W. E. HAINES.

CARBURETER.

APPLICATION FILED DEC. 11, 1909.

973,937. Patented Oct. 25, 1910.

3 SHEETS—SHEET 1.

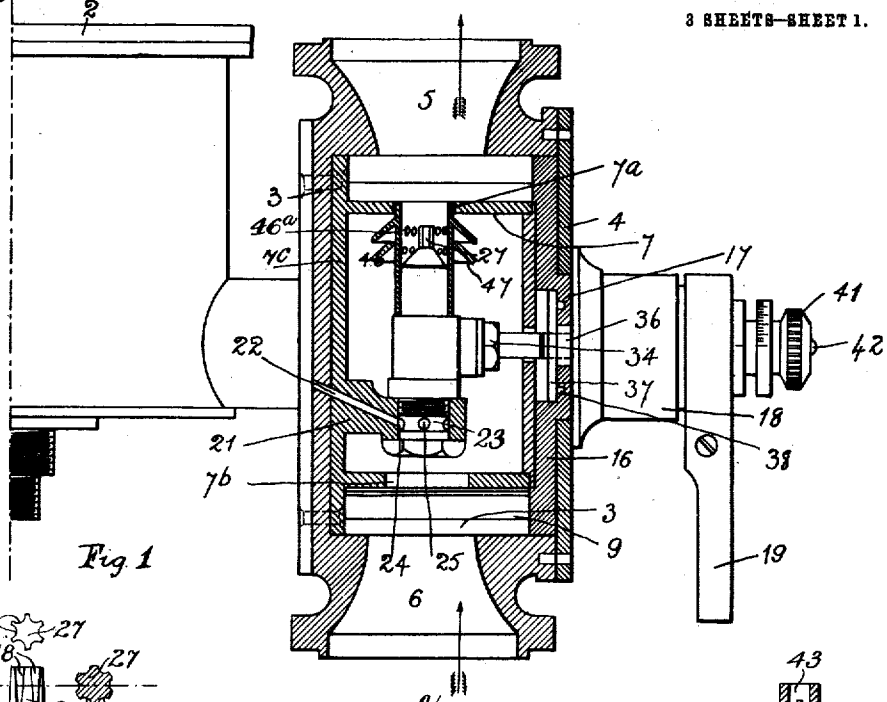

Fig. 1

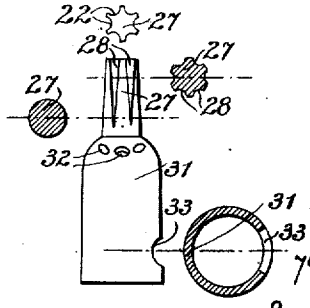

Fig. 10

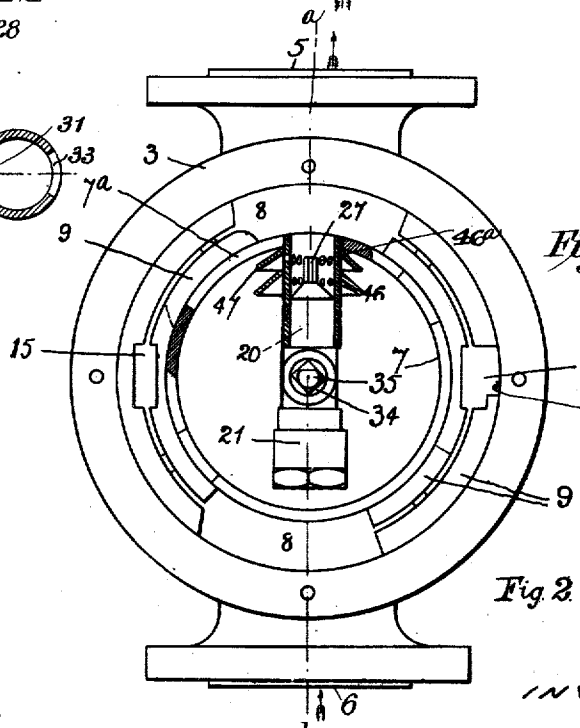

Fig. 2

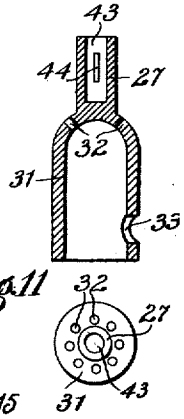

Fig. 11

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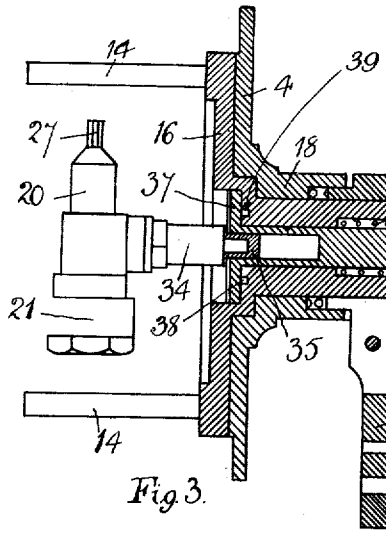

Fig. 3.

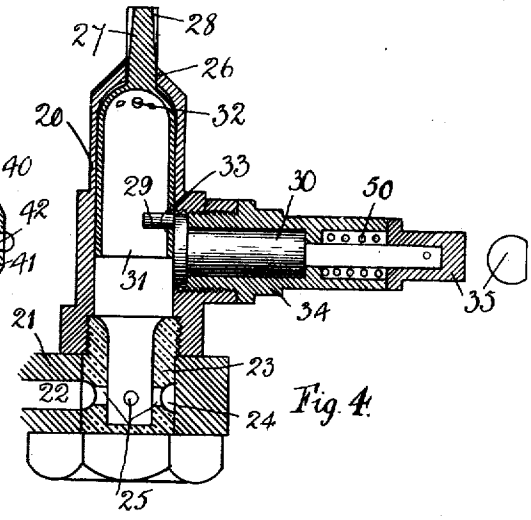

Fig. 4.

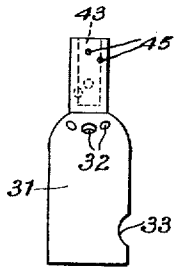

Fig. 12.

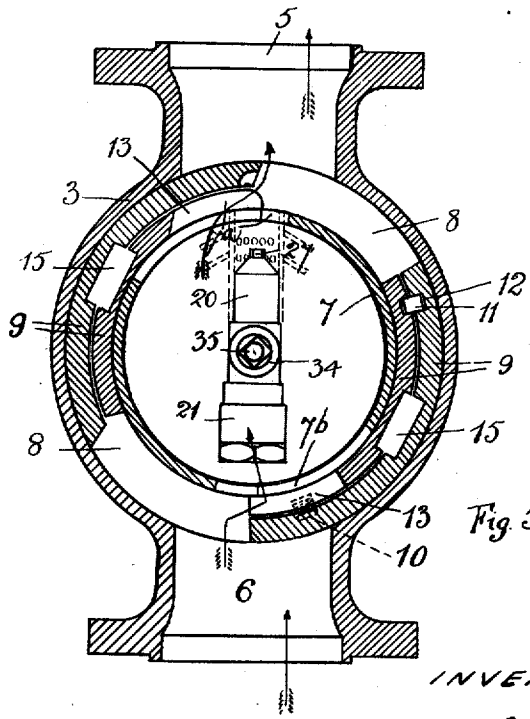

Fig. 5.

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3 SHEETS—SHEET 3.

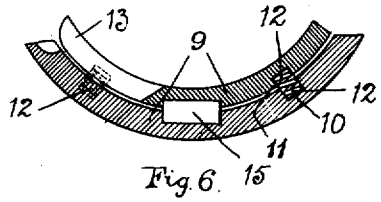

Fig. 6.

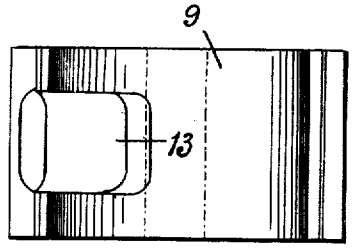

Fig. 7.

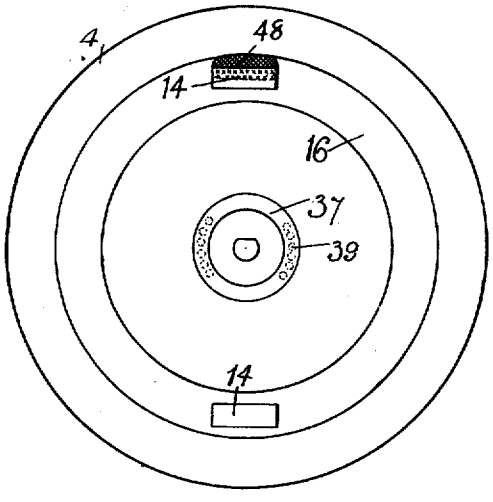

Fig. 8.

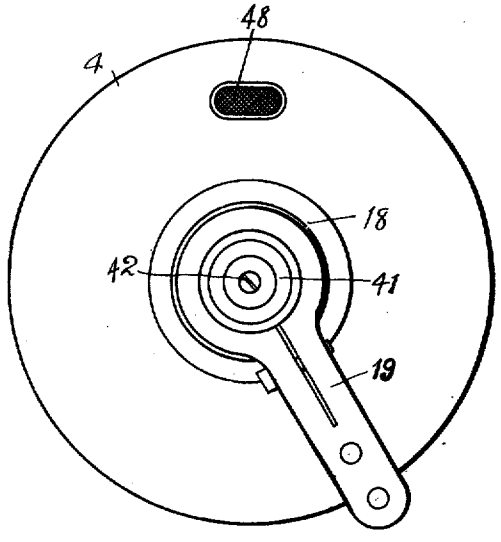

Fig. 9.

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CARBURETER.

973,937. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed December 11, 1909. Serial No. 532,714.

To all whom it may concern:

Be it known that I, WILLIAM ERNEST HAINES, subject of Great Britain, residing at Cheltenham, in the county of Gloucester, England, have invented new and useful Improvements in Carbureters for Use in Connection with Internal-Combustion Engines, of which the following is a specification.

This invention has reference to carbureters for internal combustion engines and more particularly to such as are designed so that the supply of fuel is regulated simultaneously with the movement of the throttle.

The type of carbureter to which this invention is especially applicable is characterized by a fuel jet which is made larger than usual and is fitted with a grooved tapered or fluted plug adapted to be reciprocated within the jet body by mechanism coupled to and moving in unison with the throttle.

The object of the present invention is to improve the construction and operation of such carbureters with a view mainly to prevent the fuel jet becoming choked.

Accordingly the invention consists in imparting to the reciprocating plug a simultaneously rotary motion in the jet and in the mechanism employed for effecting this compound movement of the plug.

The invention also embraces minor constructional features such for example as the improved means for giving an independent and differential adjustment to the jet plug when desired and the improved construction of throttle.

In order that my invention may be readily understood and carried into effect reference is made in describing the same to the accompanying sheets of explanatory drawings, wherein,

Figure 1, is a part sectional side view on the line *a*—*b* of Fig. 2 of a carbureter constructed according to this invention showing the relative arrangement of the principal parts. Fig. 2, is a front view of the same with the cover plate and throttle and jet plug actuating mechanism removed and showing the segmental throttle plates or slides. Fig. 3, is a sectional side view of the cover plate and throttle and jet plug actuating mechanism. Fig. 4, is an enlarged sectional view of the jet plug and plug actuating mechanism. Fig. 5, is a transverse vertical view of the mixing chamber showing the throttle partly closed. Figs. 6 and 7 are edge and inside plan views respectively of one of the throttle slides showing the cut away portion of the inner member and the arrangement of the springs between the two members. Figs. 8 and 9 are back and front elevations respectively of the cover plate and throttle and jet plug operating mechanism carried thereby, and Figs. 10, 11 and 12 are enlarged detail views of three different forms of jet plug, Fig. 10, including cross sectional views at different parts of the plug.

Throughout the drawings like parts are designated by the same reference characters.

Referring to the drawings, 2 represents the float chamber which is of conventional form and only partly shown, 3 the body or outer casing of the carbureter usually of brass connected rigidly to the float chamber, and 4 is the cover plate carrying the throttle and jet plug operating mechanism.

The body 3 of the carbureter is cylindrical and provided at the top and bottom with outlet and inlet orifices or ports 5, 6 respectively. The mixing chamber in which the fuel jet is located comprises a short cylinder 7 carried by a base plate 7^c and formed with corresponding inlet and outlet orifices, 7^b, 7^a respectively. The said cylinder 7 is arranged concentrically within the outer casing 3, the base plate being riveted to the rear wall of the outer chamber. The said cylinder is of less diameter than the said outer casing so that between the inner surface of the outer casing and the outer surface of the cylindrical mixing chamber an annular space 8 is left, see Figs. 2 and 5, in which a pair of segmental throttle plates or slides 9 is adapted to be moved to control the said inlet and outlet orifices or ports.

Each throttle slide 9 comprises two superposed segmental members, the respective outside surfaces of which are concentric with the inside surface of the outer case 3 and the exterior surface of the mixing chamber 7 and are maintained in close contact therewith by small spiral springs 10. The said springs are preferably contained in open-ended ferrules 11 the ends of which are adapted to enter suitable recesses 12 formed in the inner faces of the members of each slide as clearly shown in Fig. 6.

As will be seen from Fig. 5, the ports 7^a, 7^b, in the mixing chamber 7, are set slightly out of alinement with the corresponding ports 5, 6 in the outer casing and with each

other. The end of the inner member of each slide adjacent to the ports 7^a, 7^b, is also cut away for a suitable distance at 13 as shown. A sinuous or tortuous passage for the entry of the air and the exit of the mixture is thus formed as indicated by the curved arrows in Fig. 5, the object being to assist the mixing of the air and gas.

The slides are operated to open and close the inlet and outlet orifices 6, 5 by means of keys or drivers 14 which enter corresponding keyways 15, cut through said slides, and are carried by and project at right angles from the inner face of the head 16 of a hollow sleeve 17 mounted in the cover plate 4, see Fig. 3. Said sleeve 17 passes through the hollow central boss 18 of the cover plate 4 and is furnished at its outer end with an arm or lever 19, see Figs. 3 and 9, whereby the said sleeve and hence the throttle plates may be moved at will through any suitable connections.

The improved construction of fuel jet employed to prevent choking of the latter and to provide for an automatic and proportionate supply of fuel in relation to the throttle and air is clearly shown in the enlarged detail view Fig. 4 and comprises a secondary inlet chamber or jet body 20 located vertically and centrally within the mixing chamber 7 and supported by a hollow lug 21 into which the petrol duct 22 leads from the float chamber, Fig. 1. The said lug may be cast integral with the back plate of the mixing chamber, as shown, or may be a separate fitting and the jet body is secured firmly in position thereon by means of a hollow screw 23. The part of the screw which occupies the lug 21 is formed with an annular groove 24 in which a series of lateral holes 25 are formed to establish communication between the petrol duct 22 and the bore of the screw, and hence to the hollow interior of the jet body. The upper extremity of said jet body is tapered and formed with a small passage 26 through which the petrol issues. The necessary variation in the amount of petrol issuing from the jet body and the removal of obstructions therefrom is effected by means of a plug 27 which is adapted to reciprocate and turn with a snug fit in said passage and according to a preferred construction is formed with a series of longitudinally tapered grooves 28 which decrease in depth from the top of the plug until at the root of same there are no grooves, as clearly illustrated in Fig. 10, so that when the plug is in its highest position in the jet body as shown in Figs. 1, 3 and 4, the passage therein is completely closed. The grooves in the plug are intended to take the place of the customary fine holes or seatings which have hitherto been employed in carbureter jets.

The compound reciprocatory and rotary movement of the plug in the jet body is effected by means of a pin 29 carried eccentrically on the end of a short spindle or crankshaft, 30, and for this purpose said plug is provided at its lower end with an enlarged sleeve like extension 31 the upper part of which is perforated at 32 for the passage of the petrol from its hollow interior to the grooves aforesaid. The said extension is made a sliding and turning fit within the hollow body 20 of the jet and is formed with a horizontal slot 33 at its lower end for the reception of the aforesaid eccentric pin 29. It will now be seen that as the spindle or crankshaft 30 before mentioned is rotated, the pin in traversing a circular path alternately raises and lowers and also at the same time partly rotates or oscillates the plug within the jet body thus fulfilling the necessary conditions for varying the quality of the explosive mixture and for keeping the jet clear of obstructions.

The spindle or crankshaft 30 is supported in a socket 34 which screws into the lower front part of the jet body and its outer free end is furnished with a cap 35 of preferably D-section pinned thereto whereby the spindle may be rotated, and with a spiral spring 50 for the purpose of maintaining a petrol tight joint between the adjacent contacting inner ends of the spindle and socket 34.

The connection between the headed hollow sleeve 17 which effects the movements of the throttle slides 9, and the aforesaid spindle 30 operating the jet plug, is by means of a headed stem 36 carried in the bore of the said headed sleeve 17. In order to provide for adjustment of the jet plug 27, independently of the throttle to allow for atmospherical variations the said stem 36 has a clutch connection with the headed sleeve 17 and for this purpose the head 37 of said stem is provided with one or more pins 38 adapted to engage in one or more of a series of recesses 39 formed in the adjacent face of the head 16 of the sleeve 17, see Fig. 3. The pitch of the recesses will of course determine the minimum adjustment. Normally, the pins 38 are kept in engagement with their recesses by means of a spiral spring 40 located in the enlarged outer part of the bore of the headed sleeve 17 and abutting against a shoulder therein at one end and a milled nut 41 secured to the outer end of the headed stem 36 by a screw 42 at the other end as clearly shown in Fig. 3. The front headed end of the said stem is formed with a central D-shaped hole to receive the correspondingly formed end of the spindle 30.

When it is desired to adjust the position of the plug in the jet body independently of the throttle, the stem is forced inward by applying endwise pressure to the milled nut 41 sufficient to free the pins 38 from engage-

ment with their recesses, when the stem and hence the spindle 30 and plug 27 may be adjusted at will without in any way interfering with the throttle.

The end of the sleeve 17 may be marked and the milled nut 41 provided with a graduated scale so that the amount of relative movement between the said nut and sleeve may be used as a guide in determining the degree of independent adjustment given to the jet plug.

Figs. 11 and 12 illustrate two alternative forms of plug. In each case the plug is recessed axially at 43 and in one case, Fig. 11, is also formed with a longitudinal slot 44 and in the other case Fig. 12, with a helical series of fine holes 45. The slit or the holes as the case may be establish communication between the axial recess in the plug and the interior of the jet body into which the petrol passes by way of the perforations 32 in the extension 31 already referred to.

For the purpose of deflecting the incoming air toward the petrol as it issues from the jet the jet body is provided with a perforated ferrule 46 formed with conical flanges 47 as shown in Figs. 1 and 2. The said ferrule embraces the upper end of the jet body and incloses the jet. The conical flanges face toward the inlet orifice 6 and deflect the incoming air through perforations 46[a] in the ferrule into the presence of the petrol issuing from the jet, the resulting mixture passing out of the open top of the ferrule to the outlet orifice 5.

To provide for a free passage of air to the engine when the throttle is closed a small gauze covered orifice or by-pass such as 48, Figs. 8 and 9 is made in the cover plate which when the throttle is closed is in open communication with the outlet orifice leading to the engine. For this purpose one of the keyways 15 (see right hand side of Fig. 2) is formed with an outwardly directed extension 15[a] which, when the throttle is closed, registers with the orifice 48 in the cover plate and thus provides free access of air to the engine by way of the outlet port 5 in the outer casing 3 of the carbureter.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a carbureter, in combination, an outer casing, a mixing chamber fixed concentrically therein, a throttle valve movable between said mixing chamber and outer casing, means for actuating said throttle, a jet nozzle communicating with the source of fuel supply and located within said mixing chamber, a plug loosely positioned within said nozzle and extending through and adapted to close said fuel passage, said plug being formed with longitudinal taper grooves for controlling the passage of the fuel when the plug is moved from its closed position, and means having a releasable pin and hole connection with the throttle operating means for simultaneously rotating and reciprocating said plug.

2. In a carbureter the combination with the throttle and fuel jet of a plug movable within said jet, a spindle carried by the jet body, a crank on said spindle adapted to enter a slot in the plug, and means normally operable by and in unison with the throttle but capable of independent operation relatively thereto for imparting rotary motion to said spindle.

3. In a carbureter the combination with the throttle and fuel jet of a plug movable within said jet for controlling the flow of fuel therethrough, mechanism for imparting a simultaneous reciprocating and rotary motion to the plug within the jet, throttle controlling means, a headed stem having an adjustable and releasable clutch connection with the throttle controlling means and operatively engaging said mechanism.

4. In a carbureter, the combination with an outer casing having inlet and outlet ports for air and vapor respectively of a throttle comprising slides adapted to be moved within said casing to simultaneously control the supply of air and vapor, means for actuating said slides and mechanism normally operable by and in unison with said throttle slides for regulating the fuel supply and for removing obstructions from the fuel jet.

5. In a carbureter, the combination with a cylindrical outer casing having inlet and outlet ports for air and vapor respectively and a similarly ported concentric inner mixing chamber, of throttle slides movable between said outer and inner casings, said slides each comprising two superposed segmental members, springs located between said members for maintaining them in close contact with the walls of the said outer and mixing chambers respectively and means for operating said slides.

6. In a carbureter the combination with a cylindrical outer casing having inlet and outlet ports of a throttle comprising segmental slides rotatable within said casing, a fixed end plate, a plate rotatably carried by said end plate, fingers on said plate adapted to engage with said slides and means for rotating said plate.

7. In a carbureter the combination with a fuel jet located within the throttle and between the air inlet and the vapor outlet of a plurality of conical flanges adapted to direct the incoming air toward the jet nozzle.

8. In a carbureter the combination of an outer casing having inlet and outlet ports for air and vapor respectively, an inner mixing chamber similarly ported, throttled slides movable between said inner and outer casings, means for operating said slides, a fuel jet, a longitudinally recessed plug movable within said jet and provided with a

hollow enlarged extension, a spindle, a crank pin thereon adapted to enter a slot in said extension of said plug, and means having a releasable clutch connection with said throttle slide operating means adapted to engage with and rotate said spindle so as to impart a simultaneous reciprocatory and rotary movement to the plug.

9. In a carbureter, the combination of a cylindrical outer casing having inlet and exhaust ports for the air and vapor respectively, an inner concentric mixing chamber having inlet and exhaust ports set slightly out of alinement with the corresponding ports in the outer casing and with each other, throttle slides movable between said outer and inner casings, each said slide comprising two superposed segmental members, the end of the inner member of each said slide adjacent to the ports in the mixing chamber being cut away to facilitate the entry and exit of the air and vapor respectively to and from the mixing chamber, means for operating said slides, a fuel jet located within said mixing chamber, means for directing the incoming air toward the jet nozzle, a recessed and perforated plug movable within said jet for controlling the flow of fuel therethrough and mechanism normally operable by and in unison with the throttle slides but capable of independent adjustment relatively thereto for imparting a simultaneous reciprocatory and rotary motion to said plug within the jet.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ERNEST HAINES.

Witnesses:
THOMAS ELMES,
ERNEST CHARLES CORNOCK.