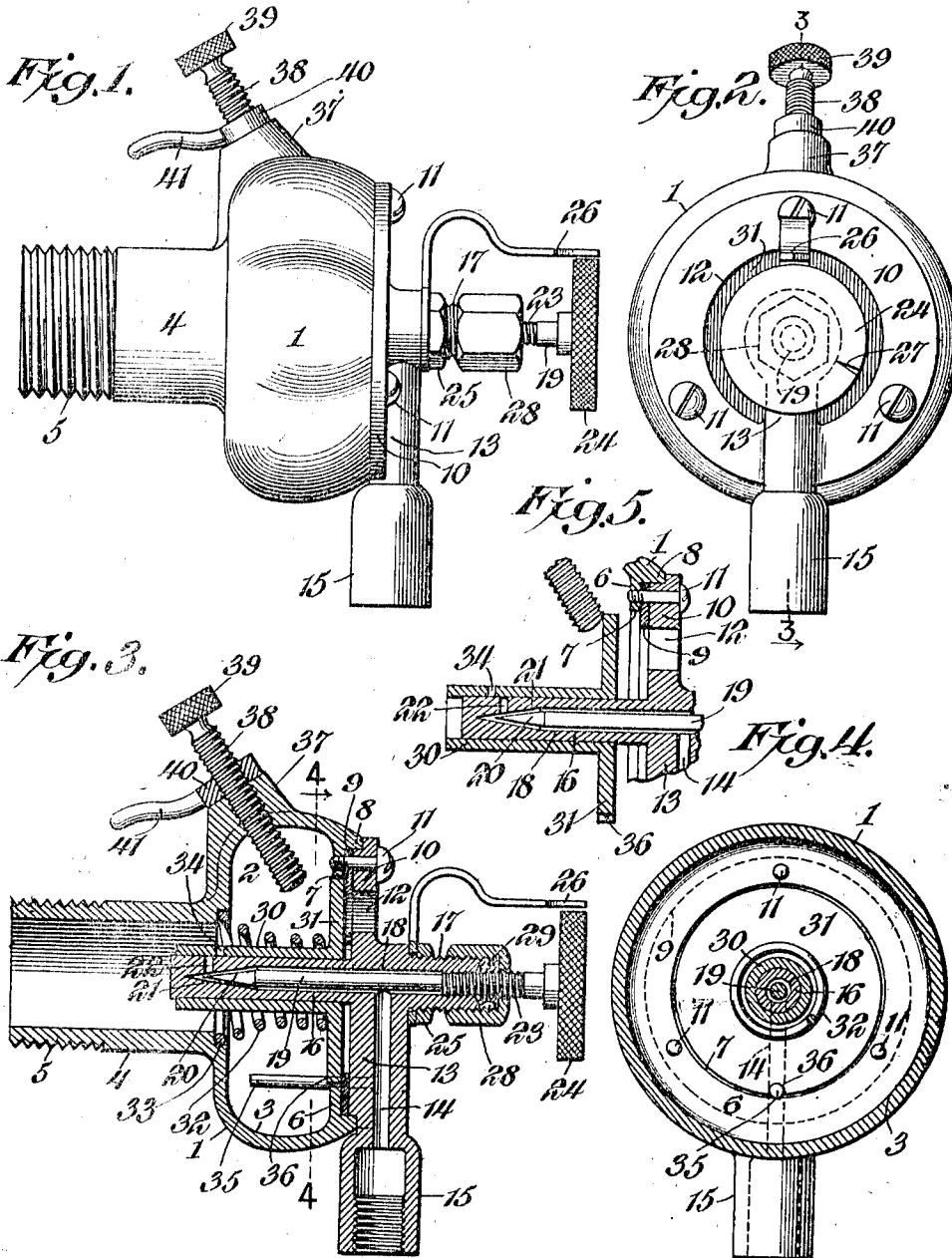


G. A. CLEMENT.
CARBURETER.
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1,061,582.

Patented May 13, 1913.



WITNESSES

Howard D. Orr.
H. T. Chapman.

G. A. Clement, INVENTOR,

BY

E. J. Siggers.

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE A. CLEMENT, OF BELOIT, WISCONSIN.

CARBURETER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE A. CLEMENT, a citizen of the United States, residing at Beloit, in the county of Rock and State of Wisconsin, have invented a new and useful Carbureter, of which the following is a specification.

This invention has reference to improvements in carbureters, and its object is to provide a carbureter wherein there is produced a perfect mixture of hydro-carbon fuel and air after the carbureter has once been set, irrespective of variations in the load on the engine.

In accordance with the present invention the fuel, which is usually gasoline and which will hereinafter be referred to as gasoline without limitation to such particular fuel, is drawn into the carbureter without admixture of air and then air is taken into the carbureter, the gasoline inlet being closed before the air valve reaches the fully open position. The construction is such that air is drawn into the chamber in which the mixture of air and gasoline vapor takes place, in substantially all directions, and the manner of indrawing the air causes a whirling motion of the air which contributes markedly to the formation of a thorough intermixing of the air and gasoline vapor.

The gasoline may be introduced into the carbureter either by suction or by gravity, but the gasoline supply is, when the parts are at rest, cut off from communication with the interior of the carbureter. The gasoline inlet is under the control of a valve in turn controlled by the suction of the engine and the valve structure further controls an air port so that when the air port is opened by the valve the air enters substantially all about the valve, while the chamber in which the air and gasoline become mixed is so shaped that there is produced a whirling motion of the air, thus causing the desirable intimacy of mixture which contributes so markedly to the efficiency of the engine, it being understood that the carbureter is designed for use in connection with explosion engines.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the further understanding, that while the drawing shows a

practical form of the invention which has proven to be efficient, it is by no means confined to any exact conformity with the showing of the drawing but may be variously changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention.

In the drawings:—Figure 1 is a side elevation of the improved carbureter. Fig. 2 is an end elevation as viewed from the right hand end of Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 2 with some parts in elevation. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is a fragmentary section similar to Fig. 3 but showing the parts in the position to which they are moved on the suction stroke of the engine.

Referring to the drawings there is shown a casing 1 inclosing a chamber 2 and having inner peripheral walls 3 rounded axially, the casing being usually of greater diameter than length. At one end the casing is formed with an axially extended neck 4 having at its free end external screw threads 5, whereby the carbureter may be attached to a manifold or directly to the cylinder of an engine, or to any part, whereby the carbureted air may be directed to the explosion chamber of the engine, but since the carbureter is adapted to many types of engines and the manner of the use of carbureters is well known, it is deemed unnecessary to show any type of engine.

That end of the casing 1 remote from the neck 4 is formed with an inwardly directed flange 6, the inner edge of which defines an opening 7 of comparatively large size. The flange 6 is inset a short distance with relation to the outer edge of the same end of the casing, thereby defining an annular flange 8 projecting axially with relation to the flange 6, wherefore there is formed a seat for an annular gasket 9 and a head 10 secured to the casing 2 by screws 11 or otherwise, the head 10 and screws 11 confining the gasket 9 to its seat. The inner edge of the gasket 9 is of less diameter than the inner edge of the flange 6 and formed in the head 10 is an incomplete annular opening 12, the continuity of this opening being broken by a radial portion 13 of the head having formed therein a duct 14, and this radial portion terminates outside the head in a threaded socket 15 designed to receive a suitable pipe or con-

duit coming from a supply of gasoline or other suitable liquid fuel. The head 10 is provided on one face with an axially projecting stem 16 and on the other face with an axially projecting threaded nipple 17. Extending through the nipple 17, through the head 10 and through the greater portion of the stem 16 is a bore 18 threaded for a short distance at the outer end of the nipple 17. Adapted to the bore 18 is a needle valve stem 19 having a pointed end 20 adapted to a conical seat 21 in that end of the bore 18 adjacent the free end of the stem 16, this conical portion defining a corresponding terminal part of the bore 18. Leading from the conical portion 21 of the bore is a passage 22 which may be in substantially radial relation to the longitudinal axis of the stem 16 and opens through the outer wall of the latter. The needle valve stem 19 has a threaded portion 23 adapted to the interior threaded portion of the neck 17 and the outer end of the stem 19 carries a milled head 24 whereby the stem may be readily manipulated to force the conical end 20 into the seat 21 or to withdraw it therefrom. Applied to the exterior threaded portion of the nipple 17 is a nut 25 carrying a pointer or index finger 26 terminating in indicating relation to the manipulating head 24, which latter is customarily provided with an index marking 27 having any desired relation to the finger 26 to indicate an appropriate position of opening of the valve 20 or any other desired position and the index marking 27 may be taken as indicative of any suitable indicating device, whereby the user may be guided in the manipulation of the carbureter. A packing gland 28 is provided for the threaded nipple 17 and this gland incloses packing 29 about stem 19 where entering the nipple to prevent the escape of gasoline, which latter finds access to the bore 18 through the duct 14 opening into said bore. Applied to the stem 16 is a sleeve 30 formed at one end with a laterally expanded head 31 in substantially radial relation to the longitudinal axis of the sleeve, this head being of a diameter to approach the inner edge of the flange 6 into close relation thereto and to rest near its periphery against the gasket 9. The head 31 constitutes an air valve carried by the sleeve 30, and this valve is held normally into closing engagement with the gasket 9 by a spring 32 surrounding the sleeve 30 with one end bearing against the head or air valve 31, and the other end seated in a recess 33 formed in the head of the casing 1 carrying the neck 4, this spring being shaped to permit a partial collapsing of the spring without materially throttling communication between the chamber 2 and the interior of the neck 4. The sleeve 30 is provided with a perforation or passage 34 serving as a port movable into

and out of coincidence with the passage 22 of the stem 16 by movement of the sleeve 30 along said stem in the direction of the longitudinal axis thereof. The passage 34 is of comparatively small size, and the passage 22 is of like area to the passage 34. In order that the sleeve 30 may in its longitudinal movement, which is caused as hereinafter described, always bring the passages 22 and 34 into coincidence, there is provided a pin 35 carried by the head 10 and projecting into the chamber 2 parallel with the axis of movement of the sleeve 30, and this pin extends through a notch 36 in the air valve 31, so that the valve 31 and sleeve 30 are held against rotation, but are still free to move longitudinally of the stem 16.

In order to limit at will the movement of the air valve away from its seat, the casing 1 is formed with a boss 37 having a threaded passage therethrough leading to the interior of the chamber 2 and adapted to this threaded passage is a thumb screw 38 provided with a milled head 39 readily accessible to the operator and mounted on the screw 38 is a nut 40 having a manipulating handle 41, so that when the screw 38 is adjusted to the desired position it may be clamped in such position by the nut 40, which then acts as a lock nut.

Let it be assumed that the neck 4 is connected up to an explosion engine in the usual manner, and that the socket 15 is connected up to a supply of gasoline. The operator now manipulates the valve stem 19 to unseat the valve 20 so gasoline will find its way through the conduit 14 to the bore 18 and ultimately to the passage 22, but beyond this point the gasoline cannot flow because the outer end of the passage 22 is closed by an imperforate portion of the sleeve 30, this sleeve fitting the stem 16 snugly, and yet without sufficient resistance to prevent easy movement of the sleeve along the stem. Suppose now that the engine is making a suction stroke, thus producing a condition of sub-atmospheric pressure within the chamber 2. The atmospheric pressure upon the face of the valve 31 presented to the port or opening 12 is sufficient to compress the spring 32, thus causing the sleeve 30 to move axially along the stem 16. Before the valve 31 passes beyond the flange 6 the port 34 is brought into coincidence with the passage 22 and sub-atmospheric pressure within the chamber 2 and parts leading therefrom to the engine causes a flow of gasoline through the passages 22 and 34 into the interior of the neck 4 and to an extent into the chamber 2. Immediately thereafter the continued movement of the valve 31 and sleeve 30 by the action of the superior pressure of the atmosphere carries the passage 34 beyond the passage 22, thus again closing the latter, but causing an opening of the air

port 12 to the chamber 2. There is thereby produced a rush of air into the chamber 2 all about the valve 31, and this valve, which is of relatively large diameter, in conjunction with the curved interior walls of the chamber 2, causes a whirl or eddying of the air entering the chamber 2 which is found in practice to be very effective in vaporizing the gasoline and taking up the vapor so caused, practice having demonstrated that the mixture thereby produced is particularly intimate and closely approaches the ideal mixture for explosion engines. As soon as the suction stroke ceases the spring 30 returns the valve 31 to its seat, and although the return movement of the sleeve 30 again uncovers the passage 22, gasoline is not then drawn into the carbureter. This action is repeated each time there is a suction stroke of the engine and gasoline is drawn into the carbureter only in such quantities as are needed, and is at once vaporized and absorbed by the inrushing air, so that no free gasoline remains in the carbureter to too greatly enrich the mixture.

The opening of the valve 31 is determined by the screw 38, and when the adjustment of the parts has been once established, it is unnecessary to change them since practice has demonstrated that the engine will run from no load to full load without any change whatsoever in the adjustment of the carbureter.

What is claimed is:—

1. A carbureter provided with an air valve and a fuel valve connected for simultaneous movement and timed in operation to cause the opening and subsequent closing of the fuel valve prior to the full active opening of the air valve.

2. A carbureter provided with an air valve responsive to the production of sub-atmospheric conditions to move to the open position, and a fuel valve connected to and operated by the air valve and timed with respect to the movement of the air valve to open and close prior to the full effective opening of the air valve.

3. A carbureter provided with an air valve having a range of movement in part substantially inactive for the admission of air, and a fuel valve movable with the air valve to fully open and then close the fuel supply, the opening and the beginning of the closing of the fuel valve being timed to occur during the substantially inactive movement of the air valve.

4. A carbureter provided with an air inlet and a fuel inlet, the latter being closer to the outlet end of the carbureter than the air inlet, and a valve structure controlling both the air inlet and the fuel inlet and responsive to the action of subatmospheric pressure established within the carbureter, the valve structure having a range of movement from

rest at first substantially inactive to open the air inlet and active to open and then close the fuel inlet, and after the fuel inlet is closed to further open the air inlet.

5. A carbureter comprising a casing inclosing a chamber with inner walls curved in the direction of the axis of the carbureter casing and provided at one end with an air inlet, a laterally expanded valve for the air inlet having its outer portions in cooperative relation to the curved walls of the chamber to produce a whirl of air entering the chamber, and a fuel controlling means within the chamber movable by the air valve and timed in operation to cause an opening and closing of the fuel inlet during the initial portion of the movement of the air valve and before the latter is fully open and maintaining the fuel inlet closed during the remainder of the movement of the air valve to the fully open position.

6. A carbureter comprising a suitable casing having a neck at one end and an opening at the other, and inclosing a chamber provided with walls curved in the direction of the length of the longitudinal axis of the carbureter, a cover member for the open end of the casing having a stem extending axially through the chamber in the casing and provided with a bore terminating in a valve seat with a passage leading from said valve seat and opening into the interior of the casing, means for the introduction of fuel into the bore, a manually operable valve for the valve seat in the stem, a sleeve carried by the stem and provided with a passage movable into and out of coincidence with the passage leading from the bore of the stem, the head being provided with an air port and the sleeve with a valve adapted to close said air port, a spring surrounding the sleeve and acting on the air valve to hold it in the closed position, and means for limiting the movement of the air valve toward the open position, the passage in the sleeve being related to the passage leading from the bore of the stem to open and then close said passage in the stem during the movement of the air valve to the open position.

7. A carbureter provided with a casing having an interior chamber with walls curved in the direction of the longitudinal axis of the casing, a cover member for one end of the casing having an air port therein, said cover member having an axially projecting stem extending into the casing, and a neck exterior thereto, said neck and stem being provided with an axial bore terminating in a valve seat near the free end of the stem, the latter having a passage leading from the valve seat to the outer edge of the stem, said head also carrying a duct for fuel communicating with the bore, a manually operable valve extending through the bore

of the neck and stem, a sleeve adapted to the stem carried by the head and provided with a passage movable into and out of coincidence with the passage in the stem, said sleeve terminating at one end in a laterally expanded valve adapted to cover the air port in the head, guiding means for the sleeve and valve for preventing turning movement thereof, a spring surrounding the sleeve and tending normally to hold the valve on the stem in covering relation to the air port, and means for determining the extent of opening movement of the valve, the passage of the sleeve being related to the passage in the stem to coincide during the initial movement of the air valve carried by the sleeve from the closed toward the open position.

8. In a carbureter, normally closed inlet means for fuel, and normally closed inlet means for air, the fuel and air inlet means being responsive to sub-atmospheric conditions produced within the carbureter, and said means being timed in action to open and close the fuel inlet in order during the opening movement of the air inlet means

and before such opening movement is completed.

9. A carbureter provided with an internal chamber having an air valve at one end and an outlet at the other end and with means for the inlet of fuel between the air valve and the outlet end of the carbureter, the chamber within the carbureter being curved in the direction of the longitudinal axis of the carbureter and related to the air valve to cause a whirl or eddying of air entering the chamber through the opening controlled by said valve, the fuel inlet being provided with controlling means in turn controlled by the air valve and timed in operation with respect to said air valve to admit fuel and cut off the supply while the air valve is moving to the open position.

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

GEORGE A. CLEMENT.

Witnesses:

T. D. WOOLSEY,
W. H. ARNOLD.