J. W. SMITH.

CARBURETER.

APPLICATION FILED MAY 18, 1909.

955,218.

Patented Apr. 19, 1910.

2 SHEETS—SHEET 1.

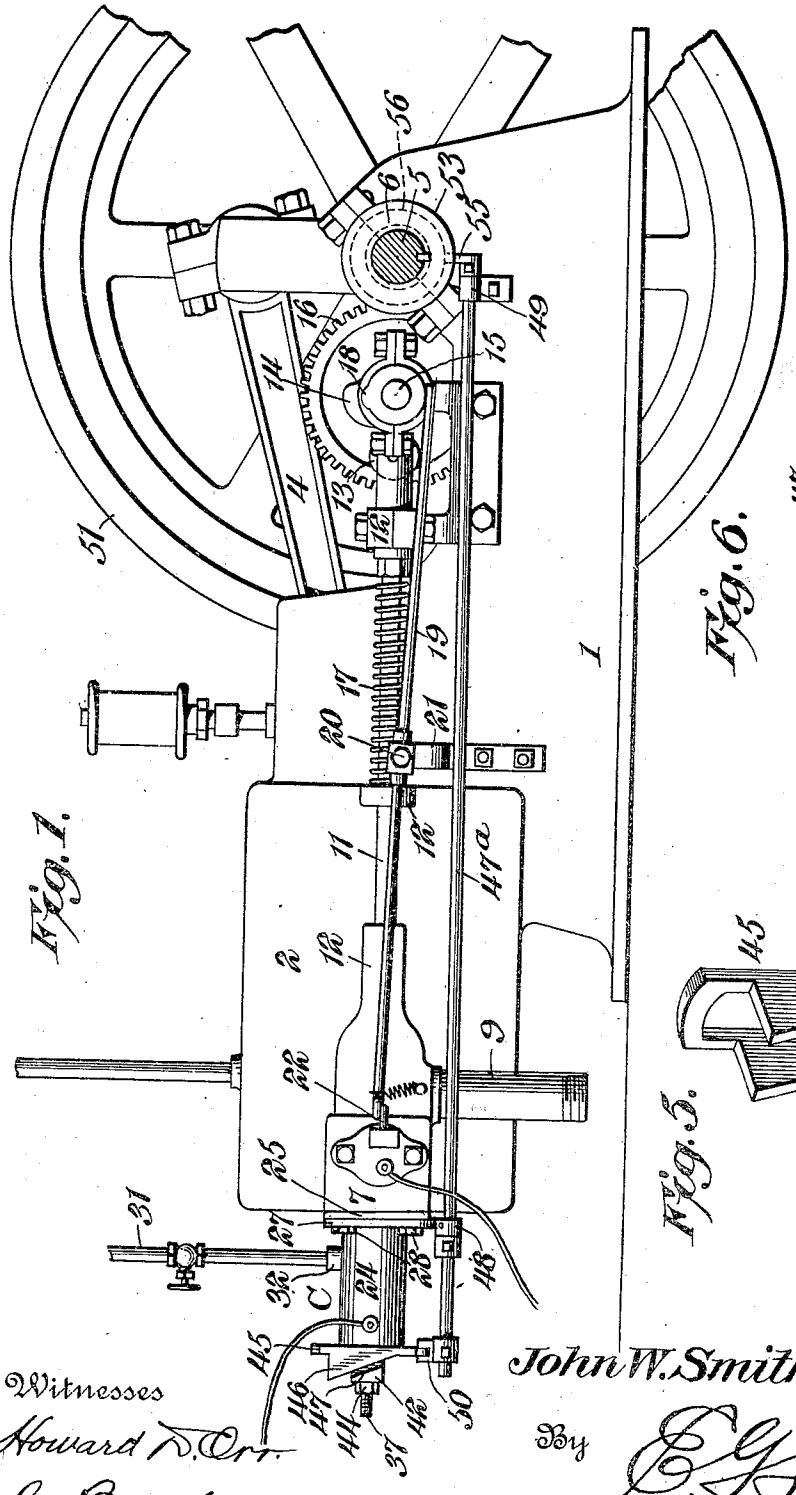

Fig. 1.

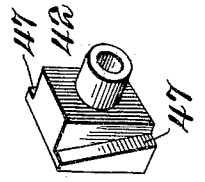

Fig. 6.

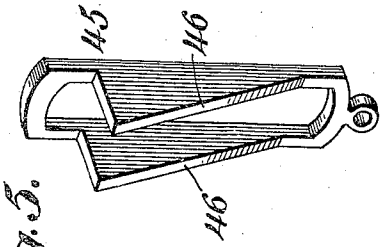

Fig. 5.

Witnesses

Howard D. Orr.

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2 SHEETS—SHEET 2.

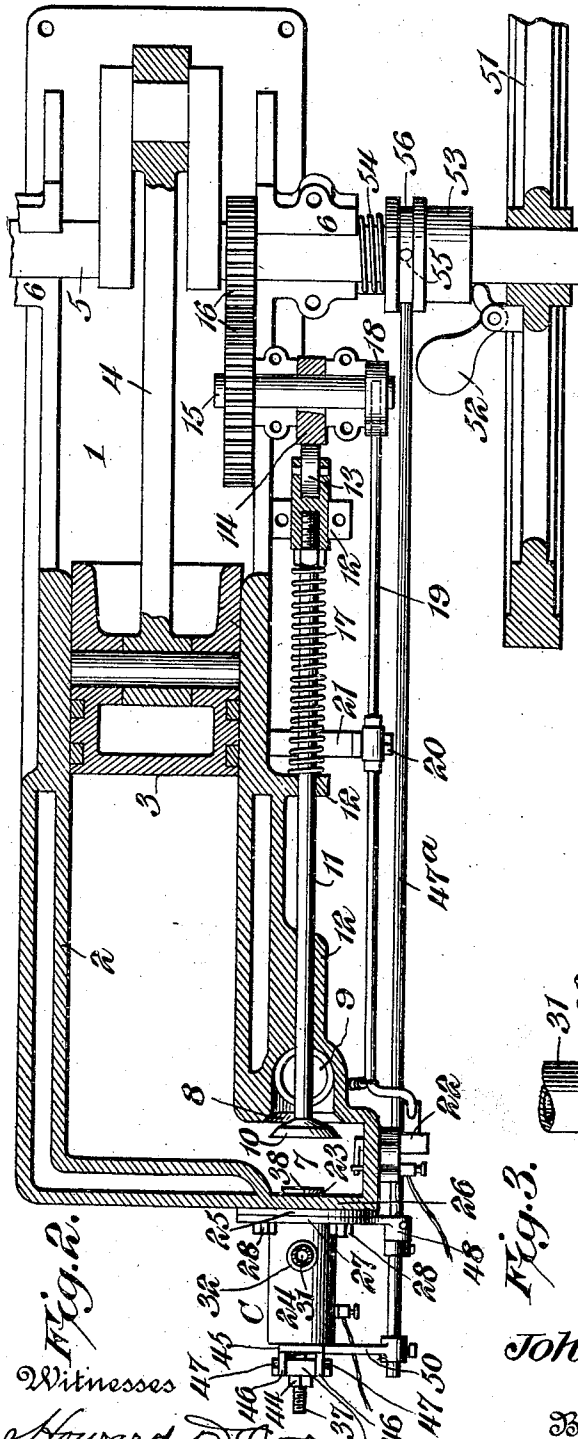

Fig. 2.

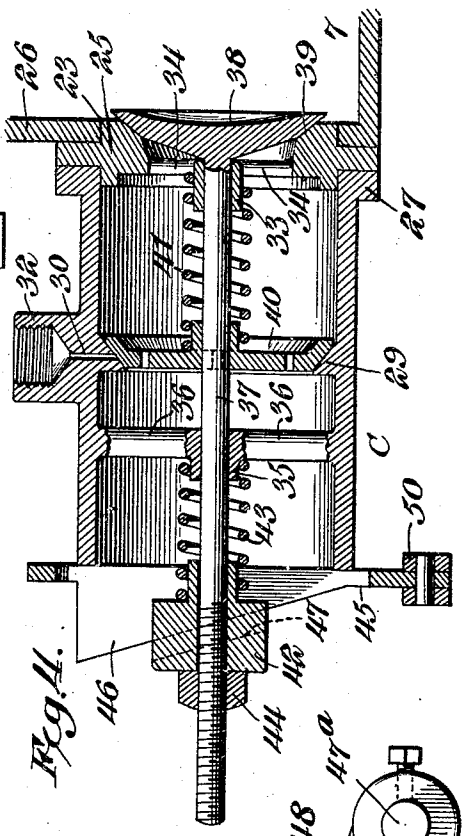

Fig. 4.

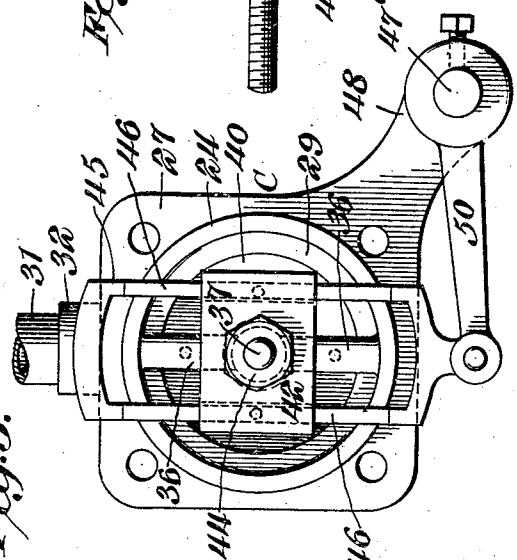

Fig. 3.

Witnesses
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UNITED STATES PATENT OFFICE.

JOHN W. SMITH, OF STANLEY, IOWA, ASSIGNOR OF ONE-HALF TO FRANK A. SHERMAN, OF INDEPENDENCE, IOWA.

CARBURETER.

955,218. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed May 18, 1909. Serial No. 496,779.

To all whom it may concern:

Be it known that I, JOHN W. SMITH, a citizen of the United States, residing at Stanley, in the county of Buchanan and State of Iowa, have invented a new and useful Carbureter, of which the following is a specification.

This invention relates to a carbureter of that type in which the fuel is mixed with air at the admission valve of the engine, the charge being varied automatically by a governor to suit the varying load conditions.

The invention has for one of its objects to improve and simplify the construction of carbureters of this type so as to be extremely reliable and efficient in use, comparatively simple and inexpensive to manufacture, and readily adjusted to obtain good results.

Another object of the invention is the provision of an auxiliary valve arranged within the chamber of the carbureter around which the entire quantity of air passes on its way to the engine cylinder so that the liquid fuel will be effectively vaporized and mixed with the air.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a side elevation of a four-cycle engine equipped with the improved carbureter. Fig. 2 is a horizontal longitudinal section thereof. Fig. 3 is an end view of the carbureter. Fig. 4 is a vertical longitudinal section of the carbureter. Fig. 5 is a perspective view of the governor-actuated wedge for controlling the admission valve. Fig. 6 is a perspective view of the wedge block coöperating with the wedge of Fig. 5.

Similar reference characters are employed to designate corresponding parts throughout the views.

In the present instance, I have elected to illustrate the invention in connection with an ordinary four-cycle engine, but it is to be understood that it may be used with other types.

Referring to the drawing, 1 designates the bed of the engine on which is mounted a water-cooled cylinder 2 containing a reciprocatory piston 3 of the trunk type that is connected by a rod 4 to a crank shaft 5, and the shaft is mounted in bearings 6 on the bed of the engine. The cylinder 2 is cast or otherwise formed with an offset chamber 7 adjacent the head through which the fuel charges are admitted and the spent gases exhausted. This chamber 7 is provided with an exhaust port 8 that communicates with a conduit 9 leading off to the atmosphere, and the exhaust port is controlled by a valve 10 arranged on the inner end of a stem 11 slidable in guides 12 formed on the engine and equipped at its forward end with a roller 13 that rides on a cam 14 secured to the half speed shaft 15, which shaft is driven by gears 16 from the crank shaft. On the valve stem is a compression spring 17 serving to hold the valve closed when the high portion of the cam 14 is not passing under the roller 13. On the half speed shaft 15 is a second cam 18 for operating the rod 19 pivoted at 20 on a bracket 21, and which actuates the make and break ignition device designated generally by 22, which device may be of any improved construction.

Opposite the exhaust port 8 is an inlet 23 for the explosive charges, and these charges are admitted through the carbureter designated generally by C. The carbureter comprises a hollow casing 24 open at one end to the atmosphere and equipped at its opposite end with a valve seat 25 which is interposed between the wall 26 of the chamber 7, and flange 27 of the casing 24, the parts being secured together by stud bolts 28. This valve seat is thus removable so that the valve-engaging surface can be ground from time to time, as required. The casing 24 is formed with a fixed conical seat 29 at a point intermediate its ends, and in line with this seat is a liquid fuel passage 30 that receives fuel from a pipe 31 threaded into a tapped boss 32 on the casing 24. The removable valve seat 25 is provided with a central collar 33 supported by radial arms 34, and adjacent the outer end of the casing C is a second collar 35 supported on radial arms 36, the collars being in alinement to form bearings for the valve stem 37. On the inner end of the stem 37 is a puppet valve 38 adapted to engage the valve face 39 of the seat 25. Slidably mounted on the valve stem 38 is an auxiliary valve 40 in the form of a disk having a conical peripheral surface to en-

gage the seat 29, and interposed between this valve and the arms 34 is a helical compression spring 41 which yieldingly holds the auxiliary valve against its seat. On the outer end of the valve stem is an adjustable block 42 between which and the outer collar-supporting arms 36 is a second helical compression spring 43 on the valve stem, which yieldingly holds the admission valve 38 seated, the said block being adjustable by means of a nut 44 threaded on the valve stem and bearing against the outer face of the block 42. During the suction stroke of the engine, the valves 38 and 40 open inwardly and the entire charge of air is drawn in through the casing 24. As the air passes over and around the valve 40, the liquid fuel is sucked in through the passage 30 and is incorporated with the air, the seat 29 being, for the most part, at all times, supplied with liquid fuel so that as the air passes thereover, the fuel will be effectively vaporized.

The engine is governed by throttling the charge by the admission valve 38 and, in the present instance, it is done automatically. Extending across the outer open end of the casing 24 and slidably bearing thereon is a rectangular yoke 45 having parallel spaced wedges 46, the yoke being open so that the inlet area for the air will not be materially restricted. The inclined surfaces of the wedges engage correspondingly inclined shoulders 47 at diametrically opposite sides of the blocks 42, so that by shifting the yoke 45 backwardly or forwardly, the extent of opening of the valve will be varied. The yoke is connected to any suitable governing means, such for instance, as a rock shaft 47^a extending along the side of the engine and mounted in bearings 48 and 49, the said shaft having an arm 50 hingedly connected with the yoke for shifting the same. On the crank shaft 5 is a fly wheel 51 having a centrifugally-acting weight 52 for operating a sleeve 53 on the crank shaft, which sleeve is operatively connected with the rock shaft 47^a in any suitable manner, so that on variations in speed, due to changes in load, the sleeve will be shifted to alter the position of the wedge yoke 45, and thus adjust the inlet valve to appropriately vary the charges admitted to the cylinder. In this manner, a substantially uniform speed can be maintained. The sleeve 53 is pressed by a spring 54 on the crank shaft, the spring opposing the action of the centrifugal weight 52, and on the rock-shaft 47^a is an arm 55 engaging in a peripheral groove 56 in the sleeve, so that as the sleeve shifts, the shaft 47^a will be rocked.

During the out-stroke of the cylinder after the discharge stroke, a fresh charge of combustible mixture is drawn into the cylinder through the carbureter, and upon the succeeding in-stroke, the charge is compressed while both admission and exhaust valves are closed. At a suitable point, the ignition device is operated so as to fire the charge whereby the expanding gases impart an impulse to the piston. On the succeeding in-stroke, the exhaust is open so that the spent gases can be driven out, thus completing the cycle of operation.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination of a cylinder, a carbureter connected therewith and open at its outer end for the admission of air, an inlet valve, a stem connected with the inlet valve and passing through the carbureter, an auxiliary fuel-admitting valve arranged in the carbureter and mounted on the stem, springs supported on the said stem and both housed within the carbureter for holding the valves on their respective seats, one spring being located between the valves and the other outwardly from the auxiliary valve, and means for automatically controlling the opening of the inlet valve without affecting the auxiliary valve.

2. The combination of an engine cylinder, a piston therein, a crank shaft, a speed governor, a carbureter connected with the cylinder, an inlet valve between the carbureter and cylinder, a fuel-controlling valve in the carbureter and around which all the air drawn into the engine passes, a valve stem connected with the first-mentioned valve and on which the second valve is slidably mounted, springs supported on said stem for holding the valves seated, an abutment between the valves against which the spring for the fuel-controlling valve bears, an adjustable block on the valve stem, a wedge engaging the block for controlling the opening of the first-mentioned valve, and means for operatively connecting the wedge with the governor.

3. A carbureter comprising a casing open to the atmosphere at one end, a valve seat at the opposite end, a puppet valve engaging the seat, a stem on the valve extending centrally through the casing and out of the open end thereof, bearings for the valve

stem, a floating valve on the stem for controlling the supply of liquid fuel to the carbureter, a spring for holding the second valve closed, an adjustable block on the outer end of the valve stem, a spring engaging the said block for seating the first-mentioned valve, a yoke extending across the open end of the casing and having wedges engaging the opposite sides of the said block, and means for shifting the position of the yoke.

4. A carbureter comprising a casing open to the atmosphere at one end, a valve seat removably mounted on the opposite end of the casing, an admission valve engaging the seat, a stem for the valve passing centrally through the casing and out of the open end thereof, a guide on the seat for the stem, a second guide in the casing for the stem, an auxiliary fuel-admitting valve arranged in the casing and mounted on the stem for independent movement, a spring on the stem and bearing on the first guide and auxiliary valve for holding the latter seated, an abutment on the outer end of the stem, a spring on the stem and interposed between the abutment and second guide for holding the admission valve seated, and a regulating device engaging the said abutment for controlling the extent of opening of the admission valve.

5. A carbureter comprising a casing open to the atmosphere at one end, a valve seat removably mounted on the opposite end of the casing, an admission valve engaging the seat, a stem for the valve passing centrally through the casing and out of the open end thereof, a guide on the seat for the stem, a second guide in the casing for the stem, an auxiliary fuel-admitting valve arranged in the casing and mounted on the stem for independent movement, a spring on the stem and bearing on the first guide and auxiliary valve for holding the latter seated, an abutment on the outer end of the stem, a spring on the stem and interposed between the abutment and second guide for holding the admission valve, a rectangular yoke extending diametrically across the open end of the casing and bearing against the same and through which the said stem projects, a pair of wedges mounted on the yoke and bearing on the abutment, and controlling means for shifting the yoke and changing the points of engagement of the wedges with the abutment to vary the extent of opening of the admission valve.

6. A carbureter comprising a casing open at one end to the atmosphere, an internal annular seat arranged intermediate the ends of the casing, a fuel supply conduit having a discharge passage terminating at the said seat, an apertured disk valve normally engaging the seat, a valve seat at the inner end of the casing, an admission valve engaging the last-mentioned seat, separate springs for holding the valves closed, a stem on the admission valve, an adjustable abutment having inclined surfaces at opposite sides, means for adjusting the abutment, a pair of wedges extending across the open end of the casing and adapted to engage the said inclined surfaces of the abutment to control the opening of the admission valve, and speed regulating means for shifting the wedges.

7. In a carbureter, the combination of a casing open at one end to the atmosphere, a removable valve seat secured to the opposite end of the casing and provided with a bearing, a valve adapted to engage the seat, a stem extending axially through the casing and connected with the valve, bearings for the stem, a thread on the outer end of the stem, an abutment on the stem, a spring interposed between one of the said bearings and abutment for holding the valve seated, a nut on the threaded end of the stem for adjusting the abutment, a wedge bearing against the open end of the casing and shiftable across the abutment to regulate the opening of the valve, a rock-shaft mounted in the first-mentioned bearing, a connection between the wedge and rock-shaft, and means for actuating the rock-shaft.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN W. SMITH.

Witnesses:
M. M. ELDER,
MARK IRVINE.