No. 790,173. PATENTED MAY 16, 1905.

F. A. BIEHN.

CARBURETER FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAR. 2, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

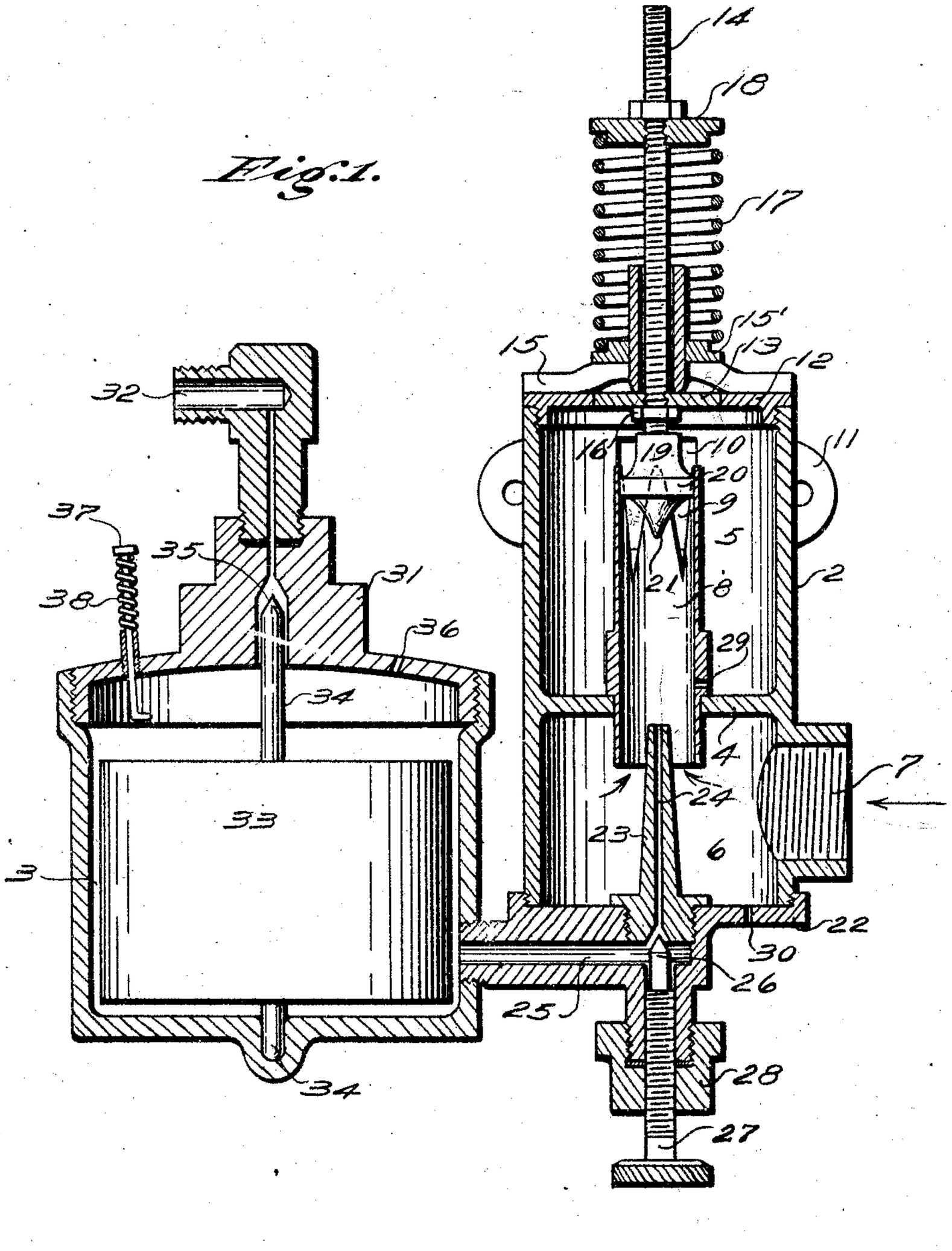

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Fig. 3.

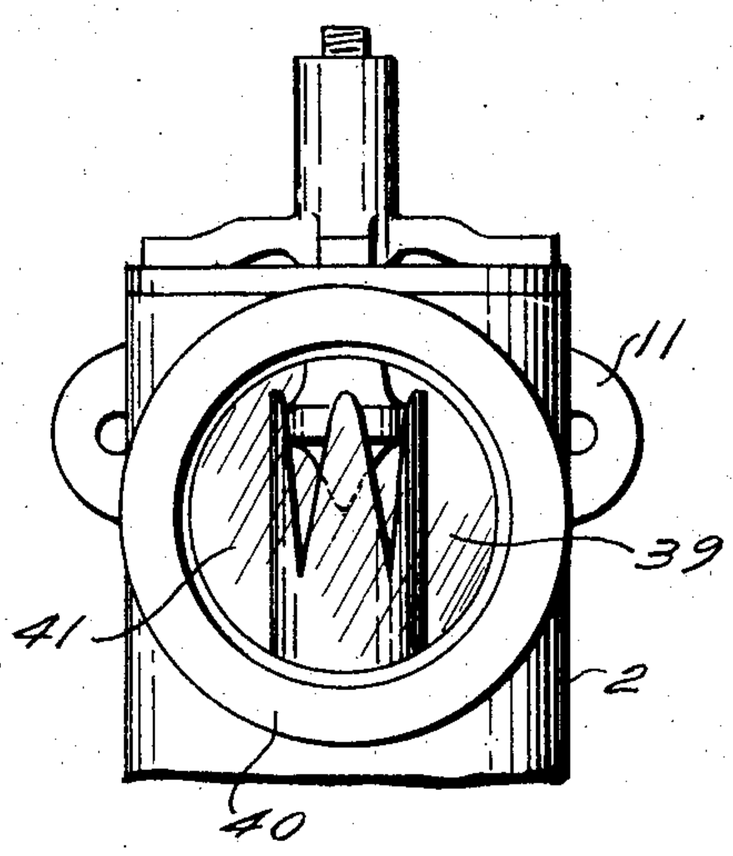
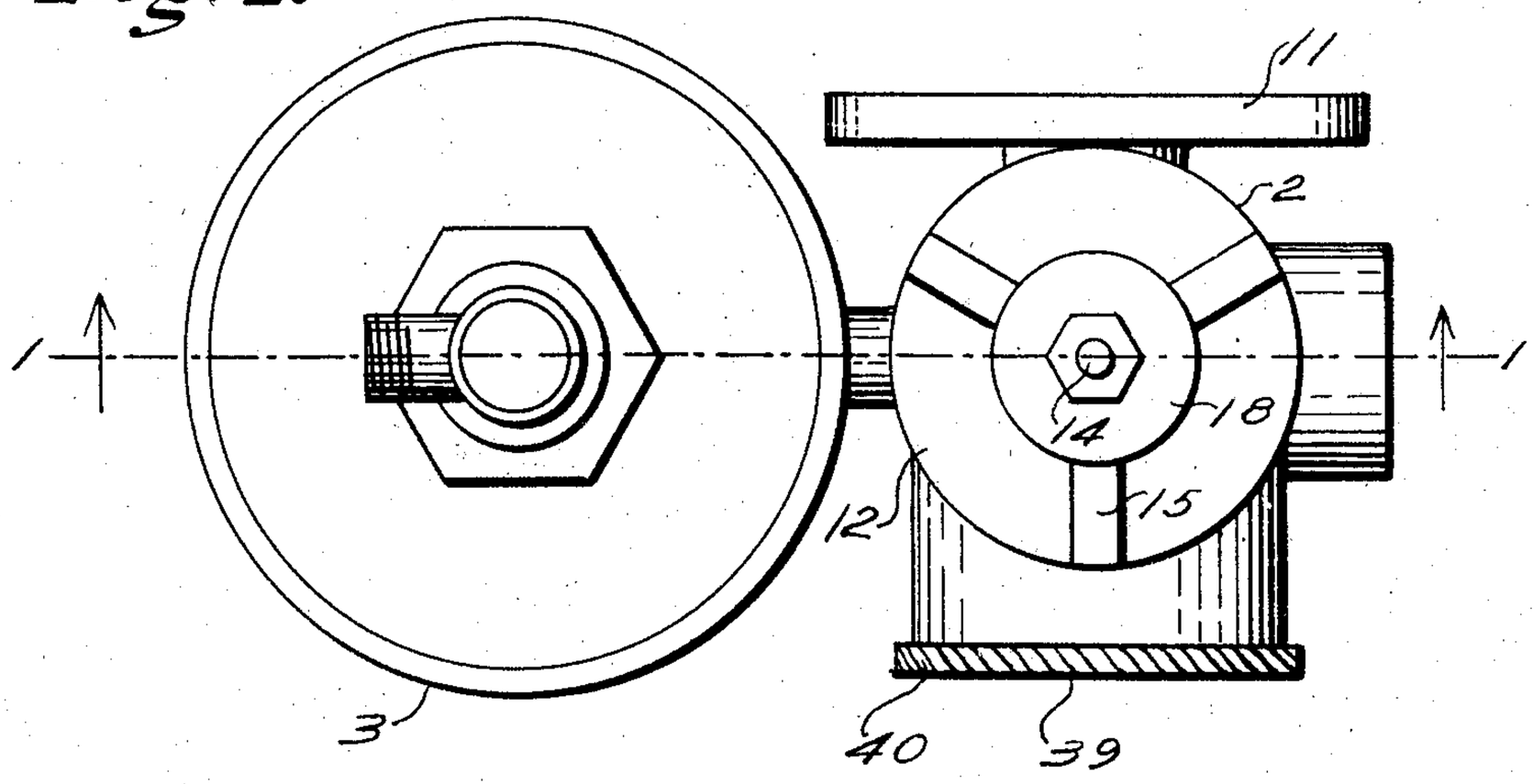


Fig. 2.



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UNITED STATES PATENT OFFICE.

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CARBURETER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 790,173, dated May 16, 1905.

Application filed March 2, 1903. Serial No. 145,799.

To all whom it may concern:

Be it known that I, FRANK A. BIEHN, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carbureters for Explosive-Engines, of which the following is a specification.

My invention relates to carbureters for oil-engines.

The main objects of my invention are to provide a carbureter adapted to mix fuel-oil and air in their passage to an engine-cylinder and to automatically adjust the relative proportions of such fuel-oil and air to meet the varying requirements of the engine under varying loads, to provide means for approximately adjusting the relation of the fuel to the air-supply to suit weather conditions, and to so arrange the parts of the device that the relation of the parts of the mixer may be readily seen from the exterior of the carbureter. I accomplish these objects by the device shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a carbureter constructed according to my invention. Fig. 2 is a top plan of the same. Fig. 3 is a side elevation, partly broken away, of the mixing-chamber.

In the construction shown the carbureter consists of a cylinder-body 2 and an oil-reservoir 3, rigidly connected together. The body 2 is hollow and is divided into two compartments by means of a horizontal partition 4. The compartment 5 above the partition 4 forms a mixing-chamber, and the compartment 6 below the partition 4 communicates with the exterior air through the air-inlet 7. Secured to the partition 4 and extending through the middle part of the same is a vertically-disposed tube 8, through which the chambers 5 and 6 communicate with each other. The upper end of the tube 8 is provided with a plurality of V-shaped slits 9. The chamber 5 communicates with the cylinder of the engine (not shown) by means of a port 10, and the device is secured to such cylinder by the flange 11. The upper end of the body 2 is closed by means of a threaded cap 12, having therein a central aperture provided with a valve-plate 13. The valve-plate 13 is secured to a threaded stem 14, which is longitudinally slidable in a yoke 15, secured to the cap 12. The valve-plate 13 is adjustable along the stem 14 and is locked to such stem by means of the jam-nut 16. The valve-plate 13 is normally urged into its closed position by means of a spring 17, which bears between the collar 15′ on the yoke 15 and a collar 18, which is adjustably secured to the stem 14. The stem 14 extends through the plate 13 and below same and is provided at its lower end with a head 19, having a cylindrical part 20 fitting the interior of the tube 8 and having a conically-pointed part 21 below the same.

The lower end of the body 2 is closed by a cap 22, which is provided with an upwardly-extending nozzle 23, projecting into the lower end of the tube 8 and communicating, by means of the passages 24 and 25, with the oil-reservoir 3. The opening of the passage 24 is controlled by means of a needle-valve 26, which is provided with a threaded stem 27, extending through the stuffing-box 28. Drain-holes 29 and 30 are provided in the tube 8 and the cap 22, so that any oil gathering in the compartments 5 and 6 of the body 2 will be drained away.

The reservoir 3 is closed at its upper end by means of a threaded cap 31, which is provided with a passage 32, communicating with the oil-supply. A float 33 is seated within the reservoir 3 and supported by the oil contained therein. The float 33 is provided with a stem 34, which extends above the float and is conical at its upper end, forming a needle-valve 35, controlling the passage 32. The cap 31 is also provided with an air-passage 36 and a rod 37, by means of which the float 33 may be released in case such float becomes stuck in its uppermost position. The rod 37 is normally supported in its upper position by means of a spring 38.

The body 2 is provided with a circular opening 39, located directly opposite to the port 10 and closed by means of a threaded cap 40, which is provided with a glass light 41, so that the relative position of the tube 8

and the head 19 may be visible from the exterior of the body 2.

The operation of the device shown is as follows: Oil is supplied to the reservoir 3 through the passage 32. The float 33 is supported by the oil, and when the oil in the reservoir 3 rises to a certain level, the needle-valve 35 closes the passage 32, cutting off further supply of oil. The passage 24 is controlled by the needle-valve 26, which is adjusted by the operator. The head 19 controls the areas of the openings 9 in the upper end of the tube 8. It will be seen that the areas of the apertures 9 are greater when the head 19 is in its uppermost position and that such openings may be entirely closed by the downward movement of said head. When the device is assembled, the relative position of the head 19 with respect to the valve-plate 13 is regulated to suit the requirements of the engine, and the lock-nut 16 serves to maintain such relation.

During the suction-stroke of the engine the vacuum caused by the movement of the piston in the engine draws oil from the oil-reservoir 3 through the nozzle 23 and simultaneously draws air through the air-inlet 7 and upwardly through the tube 8. The stream of oil strikes the conical part 21 of the head 19, where it is broken into a fine spray and thoroughly mixed with air during its passage into the mixing-chamber 5. The gas formed by the mixture of oil and air in the chamber 5 is drawn into the engine-cylinder through the port 10.

The tension of the spring 17 is adjusted, by means of the collar 18, so that the valve 13 will tend to remain closed during the normal action of the engine under full load, and the mixture will then be determined by the position of the head 19 and the area of the apertures 9, according as said head has been previously adjusted. When the load on the engine is decreased, the engine will speed up on account of the increased power due to the now excessive quantity of fuel supplied by the normal arrangement of the carbureter, and the increased suction due to such increase of speed will draw the valve 13 downwardly, taking in additional air through the aperture in the cap 12, thus reducing the richness of the mixture, and consequently automatically adjusting the power of the engine to suit the load. As the plate 13 descends the head 19 also descends in the tube 8 and simultaneously reduces the areas of the apertures 9. As the suction decreases the spring 17 causes the plate 13 to rise, and the richness of the mixture is again increased. This arrangement thus automatically governs the fuel-supply to suit the load on the engine. Variation of the relation between the oil supplied and the air to suit atmospheric conditions is adjusted by means of the needle-valve 26. The tension of the spring 17 is adjustable by means of the collar 18.

It will be seen that when the parts of the device are properly adjusted for the normal operation of the engine any variations in the load will be immediately compensated for by the movement of the valve-plate 13 and the head 19. As the level of the oil in the oil-reservoir 3 is lowered the float 33 descends and opens the needle-valve 35, admitting additional oil to said reservoir, and thereby maintaining said oil at an approximately constant level. The reservoir 3 is open to the atmosphere through the air-aperture 36. In case the needle-valve 35 should stick in its closed position, the same may be released by pushing downwardly on the rod 37.

It will be seen that numerous details of the construction shown may be altered without departing from the spirit of my invention. I therefore do not confine myself to such details except as hereinafter limited in the claims.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A carbureter comprising a casing divided into two compartments forming an air-supply chamber and a mixing-chamber; a mixing-tube communicating with both of said compartments; an oil-reservoir having a discharge-nozzle extending into the end of said mixing-tube communicating with the air-supply chamber; said mixing-chamber having an outlet for connection to the cylinder of an engine, and having a port communicating with the outer atmosphere; a valve for normally closing said port; a plunger acting in said mixing-tube and connected with said valve; said mixing-tube having an opening through its wall communicating with the mixing-chamber and adapted to be closed or decreased in area by said plunger, substantially as described.

2. A carbureter comprising a casing divided into two compartments forming an air-supply chamber and a mixing-chamber; a mixing-tube communicating with both of said compartments; an oil-reservoir having a discharge-nozzle extending into said mixing-tube at its end communicating with the air-supply chamber; said mixing-chamber having an outlet for connection to the cylinder of an engine, and having a port communicating with the outer atmosphere; a valve for normally closing said port; a plunger acting in said mixing-tube and connected with said valve; said mixing-tube having a slot through its wall extending longitudinally thereof and communicating with the mixing-chamber and adapted to be closed or decreased in area by said plunger through the action of said valve, substantially as described.

3. A carbureter comprising a mixing-chamber having an outlet for connection to the cylinder of an engine; a mixing-tube having one end communicating with said mixing-chamber and the other end communicating with a fuel-supply and with an air-supply; a plunger acting in said mixing-tube and adapted to close or decrease the area of communication between said mixing-tube and said mixing-chamber; an air-supply valve in said mixing-chamber connected with said plunger and adapted to be opened through suction thereon, and to actuate said plunger so as to decrease said area of communication when said valve is opened, substantially as described.

4. A carbureter comprising a mixing-chamber communicating with a normal air-supply and a fuel-supply, and having an auxiliary air-valve; means for decreasing the area of communication of said mixing-chamber with said fuel-supply and said normal air-supply; said means being automatically actuated to decrease such area through suction adapted to open said auxiliary air-valve, substantially as described.

5. A carbureter comprising a mixing-chamber communicating with a normal air-supply and a fuel-supply, and having an auxiliary air-valve; a spring for normally closing said auxiliary valve; a device for regulating the tension of said spring; means for decreasing the area of communication of said mixing-chamber with said fuel-supply and said normal air-supply; said means being held by said spring in position to normally open such communication, and being adapted to decrease such area through suction in said mixing-chamber, exerted opposite to the action of said spring, substantially as described.

6. In a carbureter, the combination of a body having a mixing-chamber therein; a tube extending into said chamber and having in its side a triangular opening communicating with said chamber; a head fitting within said tube, being longitudinally slidable therein and adapted to move over said opening and control the area of same; an air-inlet communicating with said tube; means for projecting a jet of oil along said tube and against said head; and means for moving said head along said tube, substantially as and for the purpose described.

7. In a carbureter, the combination of a body having a mixing-chamber therein; a tube extending into said chamber and having in its side an opening communicating with said chamber; a head fitting within said tube, being longitudinally slidable therein and adapted to move over said opening and control the area of same; an air-inlet communicating with said tube; means for projecting a jet of oil along said tube and against said head; a second air-inlet communicating with said chamber independently of said tube; a valve controlling said second inlet; and suitable connection between said valve and said plunger so arranged that the opening of said valve will cause said plunger to move along said tube and reduce the area of said opening, substantially as described.

8. In a carbureter, the combination of a body having a mixing-chamber therein; a tube extending into said chamber and having in its side an opening communicating with said chamber; a plunger fitting within said tube, being longitudinally slidable therein and adapted to move over said opening and control the area of same; an air-inlet communicating with said tube; means for projecting a jet of oil along said tube and against said head; means for moving said plunger along said tube; and a glass-covered opening in said body adapted to permit the operator to see the position of said plunger in said tube, substantially as and for the purpose described.

9. In a carbureter, the combination of a vertically-disposed hollow body; a transverse partition extending across the interior of said body; said body having therein an air-inlet below said partition and an outlet-port above said partition; a tube extending through said partition longitudinally of said body and having an opening in its side, above said partition; a nozzle secured within said body below said partition and extending into said tube and substantially parallel with same; an oil-reservoir connected with said nozzle and adapted to supply oil to same; a valve-aperture in the upper end of said body in alinement with said tube; a valve controlling said aperture and normally urged into its closed position; a plunger connected with said valve, movable therewith, said plunger fitting within said tube and being adapted to move across and contract the area of the opening in same, when said valve is opened, substantially as described.

10. A device of the class described comprising a chamber communicating with a normal air-supply and a fuel-supply, and having an auxiliary air-valve; means for decreasing the area of communication of said chamber with said normal air-supply and fuel-supply; said means being connected with said auxiliary air-valve and actuated to decrease such area through suction adapted to open said auxiliary air-valve, substantially as described.

Signed at Chicago this 25th day of February, 1903.

FRANK A. BIEHN.

Witnesses:

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WM. R. RUMMLER.