 37 another adjustment between the position of the needle and of the throttle is obtained for all positions of the throttle. By manipulating the screws 43, either alone or in conjunction with the screw 37, the relation between the position of the needle and of the throttle may be varied for a plurality of individual positions of the throttle. The adjustments of the screws 37 and 43 are changed but rarely, but the adjustment of the pivot 44 is conveniently made when desired by manipulating the wire 46.

I claim as my invention:

1. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore largest at its discharge end, a needle correspondingly tapered and extending a considerable distance into said bore from the discharge end thereof, a throttle valve in said air tube and on the vacuum side of which said nozzle is located, connec-

tions between said throttle and said needle for producing corresponding movements of the needle when the throttle is moved, means for varying the relation between the positions of the needle and the throttle valve independently for a plurality of positions of the throttle valve, and separate means for varying such relation for all positions of the throttle correspondingly.

2. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore largest at its discharge end, a needle correspondingly tapered and extending a considerable distance into said bore from the discharge end thereof, said needle being movable axially of said bore, a throttle valve in said air tube, connections between said throttle and said needle for producing corresponding movements of the needle when the throttle is moved, means for varying the relation between the positions of the needle and the throttle valve independently for a plurality of positions of the throttle valve, and separate means for varying such relation for all positions of the throttle correspondingly.

3. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, a needle correspondingly tapered and extending a considerable distance into said bore, and an air-bleeding connection leading to the space between the bore of the nozzle and the needle within it.

4. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, and a needle correspondingly tapered and extending a considerable distance into said bore, said needle being provided with a longitudinal opening which at one end communicates with the atmosphere and at the other with the space between the needle and the bore of the nozzle.

5. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, a needle correspondingly tapered and extending a considerable distance into said bore, a throttle valve in said air tube and on the vacuum side of which said nozzle is located, connections between said throttle and said needle for producing corresponding movements of the needle when the throttle is moved, and means for varying the relation between the position of the needle and the throttle valve independently for a plurality of positions of the throttle valve.

6. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, a needle correspondingly tapered and extending a considerable distance into said bore, a throttle valve in said air tube, connections between said throttle and said needle for producing corresponding movements of the needle when the throttle is moved, and means for varying the relation between the position of the needle and the throttle valve independently for a plurality of positions of the throttle valve.

7. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, a needle correspondingly tapered and extending a considerable distance into said bore, a throttle valve in said air tube, and connections between said throttle and said needle for producing corresponding movements of the needle when the throttle is moved, said connections in the throttle and the needle being adjustable to vary both the position of the needle corresponding to all positions of the throttle and the position of the needle corresponding to individual positions of the throttle.

8. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, a needle correspondingly tapered and extending a considerable distance into said bore, a throttle valve in said air tube, and connections between said throttle and said needle for producing corresponding movements of the needle when the throttle is moved, said connections in the throttle and the needle being adjustable to vary the position of the needle corresponding to individual positions of the throttle.

9. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said air tube, a needle controlling the outlet of said fuel nozzle and spring-pressed openward, a lever acting on said needle to move it toward closed position against the action of its spring, a throttle in said air tube and wholly controlling the size of the supply passage for the flow of air through the air tube and on the vacuum side of which throttle said fuel nozzle is located so that the passage onward from the nozzle is unobstructed, and an operating connection between said throttle and said lever.

10. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, a needle correspondingly tapered and extending a considerable distance into said bore, and an air-bleeding connection leading to the space between the bore of the nozzle and the needle within it, said needle being movable axially of said bore.

11. A carbureter, comprising the combination of an air tube, a fuel nozzle discharging into said tube, said nozzle having a long-taper bore, and a needle correspondingly tapered and extending a considerable distance into said bore, said needle being pro-

vided with a longitudinal opening which at one end communicates with the atmosphere and at the other with the space between the needle and the bore of the nozzle, said needle being movable axially of said bore.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this twenty-second day of June, A. D. one thousand nine hundred and fourteen.

EARL A. BESSOM.

Witnesses:
JOSEPHINE GASPER,
G. B. SCHLEY.