H. O. CRAVEN.

CARBURETER.

APPLICATION FILED MAR. 29, 1909.

954,785.

Patented Apr. 12, 1910.

4 SHEETS—SHEET 1.

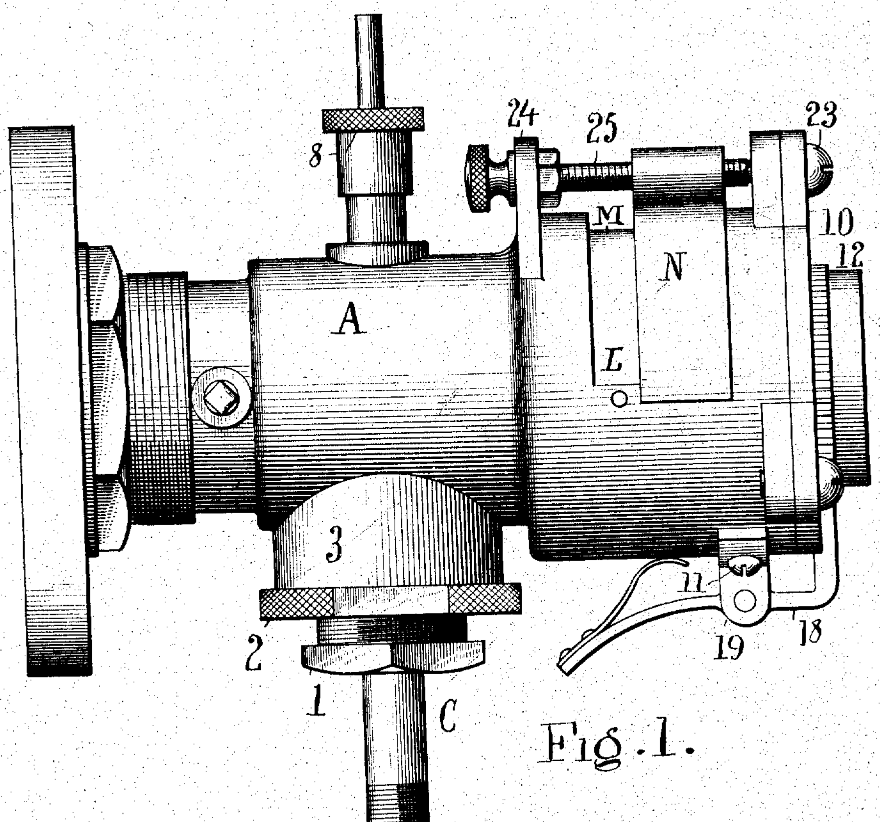

Fig. 1.

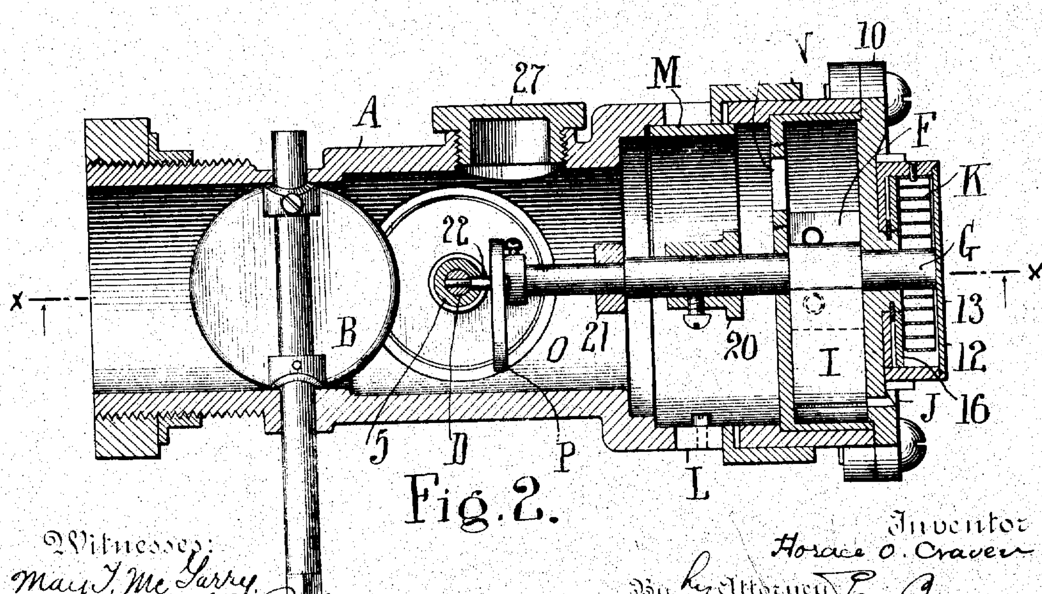

Fig. 2.

Witnesses:

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Gertrude T. Porter.

Inventor

Horace O. Craven

By his Attorney Paul Benjamin

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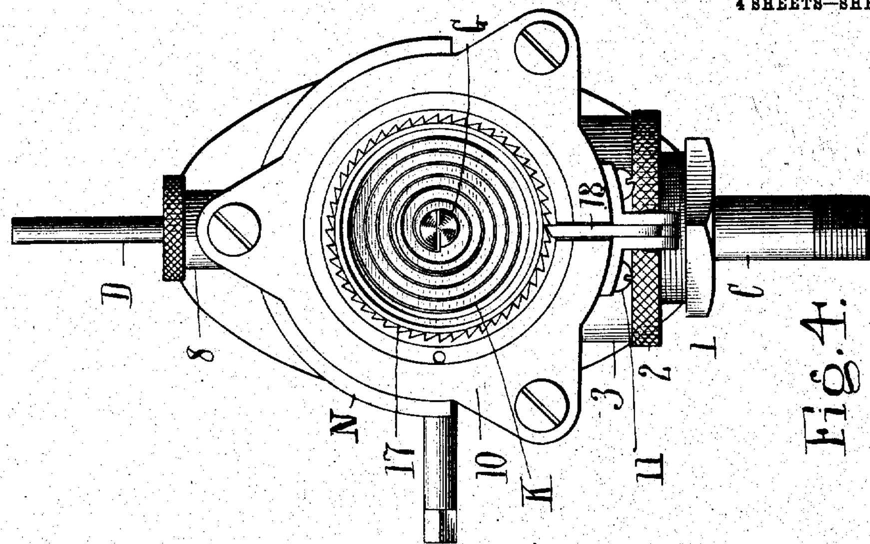

Fig. 4.

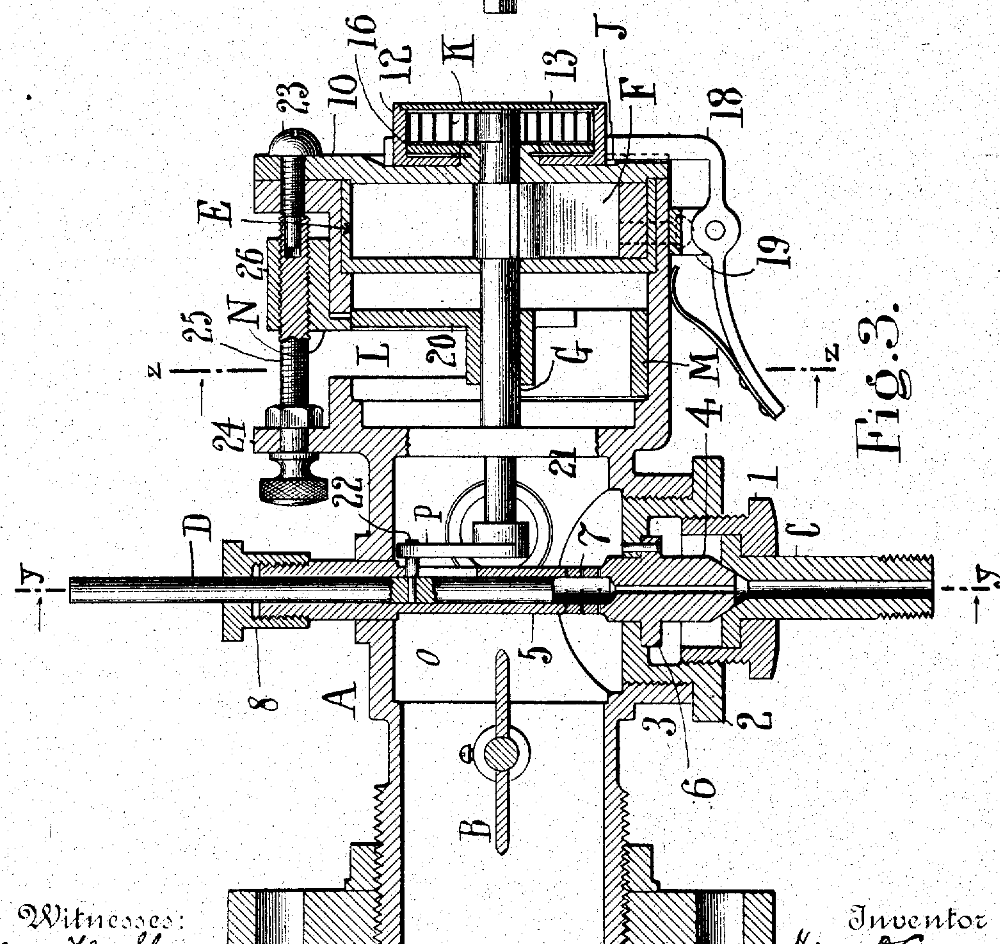

Fig. 3.

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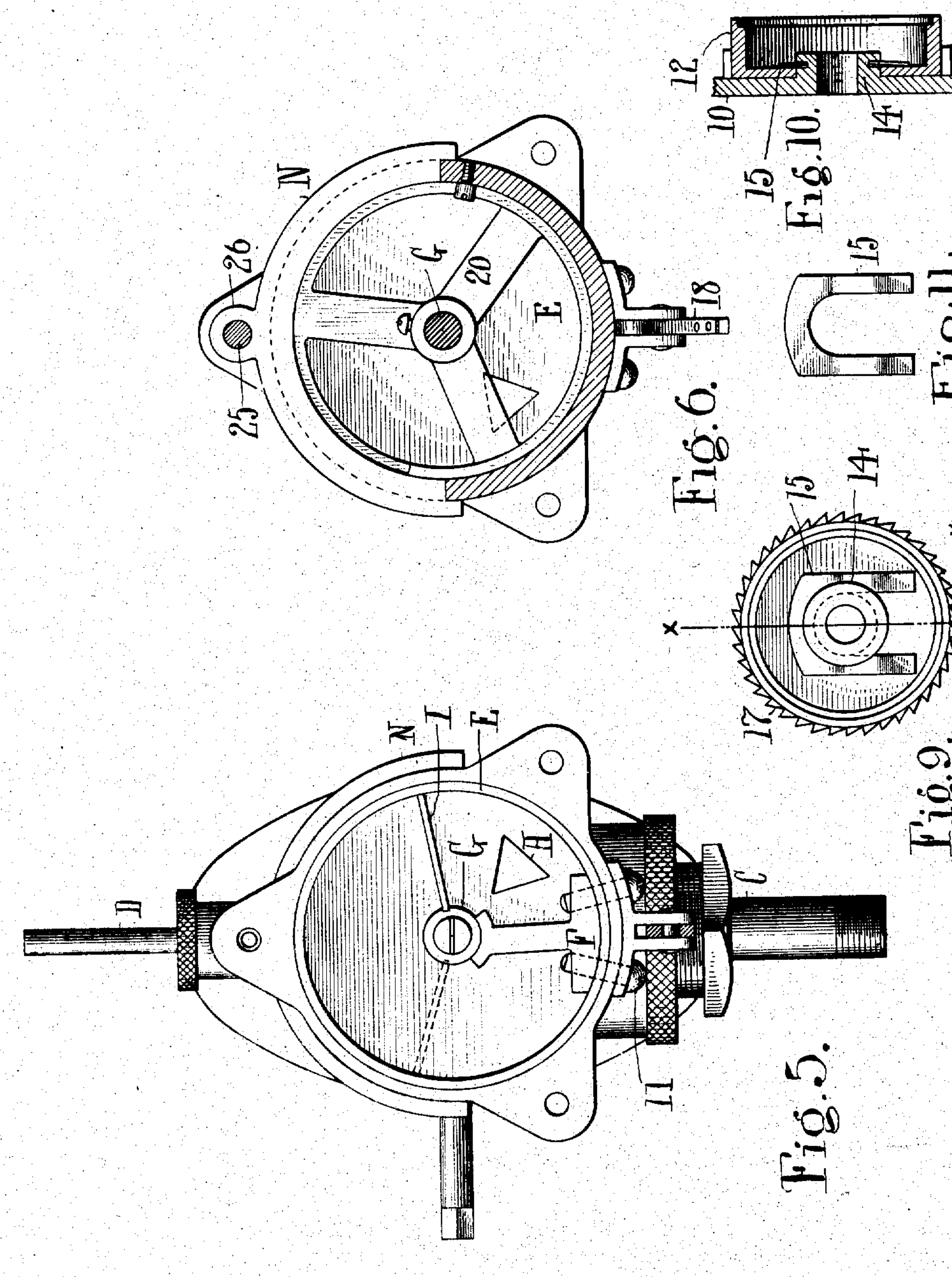

Witnesses:
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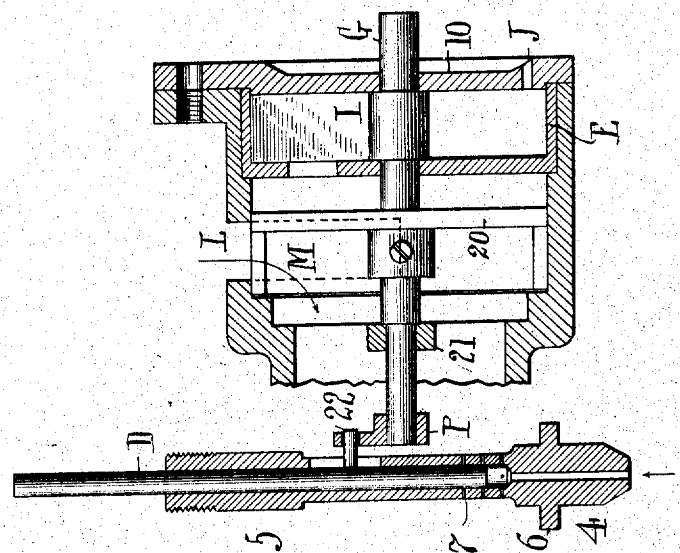

Fig. 8.

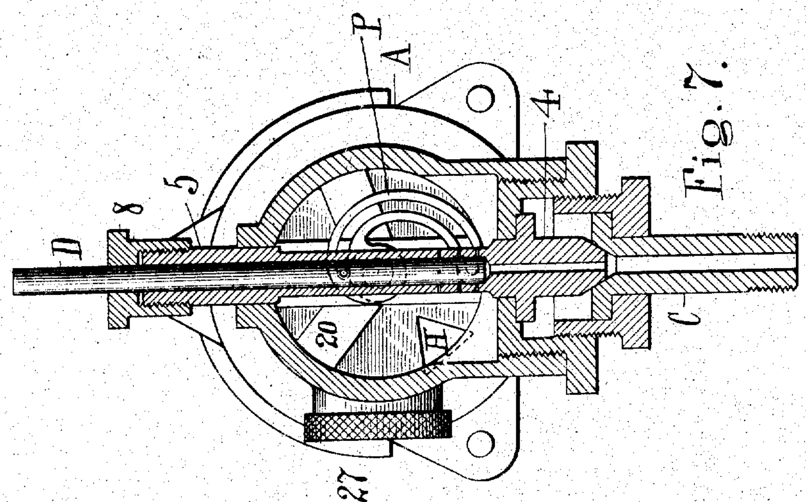

Fig. 7.

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UNITED STATES PATENT OFFICE.

HORACE O. CRAVEN, OF SCHENECTADY, NEW YORK.

CARBURETER.

954,785. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed March 29, 1909. Serial No. 486,315.

To all whom it may concern:

Be it known that I, HORACE O. CRAVEN, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Carbureters, of which the following is a specification.

The invention relates to carbureters for mixing hydrocarbon and air to produce gas for internal combustion motors.

The principle of the invention is to actuate a movable member, disposed in a suitable casing, by pressure variations produced in the mixing chamber by the suction of the motor, and to cause said member, through suitable mechanism, to control both the valve for admitting air and the valve for admitting hydrocarbon to said chamber. The said member is preferably a diaphragm disposed in a compartment of the casing, which compartment communicates with the mixing chamber and with the atmosphere, and in which the diaphragm is actuated by the differential between atmospheric and the mixing chamber pressure. The position taken by the diaphragm at any instant is that due to the counterbalancing of said differential pressure by an adjustable spring, and as the diaphragm controls both valves, the extent of their opening will depend upon the extent of movement of the diaphragm, while this in turn depends upon the suction of the motor.

The invention is embodied in the various combinations more particularly set forth in the claims.

In the accompanying drawings—Figure 1 is a side elevation of my carbureter. Fig. 2 is a longitudinal section. Fig. 3 is a longitudinal section on the line *x*, *x*, of Fig. 2. Fig. 4 is an elevation of the right hand end of the apparatus as shown in Fig. 3. Fig. 5 is an end elevation of the right hand end of the apparatus, as shown in Fig. 3, with the cover plate removed. Fig. 6 is a section on the line *z*, *z*, of Fig. 3. Fig. 7 is a section on the line *y*, *y*, of Fig. 3. Fig. 8 shows in section the relation of the principal operating members of the mechanism, other parts being removed for clearness. Fig. 9 is an end view of the box for containing the coiled spring, with the covering disk removed. Fig. 10 is a section on the line *x'*, *x'*, of Fig. 9. Fig. 11 shows separately the bifurcated spring plate.

Similar letters and numbers of reference indicate like parts.

A is a cylindrical casing, provided with the usual coupling at one end for attachment to a gas engine or like motor, which creates the necessary suction. Near said end is a pivoted throttle valve B, which is operated by hand to control the gas flow from the mixing chamber O to the motor.

The source of gasolene or other hydrocarbon is to be connected to the threaded end of a pipe section C, Fig. 3, which passes through and has its flanged end received within a threaded gland 1, which in turn enters a threaded flanged ring 2, which ring enters the threaded flanged projection 3 on casing A. The bore of pipe C is flared at its end to receive the frusto-conical extremity of an enlargement 4 of the tubular valve chamber 5. A flange 6 on valve chamber 5 is received in an annular recess in ring 2, and secured to said ring by a bolt. The valve chamber 5 extends across the casing A and through the wall thereof, and is threaded at its end to receive the gland 8. By removing the gland 1, the pipe C can be disconnected from the valve chamber 5. By removing the gland 8 and ring 2, the tubular valve chamber 5, after the valve therein has been disconnected from its operating mechanism, can be removed from the casing. Within the enlargement 4 the bore of the valve chamber is diminished, but in the remainder of said chamber, said bore is increased in diameter and receives the valve D. In the wall of said chamber near said enlargement are made a number of small openings 7 through which the gasolene is permitted to pass into the casing A to mix in fine jets with the incoming air. The openings 7 are disposed successively, so that as the valve D is moved away from its seat, a progressively greater number of said openings will be uncovered, and hence the amount of entering gasolene will be constantly varied in accordance as the position of said valve changes to uncover more or less of said openings.

Air to be mixed with the hydrocarbon is caused to enter the apparatus as follows: Casing A is enlarged at its end to receive the circular flanged disk or cup E which is closed by the cover plate 10 bolted to lugs on the casing. Secured to the inner periphery of the flange of disk E, by screws 11, (Fig. 5) is a fixed radial partition F, the inner end of which is made suitably concave to bear against the shaft G which extends through the disk E and also through the cover plate 10. In the disk E is an opening H which may be provided with a threaded bushing, and on the shaft G within the inclosed cylindrical chamber formed between disk E and cover plate 10, is a radial diaphragm I. In the cover plate 10 is an opening J communicating with the atmosphere. The relative location of the opening J to the opening H is such that they are on opposite sides of the fixed partition F; so that when suction occurs through H, the air entering through J acts on the side of diaphragm I, opposite to that on which H is located, so as to swing the diaphragm from left to right in Fig. 5. Mounted on the exterior of said plate is a box 12 containing a coiled spring K, one end of which is connected to the box, and the other end to said shaft G.

The box is connected to the cover plate 10 in the following way: The disk 13, which forms the cover of the box, being removed, a circular central opening in the bottom of the box is placed over the circular projection 14 on the cover plate 10. A bifurcated spring plate 15, Figs. 9, 10 and 11, is then placed in a groove on said projection, and over this plate a flat tightly fitting ring 16, Fig. 3, is applied. By reason of this construction, the box 12 may be rotated on projection 14 so as to wind up the spring J, and may be held by means of the ratchet teeth 17 on its exterior, and the spring pawl 18 engaging with said teeth and pivoted in a bracket 19 which is secured on the exterior of the case by the screws 11. The main air inlet opening L is formed in the circumferential wall of casing A. It is opened and closed by means of the arc-shaped valve M within said casing, which valve is carried by a spider 20, the central sleeve of which receives the shaft G and is secured thereon, Fig. 2. The shaft G is shouldered to bear against a cross bar 21 in the casing, through which bar it passes and to its end is secured a slotted cam plate P which receives a pin 22 extending from valve D through an elongated slot in the wall of tubular valve chamber 5.

The operation of the whole apparatus can now be followed: Suction from the engine creates vacuum in the space between partition F and one side of the movable diaphragm I, Fig. 7. Air entering through the opening J into the space between said diaphragm and the other side of partition F, the diaphragm is caused to move, say from the position shown in dotted lines, Fig. 5, to the position shown in full lines. This movement is against the resiliency of the counterbalancing coiled spring K which is previously set to any desired tension. Upon the extent of movement of the diaphragm I, which is dependent upon pressure variation in the mixing chamber O, will also depend the extent of movement of valve M, and hence the extent of opening of the main air inlet L. The gasolene valve D being assumed as normally closing the openings 7, it also follows that the extent of movement of said valve to uncover more or less of said openings will also depend upon the extent of movement of diaphragm I, since the same partial rotation of the shaft G, which actuates the main air valve M, also actuates the cam plate P to operate the gasolene valve. It is to be observed, therefore, that the suction of the engine counterbalanced by the spring K establishes the extent of movement of the radial diaphragm I, and this in turn controls positively the extent of opening of both the main air inlet and the gasolene inlet. If the suction increases, the air inlet L will be opened wider and the gasolene valve D set to admit more hydrocarbon—if it decreases, the air inlet will be reduced in area and the gasolene valve set to admit less hydrocarbon. If it stops, air inlet and gasolene valves will both be closed.

As the control of the gasolene and air is positive, the relative proportions thereof in the mixture which passes the valve B to the engine do not vary. The total amount of gas delivered depends on the suction exerted, and hence on the pressure variation in the mixing chamber, and hence on the demands of the motor.

In order to regulate the initial area of the air inlet L, I provide a movable arc-shaped cover N having a flange entering the inlet opening and bearing on the spider 20. Opposite one of the lugs on the casing which receive the fastening screws 23 for the cover plate 10, is another lug 24 through which passes a shaft 25 provided with a milled head and threaded to pass through a nut 26 integrally formed on cover N. In the end of the shaft 25 is a cavity which receives a projection on the screw 23, upon which projection said shaft turns. By rotating the milled head, the cover N may be slid on the casing to extend more or less over the air inlet L and thus reduce the area of said inlet as may be desired.

In order to afford convenient access to the mixing chamber O, I provide an opening in the casing wall and a removable threaded cover 27 therefor.

I claim:

1. In a carbureter, a cylindrical casing having an outlet, and air and hydrocarbon inlets, a tube extending diametrically across said casing, closed at one end, communicating with said hydrocarbon inlet at the other end and having openings in its wall, a cylindrical valve in said tube, and a rotary member in said casing connected to said valve and controlled by differences of pressure therein to actuate said valve.

2. In a carbureter, a cylindrical casing

having an outlet, and air and hydrocarbon inlets in its wall, valves controlling said inlets, and a rotary member in said casing connected to said valves and actuated by pressure variations therein to control both of said valves.

3. In a carbureter, a casing, having an outlet, an inlet for hydrocarbon, and an inlet for air, a central rotary shaft in said casing, a valve controlling said hydrocarbon inlet and connected to said shaft, a movable member in said casing actuated by pressure variations therein, and mechanism for transmitting motion from said member to said shaft to actuate said hydrocarbon inlet valve.

4. In a carbureter, a casing, a mixing chamber therein having an outlet, a valve controlling the admission of air and a valve controlling the admission of hydrocarbon to said chamber, a central rotary shaft in said casing, mechanism connected to said shaft to actuate both of said valves, and a movable member on said shaft actuated by pressure variations in said chamber.

5. In a carbureter, a cylindrical casing having an outlet, and air and hydrocarbon inlets in its wall, valves in said inlets, a partition in said casing forming a compartment therein, the said compartment having an opening in said partition communicating with the main portion of the casing, and an opening in the casing end communicating with the atmosphere, a central rotary shaft extending through said casing and actuating both of said inlet valves, a radial diaphragm in said compartment carried by said shaft, and a fixed radial partition in said compartment: the said compartment openings being located on opposite sides of a diameter drawn through said radial partition.

6. In a carbureter, a cylindrical casing having an outlet, and air and hydrocarbon inlets in its wall, valves in said inlets, a rotary member in said casing connected to said valves actuated by pressure variations therein, and a volute spring disposed outside of said casing and counterbalancing said member.

7. In a carbureter, a cylindrical casing having an outlet, and air and hydrocarbon inlets in its wall, valves in said inlets, a rotary member in said casing connected to said valves and actuated by pressure variations therein, a volute spring disposed outside of said casing and counterbalancing said member, and means for regulating the resiliency of said spring.

8. In a carbureter, a cylindrical casing having an outlet, and air and hydrocarbon inlets in its wall, a transverse partition forming a compartment at one end of said casing, a rotary shaft axially disposed in said casing and compartment, a spider on said shaft, an arc-shaped valve carried by said spider and controlling said air inlet, and a movable member fast on said shaft and located within said compartment and ports in the partition and casing arranged to permit the actuation of said movable member by differential pressure in said compartment to control said air inlet.

9. In a carbureter, a cylindrical casing having an outlet, and air and hydrocarbon inlets in its wall, a transverse partition forming a compartment at one end of said casing, a rotary shaft axially disposed in said casing and compartment, a spider on said shaft, an arc-shaped valve carried by said spider and controlling said air inlet, and a movable member fast on said shaft and located within said compartment and ports in the partition and casing arranged to permit the actuation of said movable member by differential pressure in said compartment to control both of said inlets.

10. In a carbureter, a casing, having an outlet, an inlet for air, and an inlet for hydrocarbon, a reciprocating valve controlling said hydrocarbon inlet, a central rotary shaft in said casing, a movable member fast on said shaft and actuated to rotate the same by pressure variations in said casing, a cam plate on said shaft, and a pin on said valve engaging said cam plate.

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

HORACE O. CRAVEN.

Witnesses:
MAY T. McGARRY,
GERTRUDE T. PORTER.