W. P. KIDDER.

CARBURETER.

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1,258,787. Patented Mar. 12, 1918.

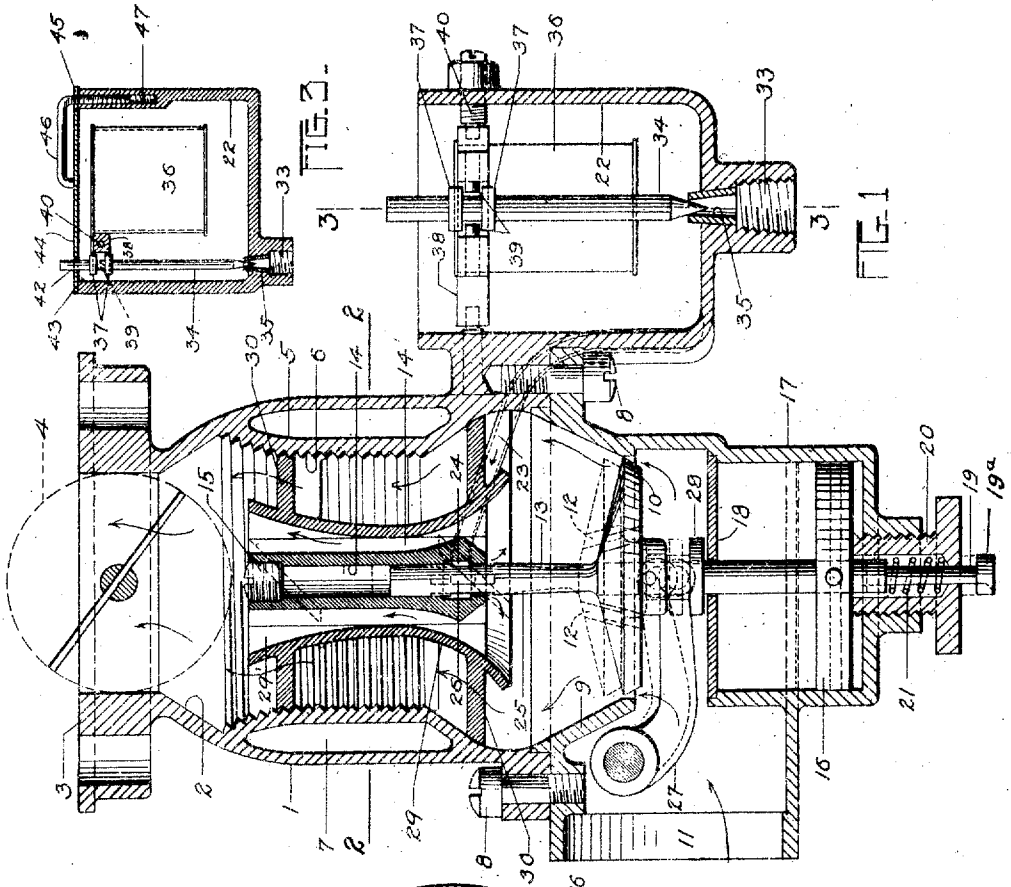


FIG. 3.

FIG. 1

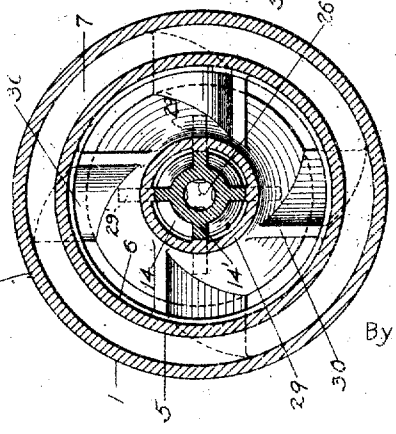


FIG. 2

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CARBURETER.

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To all whom it may concern:

Be it known that I, WELLINGTON P. KIDDER, a citizen of the United States, residing at Jamaica Plain, county of Suffolk, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters for internal combustion engines and particularly to the regulation of the fuel and air intake according to the needs of the engine.

The specific improvements involved in my present invention relate to the increase of the fuel discharge simultaneously with the increase of the suction. In starting the engine, particularly when cold, it is necessary to not only increase the suction but to enrich the mixture proportionately so that the charge will be delivered in a form best suited for immediate explosion. It is also desirable that both intake controls shall return to their normal low speed adjustment as soon as the engine is started.

To the end therefore of providing a carbureter wherein the fuel and air intakes may be positively controlled to enrich or diminish the mixture according to the needs of the engine I have devised my present invention. In this invention the normal and the increased suction and the normal and the increased fuel discharge are controlled simultaneously so that the mixture may always be regulated according to the needs of the engine. The volume of air admitted into the mixing chamber of the carbureter is controlled by an adjustable air valve having two effective positions, one for normal low speed or for very slow idling and the other for increased suction. The quantity of fuel admitted is controlled by two independent fuel valves, one controlling the normal fuel discharge and the other controlling the increased fuel discharge and effective only when the suction is increased. All valves are mounted on a single stem which is adjustable from the dash and constitutes substantially the only moving part of the carbureter mechanism so that by its displacement all the valves are simultaneously moved. The fuel is caused to travel a downward and upward path and in its course is atomized and intimately mixed with the air which is introduced in opposition to the initial fuel flow.

These and other features which will appear more fully hereinafter are secured in the carbureter forming the subject matter of the present invention. The construction and operation of my invention will be more fully disclosed in the specification which follow. In the drawings forming a part of that specification I have shown a carbureter which not only illustrates the principles involved but is in itself a form found satisfactory in use. Throughout specification and drawings like reference numerals are correspondingly applied and in these drawings,

Figure 1 is a vertical section through a carbureter in accordance with my invention, showing in full lines the air valve moved downward to act as a choker in starting and in dotted lines the air valve raised to idling position.

Fig. 2 is a section on the line 2—2 of Fig. 1, and

Fig. 3 is a section on the line 3—3 of Fig. 1.

I have indicated at 1 the cylindrical outer shell of a carbureter equipped with my improvement. The shell 1 is deflected inwardly at its upper end to provide a restricted passage 2 for the mixture and terminates in an annular flange 3 with which the intake to the engine connects. The delivery of the mixture through the restricted passage 2 is controlled by the usual throttle valve 4 operated from the dash.

Set within the shell 1 is an air intake sleeve 5. The inner wall of this sleeve is preferably corrugated as indicated at 6 to assist in subdividing the mixture and delivering it to the engine in the form best suited for immediate vaporization. The shell 1 and sleeve 5 define an annular space or jacket 7 with which connection may be made for heating the carbureter from the exhaust of the engine.

Secured to the base of the shell 1 by screws or other fastenings 8 is a casting forming the base of the carbureter. The casting is formed as a dished flange 9 at its upper end. The flange 9 provides a seat for an upwardly opening automatic air valve 10 which is effectively disposed to control the passage of air from the lateral air intake 11 into the carbureter. The air valve has a plurality or ports 12 therethrough for the passage of air.

The air valve is mounted on a stem 13 which constitutes substantially the only moving part of the carbureter mechanism. The

upper end of the stem is guided in a tubular guide 14. The guide 14 has a plurality of ribs 14^1 which are sweated or otherwise secured to a plurality of similar ribs 29^1 on a Venturi tube 29 whereby to rigidly fix the guide within the sleeve 5. The tube 29 is fixed within the sleeve 5 by a plurality of fins 30 which are sweated or otherwise secured to the internal corrugated wall of the sleeve. The fins 30 in addition to securing the tube, assist with the corrugations 6 to subdivide the fuel. The fins are preferably developed as spirals whereby to give a whirling action to the mixture. The upper end of the guide 14 is closed by a cap screw 15.

The lower end of the stem 13 is fast in a disk 16 forming a guide for said stem and also acting as the movable piston of a dash pot 17, in which it reciprocates. The dash pot is formed as a cylinder depending from the base of the casting and is effective with the piston 16 to prevent chatter of the air valve. The dash pot has a dust cover 18 through which the stem passes with a slight clearance.

The stem is yieldably supported at this end by an adjustable spring mount, the normal tendency of which is to support the stem with the air valve slightly above its seat, as shown in dotted lines, Fig. 1, whereby to register correct idling position. The normal low speed adjustment of the air valve is not indicated in the drawings, but it will be understood that for this position the air valve is disposed still higher from its seat. Similarly at high speed the position of the air valve is still farther from its seat. All of these adjustments are secured by manually elevating the air valve through the rocker lever 27. This spring mount may conveniently consist of a yielding plunger 19, the head of which bears against the lower end of the stem. The plunger 19 is reciprocably mounted in the bore of an adjusting screw 20 threaded in the base of the dash pot 17 with its head yieldably supported by a coil spring 21 confined about the stem of the plunger within the bore of the screw. The plunger carries a stop collar 19^a at its lower end for limiting its elevation relative to the screw when released. The spring 21 normally maintains the air valve just above its seat. The screw 20 permits an initial adjustment of the plunger for changing normal low speed adjustment of the valve stem.

The valve stem carries means for regulating the fuel discharge for both normal and increased suction simultaneously with the adjustment of the air valve. The fuel is delivered from the fuel chamber 22 through the connection 23 to a port 24 chambered out near the lower end of the guide 14 and open to the bottom of the guide. The normal fuel discharge from the said port is controlled by an upwardly opening taper valve 25 on the valve stem. The taper valve has a slight clearance in the guide 14 at its lower end so that the valve does not contact the guide in any part of its movement. The valve 25 moves simultaneously with the air valve whereby to admit a quantity of fuel in proportion to the volume of air delivered by the air valve in normal use.

The fuel chamber 22 has a fuel inlet 33. The admission of fuel through said inlet is controlled by a needle valve 34 having a seat in a tapered plug 35 mounted in the inlet. To assist the needle valve in finding its seat if displaced therefrom by vibration of the car, the needle valve is loosely supported from its float 36. This may conveniently be effected by providing the stem of the needle valve near its upper end with a pair of spaced collars 37 and by providing the trunnion 38 for the float with a pair of opposed pins 39 which engage said stem between said collars. The top wall of the float and the trunnion are cut away adjacent the pins 39 to receive the valve stem. The top wall of the float is extended laterally and the trunnion is fastened to the wall whereby to space the needle valve from the float and in substantial parallelism thereto. The ends of the trunnion have holes tapped therein to receive screws or other fastenings 40 whereby to pivot the float to the chamber 22.

The upper end of the valve stem is guided with slight clearance in a hole 42 let through a two part cover 43—44 for the float chamber. One part 43 of the cover is fixed to a wall of the chamber and the other part 44 is mounted for covering and uncovering movement relative to the chamber. The movable part 44 has a notch 45 at one edge to receive a swingable friction locking member 46. The member 46 may conveniently consist of a pin threaded at one end for turning movement in a threaded socket 47 formed in a wall of the chamber 22 and having its free end bent down to frictionally engage the top face of the cover part 44.

When the air valve is moved near to its seat for choking the engine by increasing the suction, it is desirable that there shall be an increased flow of fuel at the same time in order to properly enrich the mixture. The valve stem is therefore flattened at one or more points as indicated at 26. When the stem is depressed, these flattened portions move down into registry with the port 24 thereby permitting an increased flow of fuel. The downward movement of the valve stem carries the plunger 19 down and compresses the spring 21. This brings the air valve down close to its seat so that it acts as a choker to increase the suction, as shown in

full lines, Fig. 1. At the same time the flattened portions 26 being in registry with the port 24 provide for an increased flow of fuel to correspond to the increased suction. As soon as the pressure on the stem is removed the spring automatically returns it and thus the air valve to normal low speed adjustment, and carries the flattened portions 26 sufficiently far up into the guide 14 above the port 24 to render this increased flow fuel valve ineffective.

The adjusting movements of the valve stem in its guides are effected by a rocker lever 27 which is operatively connected at one end with the wheel or within reach of the driver and has a stud at its opposite end which engages in the groove of a collar 28 fast on the stem 13.

In use, the correct idling position of the parts is that shown in dotted lines, Fig. 1, wherein the air valve is disposed slightly above its seat and the increased fuel flow valve 26 is positioned above the fuel intake port so as to be ineffective. With the parts in this position the taper valve 25 is effective and permits a normal fuel discharge. This fuel flows down along the stem 13 and some of it possibly reaches the air valve which acts as a spreader and directs it to its outer edge where it is taken up by the air entering between said edge and the seat 10. In the main, however, the normal fuel discharge is caught up by the air rushing upwardly through the series of ports 12 in the valve 10 and is carried directly up through the Venturi tube 29, as indicated by the arrows. The tube 29 preferably extends slightly below the fuel intake port 24.

When it is desired to increase the suction, as in starting the engine when cold, the valve stem is depressed against the tension of the spring 21 to cause the air valve to move downwardly so near to its seat as to act as a choker as shown in full lines, Fig. 1. This movement of the stem carries the flattened portions 26 into registry with the fuel intake to admit an increased volume of fuel. Part of this increased flow descends onto the air valve which acts as a spreader. The fuel not immediately taken up by the direct air through the ports 12 is sucked down to the circumference of the valve where it is met by the air passing between the edge of the valve seat and the edge of the valve and is carried up into the mixing chamber, the corrugations 6 and fins 30 atomizing the mixture in its travel therepast and the fins giving it a helical whirling action.

In my present invention therefore, the mixture may be regulated according to the needs of the engine at any time without requiring that the driver make any further adjustments than the simple manipulation of the connection to the valve stem 13. All valves are mounted on this stem and it constitutes substantially the only moving part of the carbureter mechanism. The fuel is admitted in direct proportion to the intake of air when the carbureter is set for normal low speed, but the fuel flow is abnormally increased upon reducing the intake of air for increased suction. The single air valve controls the intake of air both for normal and increased suction and the valves 25 and 26, which are practically a single construction control the fuel flow for both positions of the air valve. The yielding resistance arrangement against which the single valve stem is worked in its adjusting movements automatically returns the parts to normal position as soon as the engine is started and the operating pressure removed from the stem.

Various modifications in the form and construction of my device may obviously be made within the limits of the appended claims.

Attention is here called to my co-pending application Serial No. 57589, filed Oct. 23, 1915, wherein are shown and claimed those features shown but not specifically claimed herein.

What I therefore claim and desire to secure by Letters Patent is:

1. In a carbureter, a fuel discharge and an air intake, a valve stem, an air valve and two fuel valves all arranged in coaxial relation on said stem, and means for moving said stem to simultaneously vary the positions of said air and fuel valves according to the needs of the engine.

2. In a carbureter, a fuel discharge and an air intake in opposition to each other, a valve stem, an air valve and two fuel valves concentrically arranged on said stem, and means operable from the dash for moving said stem to simultaneously vary the positions of said air and fuel valves according to the needs of the engine.

3. In a carbureter, a fuel discharge and an air intake, a valve stem, an air valve fast on said stem and moving therewith, and independently effective valves alined with said air valve and moving with said stem for regulating the fuel discharge according to the position of the air valve.

4. In a carbureter, a casing having a fuel discharge and an air intake, a seat for an air valve within said casing, a valve stem adjustable in said casing, an air valve fast on said stem to move therewith within the casing relative to its seat, a valve on said stem in coaxial relation to said air valve and adjusted relative to the fuel discharge by the adjustment of said stem, and means for adjusting said stem to simultaneously vary the positions of said air and fuel valves relative to said air intake and fuel discharge without changing the relative positions of said valves to each other.

5. In a carbureter, a fuel discharge and an air intake, a valve seat, a valve stem, a valve fast on said stem to move therewith and having an idling position away from said seat and a suction increasing position close to said seat, a valve on said stem controlling the normal fuel discharge and effective when said air valve is in its idling position, and a second fuel valve on said stem above said first fuel valve and effective to increase the fuel discharge when said air valve is in its suction increasing position.

6. In a carbureter, a fuel discharge and an air intake, a valve seat, a valve stem, a valve fast on said stem to move therewith and having idling position away from said seat and a suction increasing position close to said seat, a valve on said stem controlling the normal fuel discharge and effective when said air valve is in its idling position, a second fuel valve on said stem above said first fuel valve and effective to increase the fuel discharge when said air valve is in its suction increasing position, said valve stem constituting substantially the only moving part of the carbureter mechanism, and means for returning said stem to original position after each actuation.

7. In a carbureter, a fuel discharge and an air intake, a valve stem, a valve thereon controlling said air intake, a fuel valve on said stem opening in one direction and controlling the normal fuel discharge, and a second valve on said stem opening in the opposite direction to said first named fuel valve and permitting an increased fuel discharge and normally ineffective.

8. In a carbureter, a fuel discharge and an air intake, a valve stem, a valve thereon controlling said air intake, an upwardly opening fuel valve on said stem and controlling the normal fuel discharge, and a downwardly opening fuel valve on said stem permitting an increased fuel discharge.

9. In a carbureter, a fuel discharge and an air intake, a valve stem, a valve thereon controlling said air intake, an upwardly opening fuel valve on said stem and controlling the normal fuel discharge, and a downwardly opening fuel valve on said stem and permitting an increased fuel discharge, and a yielding mount for said stem effective to return it to original position after each actuation thereof.

10. In a carbureter, a fuel discharge and an air intake, a valve stem, a valve thereon controlling said air intake, said stem having a portion controlling the normal fuel discharge and having a further portion normally ineffective and becoming effective when said first fuel valve is ineffective to permit an increased fuel discharge.

11. In a carbureter, a fuel discharge and an air intake, a valve stem, a valve thereon controlling said air intake, said stem having a taper controlling the normal fuel discharge, and having a flat portion normally ineffective and becoming effective when said first fuel valve is ineffective to permit an increased fuel discharge.

12. In a carbureter, a fuel discharge and an air intake, a valve stem, a valve thereon controlling said air intake, said stem having a downwardly tapered portion controlling the normal fuel discharge, and having a plurality of flat portions above said taper portion normally ineffective and becoming effective when said first fuel valve is ineffective to permit an increased fuel discharge, said stem constituting substantially the only moving part of the carbureter mechanism.

13. In a carbureter, a casing having a fuel discharge and an air intake, a single valve stem adjustably mounted in said casing, an upwardly opening fuel valve on said stem, and an upwardly opening air valve on said stem below said fuel valve to receive and spread the downwardly delivered fuel, and means for yieldingly supporting said stem in normal position.

14. In a carbureter, a casing having a fuel discharge and an air intake, a valve stem adjustably mounted in said casing, valves thereon controlling respectively the fuel and air intakes, and adjusted by the movements of the stem to vary both the volume and the character of the mixture, and means for yieldingly supporting said stem at one end to normally maintain said valves open.

15. In a carbureter, a casing having a fuel discharge and an air intake, a valve stem adjustably mounted in said casing, valves thereon controlling respectively the fuel and air intakes, and adjusted by the movements of the stem to vary both the volume and the character of the mixture, and a yielding mount for said stem at one end to normally maintain said valves open.

16. In a carbureter, a casing having a fuel discharge and an air intake, a single valve stem adjustably mounted in said casing, an air valve and a superposed fuel valve mounted in coaxial relation on said stem and controlling respectively said air and fuel intakes, means for adjusting said valve stem exteriorly of the carbureter to vary the relation of said valves to said intakes, and a spring providing a yielding resistance against which said stem works.

17. In a carbureter, a casing having a fuel discharge and an air intake, a valve stem adjustably mounted in said casing, valves thereon controlling respectively the fuel and air intakes, and a spring yieldingly supporting said stem at one end, and means for adjusting the tension of said spring.

18. In a carbureter, a casing having a fuel discharge and an air intake, a valve stem

having valves controlling respectively said intakes, and an auxiliary fuel control on said stem for increasing the normal discharge of fuel.

19. In a carbureter, a casing having a fuel discharge and an air intake, a valve stem having valves controlling respectively said intakes, means for yieldingly supporting said stem, and an auxiliary fuel valve on said stem for increasing the normal discharge of fuel.

20. In a carbureter, an air intake and a fuel discharge, a valve stem having a valve controlling said fuel discharge and having an air valve controlling said air intake and disposed beneath said discharge, and an auxiliary valve on said stem above said fuel valve for increasing the normal discharge of fuel.

21. In a carbureter, an air intake and a fuel discharge, an adjustable valve stem having a taper valve controlling said fuel discharge, and having an air valve controlling said air intake and disposed beneath said fuel discharge, a second fuel valve on said stem for increasing the normal discharge of fuel, and a pressure operated device yieldably engaging said stem and effective to return it to normal position.

22. In a carbureter, a casing having a fuel discharge and an air intake, alined guides in said casing above and below said discharge, a valve stem adjustable in said guides, an air valve fast on said stem to move therewith within the casing between said guides, and a fuel valve carried by said stem and controlling said fuel discharge and adjusted relative thereto by the adjustment of said stem, said air and fuel valves coaxially arranged on said stem.

23. In a carbureter, a cylindrical guide, a valve stem adjustable in said guide, an air valve on said stem, a fuel intake entering said guide laterally above said valve, a valve on said stem concentric with said air valve and controlling said fuel intake, and without contact with said guide, a second guide for said stem alined with said first named guide, an air intake below said fuel intake and delivering in opposite direction to the initial flow of fuel, and a yieldable mount for said stem at one end.

24. In a carbureter, a cylindrical guide, a valve stem adjustable in said guide, an air valve on said stem, a fuel intake entering said guide laterally above said valve, a taper valve on said stem controlling said fuel intake, a flattened portion on said stem for increasing the normal discharge of fuel, a second guide for said stem alined with said first named guide, and an air intake below said fuel intake and delivering in opposition to the initial flow of fuel.

25. In a carbureter, a casing having an air intake, a valve controlling said intake, a guide for said stem having a chambered portion communicating with a source of fuel and constituting a discharge port discharging along said stem and in opposition to said air intake, a valve on said stem concentric with said air valve and controlling said fuel discharge port, and a Venturi member surrounding said guide and carrying said guide and fixed to the casing.

26. In a carbureter, a fuel discharge and an air intake, a valve stem having a conformation constituting two independent valve portions adapted to independently control said fuel discharge, an air valve on said stem, and means for moving said stem to vary the positions of said air and fuel valves according to the needs of the engine.

27. In a carbureter, a fuel discharge and an air intake, a valve stem having a conformation constituting two superposed coaxial valve portions adapted to independently control said fuel discharge, an air valve on said stem, and means for reciprocating said stem to simultaneously vary the positions of said air and fuel valves according to the needs of the engine.

In testimony whereof I affix my signature.

WELLINGTON P. KIDDER.