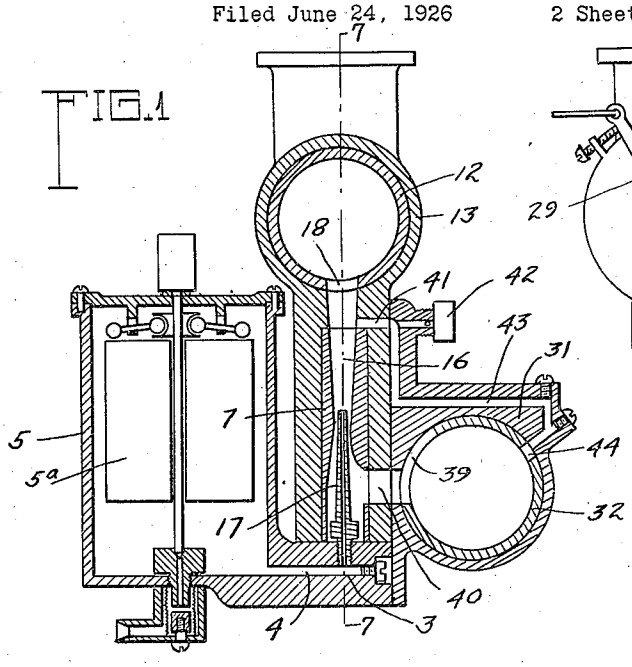
Nov. 19, 1929. S. A. WILSON 1,736,239

MULTIPLE CARBURETOR

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FIG. 1



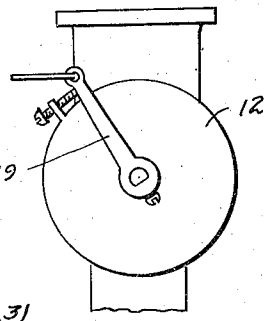


FIG. 2

FIG. 4

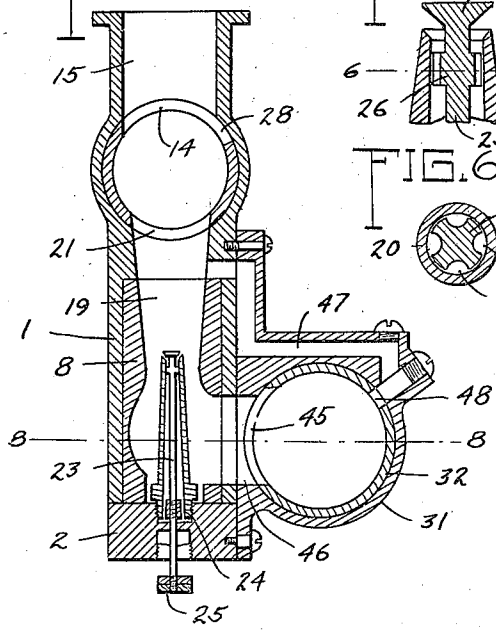
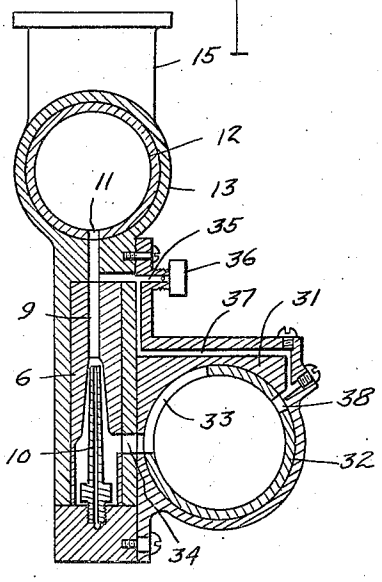


FIG. 5

FIG. 6

FIG. 3



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FIG. 7

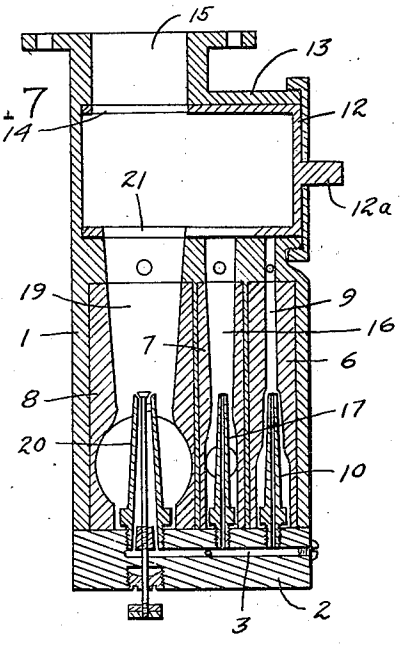


FIG. 8

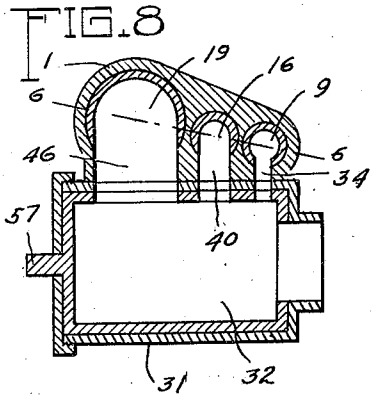


FIG. 9

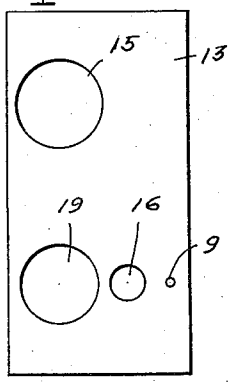


FIG. 10

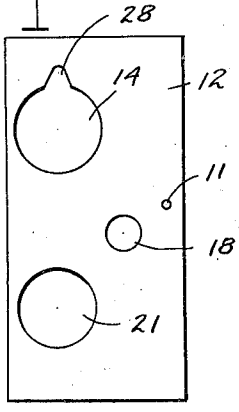


FIG. 11

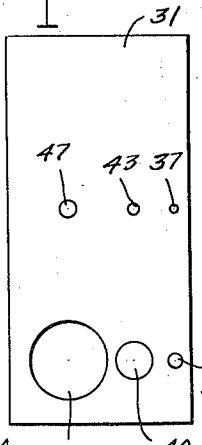


FIG. 12

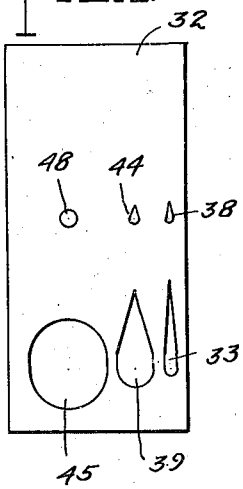


FIG. 13

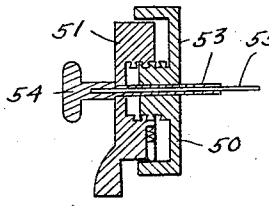
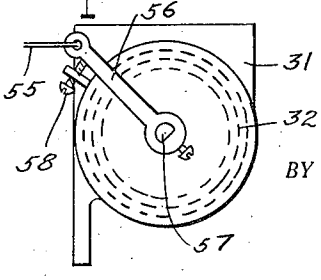


FIG. 14



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UNITED STATES PATENT OFFICE

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MULTIPLE CARBURETOR

Application filed June 24, 1926. Serial No. 118,148.

My invention has reference to a multiple carburetor for use with internal combustion engines of motor vehicles. Its chief purpose is to provide a variable supply of hydro-carbon mixture to meet the various requirements of the motor under differing demands of speed and power. In the slow action of the motor, as when the same is in idling speed, the suction is relatively low, and to supply liquid fuel to the air current under these conditions the fuel must be more readily available. Upon the speed being accelerated this requirement is less, and in the higher speed ranges, where the suction is much stronger the liquid fuel supply may be still more remote.

One of the requirements of the conditions named is that each of the fuel feeds should be independent from the others, and in the present embodiment three distinct ducts or venturi are shown, one for the low speed ranges, one for the intermediate ranges, and one for the high speed ranges. The regulation of the fuel supply is made at the point of dispensation of the liquid fuel into the air currents in the Venturi passages.

In the present invention the fuel supply is under a dual control, one of which consists in a rotary valve mechanism interposed between the Venturi passages and the intake manifold, and the other a choke-valve of a similar character which controls the admission of the air to the Venturi passages. By the use of the first-named valve it is possible to change from one of the fuel feeds to the other gradually, so that no two thereof will be operating to full capacity at the same time. This valve controls the quantity of the flow, whereas the choke valve has to do more with the quality of the fuel supply.

Vaporization of liquid fuel in a cold or cool motor is not as complete as in a warmer motor; hence the necessity of decreasing the air intake and thereby increasing the suction exerted on the fuel nozzles in order to draw enough liquid fuel into the vaporizing passages or venturi so that under adverse vaporizing conditions a greater amount of liquid fuel may be allowed to enter the venturi to compensate for the impaired vaporization and establish a combustible gaseous vapor. It is desirable that a positive regulation of the air in the venturi should be had, and in the present invention the control permits any proportionate amount of air to be admitted and in the same relative proportion to each of the venturi.

Upon the thorough warming of the motor the liquid fuel may be still further reduced by the admission of air into the venturi at a point beyond the liquid fuel nozzles. This is accomplished by means of an auxiliary air passage for each venturi communicating with the main air valve and casing therefor. These auxiliary passages are of relatively small size, and are also proportioned to the capacity of the several venturi with which they connect.

Another feature of the invention consists in having the Venturi tubes separate from the carburetor casing, and removable therefrom. This makes it possible to install tubes of different capacities to conform to the requirements of differing types of engines, and with a greater or less amount of stricture to the introduction of air into the vaporizing chamber. This is desirable in order to insure a perfectly combustible mixture of air and liquid fuel for the various types and styles of engines, as the relation of the diameter of the cylinder to the length of stroke of the piston and the relative engine speeds of different motors determine the proportions between the Venturi tubes and the liquid fuel nozzles therein.

The above named and other features and advantages of the invention will more fully appear from the following specification, reference being had to the accompanying drawings, in which:

Fig. 1 is a vertical cross-section of the invention centrally of the intermediate feed tube.

Fig. 2 is an end view of the valve casing 13.

Fig. 3 is a similar view through the low speed feed tube.

Fig. 4 is a similar view through the high speed feed tube.

Fig. 5 is a detail of the upper part of the nozzle 20.

Fig. 6 is a cross-section on the broken line 6—6 of Fig. 5.

Fig. 7 is a vertical longitudinal section on the broken line 7—7 of Fig. 1.

Fig. 8 is a horizontal section on the broken line 8—8 of Fig. 4.

Figs. 9 and 10 are companion views of the casing 13 and valve 12 as the same appear when projected on a flat plane.

Figs. 11 and 12 are similar views of the casing 31 and valve 32.

Fig. 13 is a detail in medial section of the control device for the valve 32.

Fig. 14 is an end view of the casing 31.

The same parts are indicated by corresponding reference characters throughout the several figures.

The reference number 1 indicates a casing, at the lower end of which is a base 2, containing a channel 3, in communication through a passage 4 with a float chamber 5, in which is a float 5ª and gasoline feed control mechanism such as is usually found in such devices. Fixed in the casing 1 are three tubes 6, 7, and 8, in the first of which is a Venturi passage 9 of limited capacity, in the lower end of which is fixed a nozzle 10, in communication with the channel 3. At its upper end the passage 9 communicates with an opening 11 in a cylindrical valve 12 rotatably mounted in a casing 13 of similar shape therewith. Said valve is also provided with an opening 14 in communication with a connection 15, adapted for attachment to the intake manifold of an internal combustion engine.

The tube 7 is provided with a passage 16, of greater capacity than that of the passage 9, in the lower end of which passage 16 is a nozzle 17, also communicating with the channel 3. The upper end of the passage 16 is adapted for registry with an opening 18 in the valve 12.

The tube 8 is provided with a passage 19 of relatively maximum capacity, containing a nozzle 20 communicating at its lower end with the channel 3. The upper end of said passage is adapted to register with an opening 21 in the valve 12, positioned oppositely to the opening 14 therein. The upper end of the nozzle 20 is fitted with a valve 22 on the end of a rod 23, extending downwardly through the nozzle, and having a threaded engagement with a nut 24, fixed in the lower part of the nozzle, whereby, upon the rod being rotatetd, the position of the valve can be adjusted, to regulate the amount of liquid fuel passing therethrough. The lower end of the rod 23 is fitted with a thumb-turn 25, by means of which it may be rotated. Near the upper end of the rod 23 is a guide 26, provided with openings 27 for the passage of the fuel. Said guide insures the proper positioning of the valve at all times.

In the operation of the motor with which the carburetor is connected liquid fuel is supplied to the float chamber 5 from a source of supply, from which it is drawn into the Venturi passages in the usual manner. The intake openings 11, 18, and 21 of the valve 12 are in staggered position, as shown in Fig. 10, so that no two thereof will be in registry with the corresponding passages 9, 16, and 19 at the same time. The arrangement is such, however, that as one of the passages is closing the next one begins to open, and the feed of fuel vapor merges gradually from one into the other. For example, when the engine is running on the lower speeds the passage 9 is open, as shown in Fig. 3, the other passages being closed. At this time the outlet passage 14 in the valve 12 is also closed, except for a small portion of the tapered extension 28 thereof. When it is desired to increase the speed the valve is rotated to open the passage 16, as shown in Fig. 1. As the passage 9 starts to close the edge of the opening 18 is moved beyond the edge of the opening 16, and the movement of the fuel is shifted from the passage 9 to the passage 16. The movement of the valve results in the opening of the extension 28 to a greater extent, to accommodate the increased volume of gas.

In passing to the higher speeds the operation is repeated, a further rotation of the valve 12 causing the closing of the passage 16 and the opening of the passage 19, the closing of one and opening of the other being blended as in the former case. This movement also serves to fully open the outlet 14 to provide for the increased volume of fuel vapor.

The valve 12 is provided at one of its ends with a stem 12ª, to which is attached a lever 29, by means of which the valve may be rotated, by a wire or other means attached to the lever. In its closing operation the lever action is limited by a set-screw 29ª, in an ear 13ª projected from the casing 13. By the adjustment of said set-screw the lowest speed of the engine can be regulated.

It will be observed that each of the established speeds of the motor is provided by the above described mechanism with an independent feed channel, each entirely separate from the others, so that the supply of fuel will at no time be entirely shut off when the engine is in operation. It will also be noted that the outlet for the fuel vapor is always proportionate to the admission of such vapor to the valve, so that there is always free action of the vapor into the engine. When the passage 19 is fully opened the tapered extension of the opening 14 will be closed, as appears in Fig. 4, but the capacity of said opening is somewhat greater than that of the inlet. In the drawings the passages 9, 16, and 19 are shown open to their full capacity, but it will be understood that the

flow through any one of said passages can be reduced to any desired extent.

Fixed to one side of the casing 1 is a casing 31 of cylindrical form, in which is rotatably mounted a cylindrical valve 32, in which is an opening 33, (Fig. 3) adapted to communicate with a passage 34 leading into the Venturi passage 9. Leading into the upper part of the passage 9 is an air bleed opening 35, controlled by a thumb-turn 36. Extending downwardly from said opening is a passage 37 ending in the lower face of the casing 31, and adapted for registry with an opening 38 in the valve 32. The opening 33 is of an elongated tapered form, as shown in Fig. 12, so that the admission of air therethrough to the passage 9 is gradually increasing, as the valve 12 is turned in the proper direction. The admission of the air is thereby proportioned to the needs of the passage 9, in connection with the control of the valve 12. When the large end of the opening 33 is in register with the passage 34 said opening is at its maximum capacity, and when this point is reached the opening 38 is brought into register with the end of the passage 37, permitting an additional movement of air upwardly through said passage and into the upper part of the passage 9. The opening 38 is also tapered, so as to open gradually. The introduction of the current of air into the passage 9 tends to lessen the amount of suction therethrough and decrease the fuel flow. The valve 32 and casing 31 are open at one end, to permit the free entry of air thereto.

The valve 32 also has an opening 39, adapted for registry with a passage 40, leading into the lower part of the passage 16 (Fig. 1). This opening is also tapered, so as to allow a gradually increased movement of air into the passage 16. Leading into the upper part of the passage 16 is a perforation 41, similar to the air-bleed 35, and controlled by a thumb-turn 42. From said perforation a passage 43 extends downwardly into the casing 31, adapted to register with an opening 44 in the valve 32. This opening is also uncovered when the opening 39 is at its maximum capacity, and places a check on the action of the fuel through the passage 16.

The valve 32 is also provided with a relatively larger opening 45, for communication with a passage 46 into the passage 19. The upper part of the passage 19 is also capable of communication with the valve 32 through a passage 47 extending from the upper part of the passage 19 to the inner wall of the casing 31, and through an opening 48 into said valve. (Fig. 1.) The passage 47 is also opened when the passage 19 is at its maximum capacity, and the action thereof is similar to that of the first-named auxiliary passages. The opening 45 is elongated somewhat so that its full capacity will be retained after the vent 48 is fully opened.

The air bleed channels are provided for the smaller venturi only, the liquid fuel supply to the passage 19 being controlled at the end of the nozzle 20 by the valve 22. The two smaller nozzles have the same capacity as the channel 3 to within a short distance of their discharge ends, at which point they are bored to accurately regulate the amount of fuel which may be necessary to establish a combustible vapor with the admitted volume of air.

The casing 1 is preferably attached to the base so as to be readily detachable therefrom, in order that the Venturi tubes can be removed, and replaced with others of different capacity, if desired.

The choke valve may be operated by means of the mechanism shown in Fig. 13, wherein 50 represents a circular plate which may be fixed to the dash-board or other convenient part of a motor vehicle, said plate having a threaded hub to receive an internally threaded disk 51. Passing through said disk and plate is a tube 53 provided on its outer end with a knob 54 by means of which the tube may be moved in or out. Secured to said tube is one end of a wire 55, the other end of which is attached to an arm 56 fixed to a stem 57 projecting from one end of the valve 32. The movement of said arm in one direction is limited by means of a set-screw 58 supported from the casing 31. When the arm is at this point the openings in the valve 32 will all be closed or nearly so, and the adjustment of the screw 58 provides for a variation in the air feed to the lowest practical degree. By pushing the rod 53 inwardly the arm 56 is actuated to turn the valve in a direction to open the passages in the lower part of the casing 1, permitting the desired amount of air to enter said passages. When the disk 51 is in the position shown in Fig. 12 the knob 54 will be held outwardly at a point which prevents the opening of the auxiliary passages 37, 43, and 47, but by giving a partial rotation to said disk inwardly an additional movement of the knob and wire 55 is permitted, sufficiently to uncover the lower ends of said passages, as shown in Figs. 1, 3, and 4.

By reason of the form of the openings 33, 39, and 45 in the valve 12 and the arrangement thereof, a perfect control of the admission of the air to the carburetor can be had at all times, and proportionate to the demands of the engine. When the valve is rotated so as to bring the point of the opening 33 into play with the passage 34 the point of the opening 39 will also be registering with the end of the passage 40, and one edge of the opening 45 will be entering the rim of the entrance to the passage 46. In Figures 11 and 12 the openings and passages are shown in relative positions wherein they would be

fully opened, and the same is true of the openings 38, 44, and 48, and auxiliary passages 37, 43, and 47.

When the engine is being started the fuel demand is greater, or the availability of the fuel is more requisite, and to provide therefor the valve 32 is turned to limit the air supply to the lower ends of the venturi. As the engine warms up, and the liquid requirements are less the air colume is increased, until it reaches the maximum amount. This will correspondingly reduce the fuel consumption, and will obtain in any position that the throttle valve 12 may be in. When the engine is working at full air capacity and it is desired to reduce the suction through the venturi and further reduce the fuel consumption, this is accomplished by opening the auxiliary passages leading to the upper parts of the fuel ducts, as hereinbefore set forth. Said auxiliary passages are also proportioned to the sizes of the several Venturi passages with which they connect.

While the invention is set forth herein as embodying a compound or multiple form of carburetor, it in effect embraces three distinct carbureting devices, each designed for a particular range of speed of the engine, each provided with independent fuel control and air supply devices, and with auxiliary air control, all proportioned to the demands of the carburetor units to which they pertain, so as to conform perfectly thereto. The only way in which the several carbureting devices unite is in the blending of the fuel feeds thereof when shifting from one to the other. By the arrangement named the feed supply is made to conform instantly to the demands of the motor, and the greatest degree of efficiency is attained.

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

1. A multiple carburetor, comprising a casing adapted for communication with a liquid fuel supply, two or more Venturi passages in said casing, liquid fuel nozzles in said passages having capacities proportioned to the sizes thereof, a rotary valve at the discharge ends of said passages, provided with an outlet and openings for independent communication with said passages, so arranged that no two of them will be in full operation at the same time, and a rotary air valve having openings communicating with the lower ends of said Venturi passages, and capable of furnishing air thereto in proportion to the varying demands of a motor with which said carburetor may be connected.

2. In a multiple carburetor, a casing adapted for communication with a liquid fuel supply, two or more Venturi passages in said casing, of varying capacity, a rotary air throttle valve adjacent to said casing and adapted for independent communication with the lower ends of said passages, and auxiliary air passages extending from said valve to the upper ends of said passages, and adapted for being opened when said valve is in position with the air supply openings fully opened, the capacity of the auxiliary passages being proportioned to that of the direct air communications.

3. In a multiple carburetor, a casing adapted for communication with a liquid fuel supply, two or more Venturi passages in said casing of varying capacity, a rotary valve at the discharge ends of said passages, adapted for independent communication therewith, and capable of varying the fuel vapor supply through said passages for the requirements of various speed ranges, a rotary air throttle valve having openings adapted for communication with the lower ends of said passages, to furnish currents of air thereto proportioned to the various speed requirements of the carburetor, and auxiliary air passages connecting said last named valve with the upper ends of said Venturi passages, also having a capacity proportioned to the various compliances of the carburetor to the speed requirements.

4. In a multiple carburetor, a casing, a plurality of Venturi passages of varying capacity therein, and nozzles in said passages in communication with a source of liquid fuel supply, and suited to various speed requirements, air bleed openings for the upper ends of said passages, and means for control thereof, a rotary air throttle valve adjacent to the lower ends of said Venturi passages, and provided with openings for communication therewith, to provide currents of air thereto in proportion to the fuel requirements of the carburetor, and auxiliary air passages between said valve and the upper ends of said venturi, the capacities of which are proportioned to the direct air supply thereto.

5. In a multiple carburetor, a casing adapted for communication with a liquid fuel supply, two or more Venturi passages therein, a rotary air throttle valve adjacent to said casing, having openings adapted for communication with the lower ends of said passages, auxiliary air passages adapted to connect said valve with the upper ends of said Venturi passages, means for actuating said valve, and means for limiting the movement thereof so as not to open said auxiliary air passages, except as desired.

In testimony whereof I affix my signature.

SIDNEY A. WILSON.