J. T. JENNINGS.

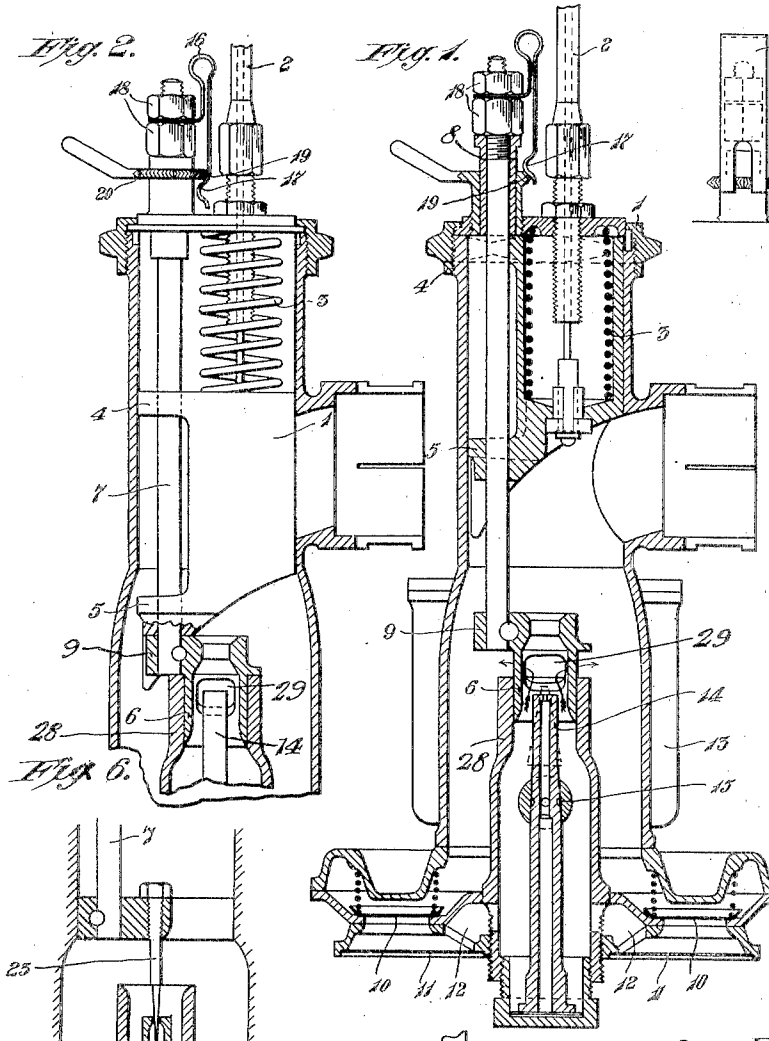
CARBURETER.

APPLICATION FILED OCT. 24, 1916.

1,349,835.

Patented Aug. 17, 1920.

4 SHEETS—SHEET 1.



Inventor:-
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4 SHEETS—SHEET 2.

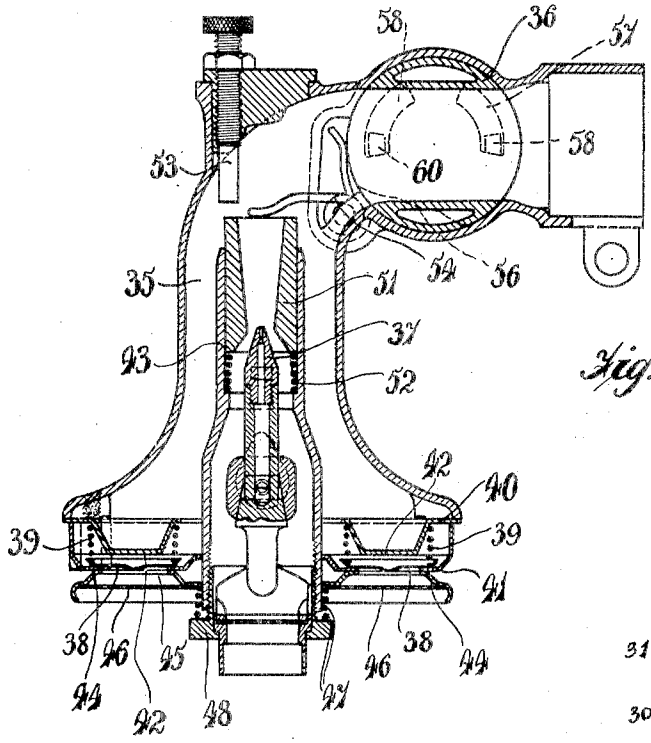


Fig. 9.

Fig. 8.

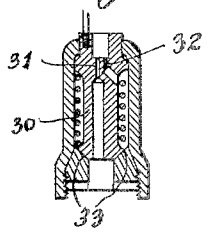


Fig. 10.

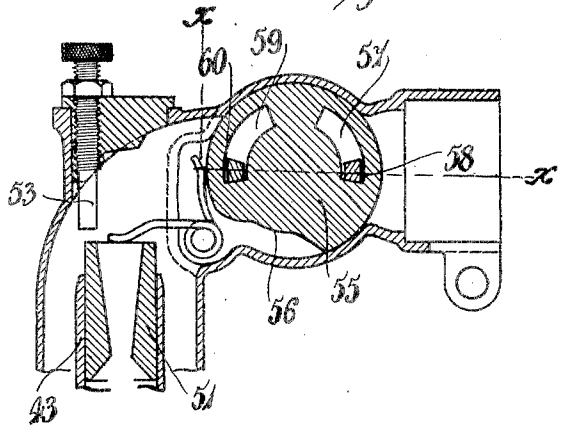
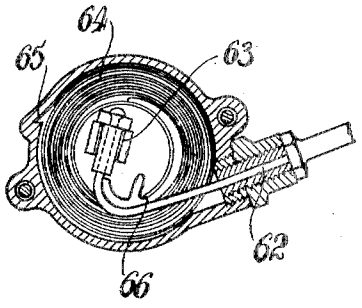


Fig. 11.



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4 SHEETS—SHEET 3.

Fig. 12

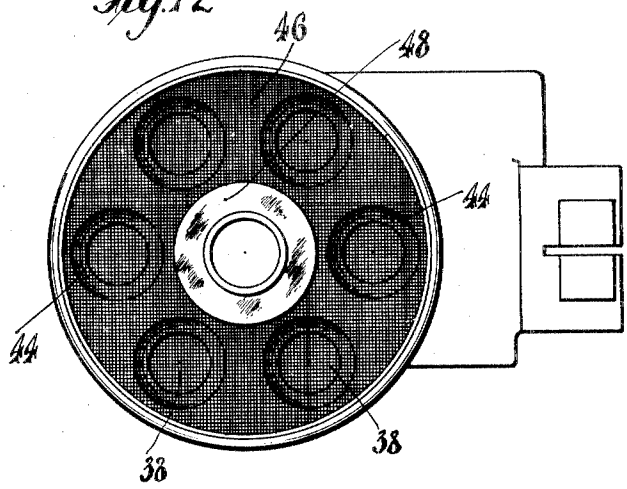
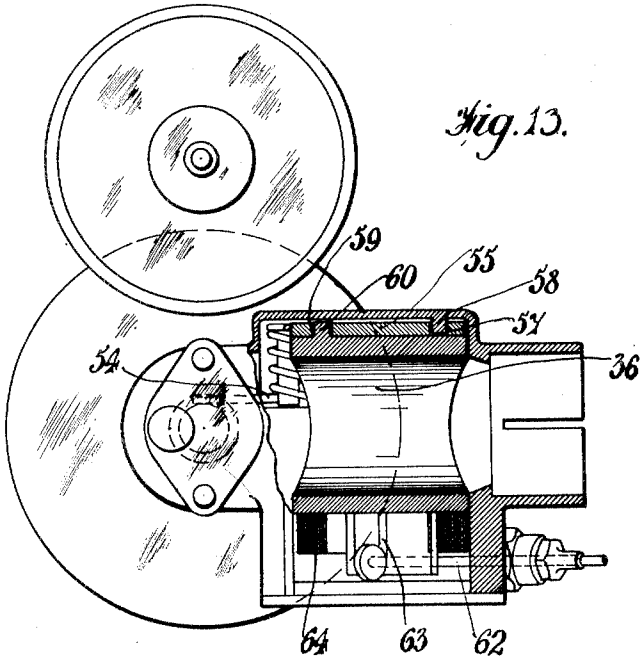


Fig. 13.



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4 SHEETS—SHEET 4.

Fig. 14.

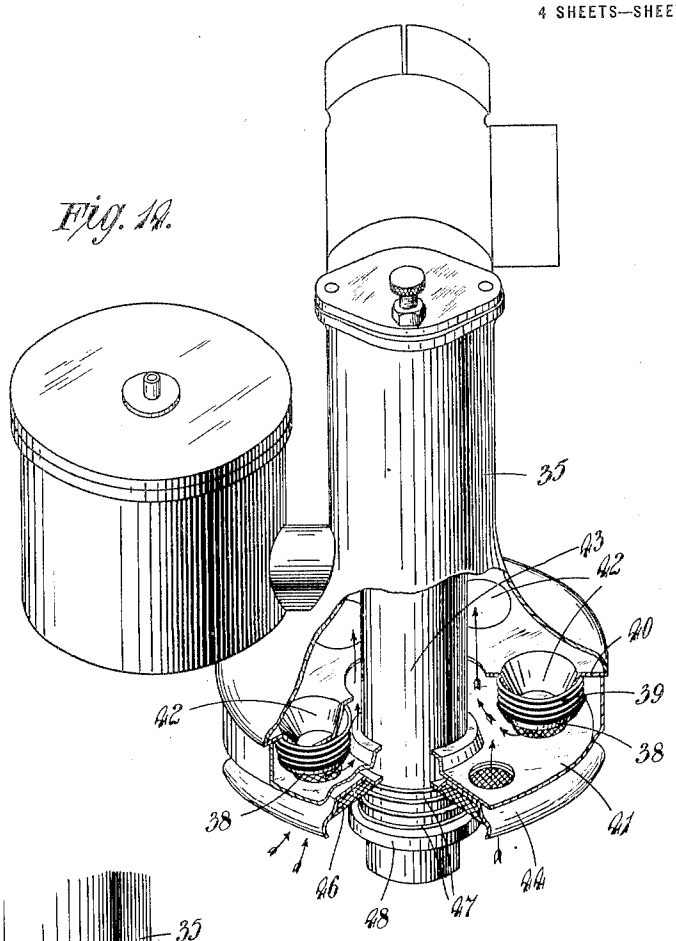
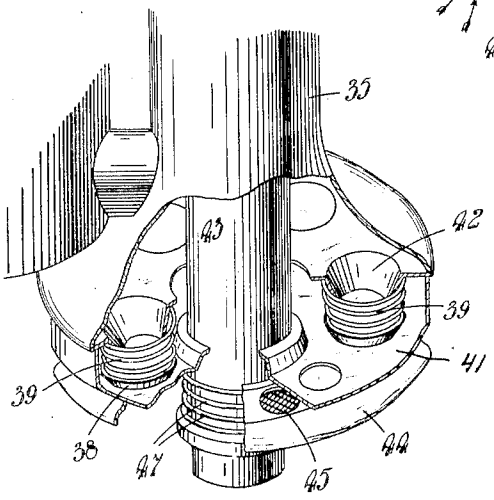


Fig. 15.



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UNITED STATES PATENT OFFICE.

JOHN THOMAS JENNINGS, OF BIRMINGHAM, ENGLAND.

CARBURETER.

1,349,835. Specification of Letters Patent. Patented Aug. 17, 1920.

Application filed October 24, 1916. Serial No. 127,446.

To all whom it may concern:

Be it known that I, JOHN THOMAS JENNINGS, subject of the King of Great Britain, residing at 35 Wharf road, King's Norton, Birmingham, in the county of Warwick, England, have invented a new and useful Carbureter for Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention refers to improvements in carbureters for internal combustion engines.

Various forms of carbureters have heretofore been proposed in which the suction at the jet or the size or number of the jet or jets is automatically varied according to the position of the throttle valve, but in such cases the mixtures were approximate to one constant mixture or infinitely variable, whereas the primary object of the present invention is to provide for two or more specific mixtures each approximately constant at varying powers obtained by defined or limited movements of the carbureter control. Further objects of the invention are improvements in the construction of various parts of carbureters.

According to this invention I employ in combination means for giving a practically constant mixture at varying powers by the automatic variation of the area of the air inlet; and means for altering the proportion of fuel delivered; all so arranged that a plurality of specific mixtures each approximately constant at varying powers are obtainable at will.

Referring to the drawings:—

Figure 1. is a sectional elevation of a carbureter according to this invention in which two specific mixtures are obtainable by raising and lowering the choke tube.

Fig. 2. is a part sectional view showing the choke tube in its lowered position.

Fig. 3. is a detail view of the spring and detent for retaining the choke tube in one of its extreme positions.

Figs. 4 and 5. are sectional detail views showing modified forms of choke tubes.

Fig. 6 is an enlarged detail sectional view of a form of the invention in which the specific mixtures are obtained by raising and lowering a needle valve which varies the effective area of the jet.

Fig. 7. is a plan of same.

Fig. 8. is a detail showing means whereby the number of jets in operation may be varied instead of varying the effective size of the jet.

Fig. 9. is a sectional view of another form of carbureter according to this invention.

Fig. 10. is a detail section showing the cam actuated means for raising and lowering the choke tube to change from one specific mixture to another.

Fig. 11. is a sectional view showing the spring which returns the throttle slide after it has been rotated by the primary lever.

Fig. 12 is an inverted plan view of Fig. 9.

Fig. 13 is a view in section on line X—X of Fig. 10.

Fig. 14 is a sectional perspective view of the form of the carbureter shown in Figs. 9 to 13, showing the plate 41 in one position.

Fig. 15 is a detail sectional perspective view of the same, showing the plate 41 in another position.

In automatic carbureters of the type as illustrated in the drawings in which the depression at the jet is practically constant for any given power, but not at all powers, and is affected normally only by variation in depression in the mixing chamber, I may use a sliding choke tube having a tapered bore by the movement of which different diameters of its bore may be brought opposite the jet orifice, giving different depressions for any particular rate of flow through the choke tube. By providing that the choke tube may have a relatively free or a variously restricted outlet at will the same results can be obtained. These methods of obtaining various mixtures are possible when a portion only of the air supply is admitted through the choke tube. The relation between the strong and the weak mixtures is not constant at all powers by this latter method but in some ways this may be an advantage.

In carrying my invention into practice illustrated in the accompanying drawings in Figs. 1–3 applied to a carbureter of the type where the depression at the jet is approximately constant at any given power, the throttle slide 1 controlled by Bowden wire mechanism 2, against the action of a spring 3, is provided with an upper abutment 4 and a lower abutment 5, the upper abutment 4 serving to lift the choke tube 6 by means of

the rod 7 and sleeve 8 when the said throttle is raised to its highest position, the abutment 5 being adapted to engage with the abutment 9 connected to the choke tube when the throttle is in its lowest position and serving to depress the choke tube to the position shown in Fig. 2. Thus the whole of the movement of the Bowden wire mechanism is employed solely to move the throttle slide with the exception of the extreme outward movements of the lever at the ends of its stroke which serve to either raise or lower the choke tube. The power is thus regulated by a single control and to alter the position of the choke tube and to obtain the second of the specific mixtures obtainable, the control is moved over its extreme position when either the abutment 4 strikes the sleeve 8 and thus lifts the choke tube or the abutment 5 engages the top of the choke tube and lowers it so as to give the second of the specific mixtures obtainable.

As illustrated the carbureter is provided with air valves 10 while a gauze 11 is provided for covering the admission to the air inlet ports 12 and 10 such valves being of such weight or being suitably weighted by springs, so as to give a practically constant mixture at all speeds. These valves open by suction and are so loaded that the amount of valve opening is automatically proportioned to the suction of the engine.

The petrol or the like is fed from the float chamber 13 to the jet 14 through the passage 15.

Means are provided for retaining the choke tube in one of its two positions against involuntary movement, such means including the spring member 16 provided with a detent 17, the spring being mounted upon the rod 7 by nuts 18, while the detent 17 engages with a rim 19 upon a member 20 screwing in a fixed part of the carbureter and obviously by partly rotating the member 20, it lifts the sleeve 8 and prevents the choke tube 6 from seating itself on the tubular piece 28, the slight opening thus provided giving additional suction at the jets through the ports 29 in the choke tube. To retain the member 20 in its adjusted position it is provided with a number of notches around its periphery which engage with the bifurcated end of the spring 16 and prevent inadvertent rotation. By adjusting the nuts 18 and the spring 16 upon the rod 7 it will be obvious also that adjustment of the movement of the choke as controlled by the throttle can be obtained. As shown in the drawings the spring 16 is clamped on the rod 7 between the two nuts 18, 18 and the spring is moved when the nuts are adjusted along the rod. The member 20 gives a finer adjustment by displacing the rim 19 relatively to the spring.

In Fig. 4 a modified form of choke tube 6′ and jet 14′ are illustrated, the choke tube having an outwardly expanding and tapered bore while the jet has upwardly inclined orifices 22′.

Fig. 5 shows another modified form of choke tube which has an upwardly contracting tapered part.

In Figs. 4 and 5 there are no side openings in the choke tube such as are shown in Figs. 1 and 2. The choke tube operates by sliding up and down and thus bringing an annular space with varying areas opposite the jet orifices. This results in varying air velocities opposite the orifices and consequent varying velocities of efflux of fuel. The choke tubes are moved to give the two specific mixtures in the same way as is the choke tube in Figs. 1, 2, and 3.

In automatic carbureters as shown by Figs. 6, 7 and 8 which normally have a fuel orifice of a constant area I may provide for the specific variations in the mixture by suitable variations in the area of the fuel orifice or in the number of them. The restriction to the flow of fuel may be at any point between the float chamber and the jet extremity.

In Figs. 6 and 7 an arrangement is shown in which the movable choke tube is dispensed with and means provided in the form of a needle valve 23 for adjusting the effective area of the jet which is obtained by raising or lowering the needle valve to one of two specific and predetermined positions. The needle valve is displaced in the same way as the choke tube shown by Figs. 1, 2, and 3.

Fig. 8 shows a method by which the number of jets in operation may be varied. When the jet regulator 30 is in its lowered position the orifice 31 only is in operation but when the jet regulator is raised off the seating 33 the orifice 32 is also in operation, liquid fuel passing around the outside of the regulator 30 and then through the orifice as well as through the orifice 31. When the regulator is on its seating it is impossible for fuel to pass the seating and therefore it cannot reach the orifice 32.

In Figs. 9 to 11 another form of carbureter is shown which comprises a body member 35 containing a rotary throttle valve 36. In this carbureter the graduation of the range of suction at the jet 37 is effected by light valves 38 loaded by springs 39 carried in a casing formed by annular plates 40, 41 secured to the carbureter body. The valves are loaded so that the valve opening is automatically proportioned to the suction of the engine. The plate 41 forms seatings for the valves 38 while the plate 40 has projections 42 which act as guides for the springs 39 thus securing the valves against

lateral displacement and also acting as stops for limiting the extent which the valves may open.

Within the carbureter body is an inner tubular member 43 which carries the air regulating valve member 44, which latter has a series of openings 45 corresponding with the air valve openings, so that by rotating this member 44 the valve openings may be closed if required as when starting up the engine. This member 44 carries the gage 46 and is held in place by a spring 47 disposed between the member 48 screwing into the tube 43 and the said member 44, so that the member 44 is frictionally retained in any position to which it may be adjusted.

In top of the tube 43, is an internally tapered choke tube 51 beneath which is a spring 52 seeking to lift the choke tube, an adjustable stop 53 being disposed above the choke tube for limiting the extent to which the choke tube may rise. Also above the choke tube is a bell crank lever 54 resting upon the top of the choke tube and thus forming a second adjustable stop, this bell crank lever being formed from slightly resilient wire the second member of the lever engaging with the periphery of a cam 55 so that when this second member of the lever engages the higher point of the cam the choke tube is depressed to its lower position, while when the cam is rotated so as to bring the depression 56 against the bell crank lever, the choke tube then rises under the influence of the spring 52 to its higher position.

The cam is provided with a slot 57 which engages with a projection 58 fixed on the carbureter body and which serves to limit the extent to which the cam may be rotated. The cam has a second slot 59 which is engaged by a projection 60 which is upon the throttle slide 36, there being thus a certain amount of lost movement between the throttle slide and the cam, equal to the length of this slot so that the cam is not moved during part of the travel of the slide, but if the throttle slide is moved to its extreme limit, *i. e.*, beyond a predetermined range of throttle opening, the projection 60 will then reach the end of the slot 59, and then move the cam thus serving to either depress the choke tube or to permit it to rise.

In operation when the throttle is rotated the projection 60 moves with it in a clockwise direction and the cam 55 remains stationary until the projection 60 comes into contact with the end of the slot 59. Upon further rotation of the throttle 36 the cam 55 moves with it. This motion can take place until the end of the slot 57 comes into contact with the stop 58.

When the choke tube is in its lower position there is one specific mixture or specific proportion between the fuel and air, the throttle valve operating to open or close the air without altering this mixture, but an extended movement of the throttle valve serves to change the position of the choke tube and thus the proportion between fuel and air thus producing a second specific mixture.

The throttle valve may be conveniently actuated by means of a cable 62 secured to the throttle valve at 63 the pull upon the cable serving to rotate the throttle valve which is returned to its normal position by means of the coiled spring 64, one extremity of which abuts against the casing at 65 and the other extremity of which abuts against a part 66 on the throttle slide. By providing another or intermediate step upon the cam a third specific mixture may be obtained.

What I claim then is:—

1. In a carbureter, the combination of a body member, means for giving a practically constant mixture at varying powers by the automatic variation of the area of the air inlet, a jet, a movable controlling member associated with said jet and adapted to control the passage of fuel therethrough, a throttle valve, an operating member for said throttle valve, and means for associating the movement of the throttle valve with the movement of the said movable controlling member, whereby during the first portion of the opening of the throttle valve the fuel supply control remains approximately stationary, but during the latter portion of the throttle opening the fuel supply control is adjusted to increase the fuel supply, so giving two distinct mixtures, a weak mixture succeeding a closure of the throttle and a strong mixture succeeding a full opening of the throttle, quite independent of the running of the engine.

2. In a carbureter the combination of a body member, means for giving a practically constant mixture at varying powers by the automatic variation of the area of the air inlet, a jet, a movable controlling member associated with said jet and adapted to control the passage of fuel therethrough, a throttle valve, an operating member for said throttle valve, a member associated with said movable controlling member and by a lost motion mounting with said throttle valve whereby during the first portion of the opening movement of the throttle valve the fuel supply control remains approximately stationary, after which further opening of the throttle serves to adjust the fuel supply control to increase the supply of fuel until this reaches a maximum, after which the throttle can be brought back to an approximately closed position without materially altering the adjustment of the fuel control supply.

3. In a carbureter the combination of a

body member; means for giving a practically constant mixture at varying powers by the automatic variation of the area of the air inlet; a jet; a choke tube disposed around the jet; spring means normally tending to raise the choke tube; a rotary throttle valve; means for rotating the throttle valve in one direction; a spring for rotating the said throttle valve in the reverse direction; a cam; means for giving a limited rotary movement to the cam when the throttle valve is moved beyond predetermined limits; and a bell crank lever engaging said cam and choke tube and serving to depress the choke tube when the cam moves in one direction and to permit it to rise under the influence of the aforementioned spring when the cam moves in the opposite direction.

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

JOHN THOMAS JENNINGS.

Witnesses:

HAROLD J. L. FORRESTER,

MARY J. PARKES.