May 21, 1935. G. L. KENNEDY 2,002,182

VALVE

Original Filed Jan. 5, 1925 2 Sheets-Sheet 1

Fig. 12

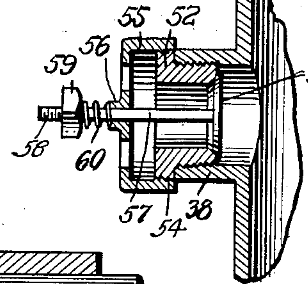


Fig. 1

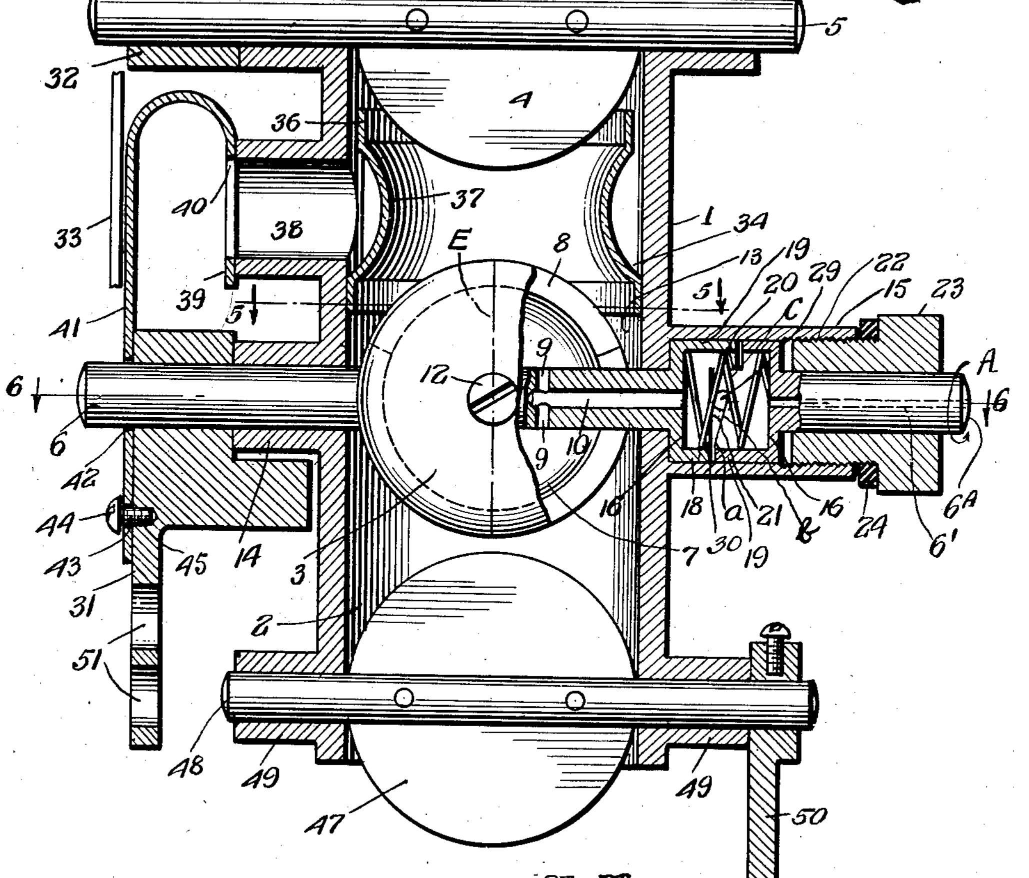
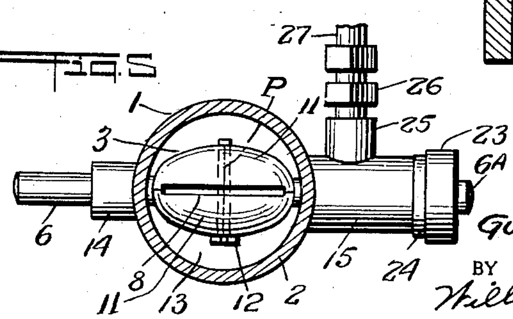


Fig. 5



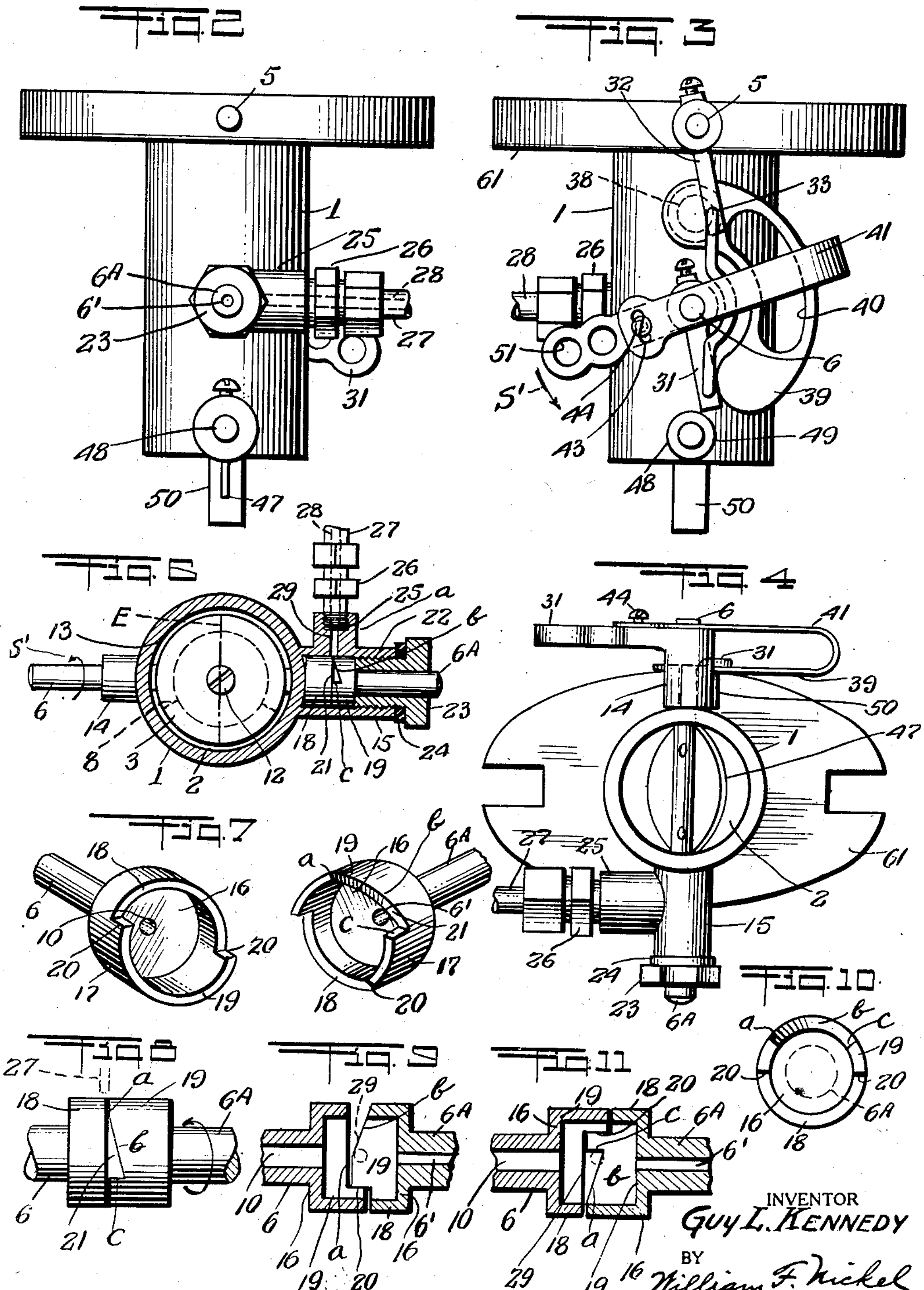
INVENTOR
GUY L. KENNEDY

BY
William F. Nickel
ATTORNEY

May 21, 1935. G. L. KENNEDY 2,002,182

VALVE

Original Filed Jan. 5, 1925 2 Sheets-Sheet 2



INVENTOR
GUY L. KENNEDY
BY William F. Nickel
ATTORNEY

Patented May 21, 1935 2,002,182

UNITED STATES PATENT OFFICE

2,002,182

VALVE

Guy L. Kennedy, New York, N. Y., assignor to Ken-Crip Corporation, New York, N. Y., a corporation of New York

Original application January 5, 1925, Serial No. 687. Divided and this application August 13, 1925, Serial No. 49,964. Renewed February 17, 1933

5 Claims. (Cl. 251—102)

This invention relates to improvements in valves for carburetors; particularly valves for carburetors to supply inflammable motive agent for internal combustion engines.

An object of this invention is to provide a carburetor having a novel form of valve for controlling the admission of liquid fuel; said valve being so constructed that the quantity of gasoline or other volatile, combustible liquid entering the carburetor, can be regulated and adjusted in the nicest degree.

This and other objects and advantages of the invention will be made clear in the following description and the novel features of my improved carburetor will be defined in the appended claims. But this disclosure is, of course, illustrative only, and I may alter the details of construction actually shown herein, to a considerable extent, as indicated by the broad meanings of the terms in which the claims are expressed.

On the drawings,

Figure 1 is a view of a carburetor according to my invention, in longitudinal section, on an enlarged scale;

Figure 2 is a side view thereof, partly in section;

Figure 3 is an opposite side view;

Figure 4 is a bottom plan of the carburetor;

Figure 5 is a transverse section on line 5—5 of Figure 1, looking downward, some of the outside members of the carburetor being omitted, the air valve and spray nozzle being illustrated as fully open;

Figure 6 is a similar section, partly in elevation, the air valve and spray nozzle in this view being in shut-off or throttle position, this view being in section on line 6—6 in Figure 1;

Figures 7, 8, 9, 10 and 11 are views showing the construction and function of the means for admitting and regulating the admission of gasoline to the carburetor; and

Figure 12 is a sectional view showing a modification of the carburetor in one detail.

The same numerals identify the same parts throughout.

This application is a division of my copending application for a patent on Carburetors, Serial No. 687, filed January 5th, 1925.

In the particular description of the drawings, I use the numeral 1 to indicate a tubular casing which has a bore 2 extending longitudinally through it, and is open at both ends. The bore 2 is indicated as a cylinder in cross-section, but may have any other desired shape, and mounted in the casing 1, so as to control the bore 2, are two valves 3 and 4. The valve 4 may be regarded as a throttle or vacuum regulating valve, and is mounted upon a transverse shaft 5 which is rotatably supported in bearings in the sides of the casing, so that this valve can be turned to be disposed transversely of the bore 2, and thus close the bore, or with its plane more or less in line with the bore, so as to open it. I also mount the valve 3 so that it can turn about an axis transverse with respect to the bore 2 to open or closing position, this valve being supported upon a rotatable shaft or spindle 6, turning in bearings in the sides of the casing 1, and being preferably parallel to the shaft 5. The valve 3 is hollow and forms an interior chamber 7, and this valve is also provided with an outlet 8 in the form of a slot, as indicated particularly in Figures 1, 5 and 6. On the inside of the valve 3, the spindle 6 is bored to provide a pair of ports 9 which communicate with a duct 10 through which gasoline and air pass by way of the ports or nozzles 9, to the chamber 7, and the gasoline thus admitted to the chamber 7 intermingles with the air in this chamber and flows out through the slot 8 into the bore 2. Therefore, the valve 3 serves as an air regulating valve and spray nozzle combined.

This valve 3 should preferably have the shape of an oblate spheroid consisting of two halves 11, each half being hemispheroidal in shape, and not truly hemispherical; and also held together rim to rim by a screw 12 which passes directly through the spindle 6, the rims of each half 11 being recessed to enable them to be clamped upon the shaft or spindle 6 with their edges in contact, except over the portions where the opposed edges of the two halves are cut away to provide the slot 8. This slot is entirely at one side of the valve and is somewhat less than a semicircle in length. As shown clearly in the drawings, the diameter of this valve measured in the plane of the contacting edges or rims of the substantially hemispheroidal halves 11, is greater than the diameter coinciding with the axis of the screw 12, the valve 3 thus being oblate in form or in the form of a spheroid flattened at the poles and bulging at the equator. The equatorial diameter is indicated by the dotted line E in Figures 1 and 6, and the polar diameter by the line indicated by the letter P in Figure 5. When the valve is turned on its shaft 6 so as to carry it into the position shown in Figure 5, that is, with the polar diameter P transverse to the axis of the bore 2, it will open the bore 2 and permit air to flow through same as fully as the shape of this valve will permit; but when it is revolved into such a position that the polar diameter is brought into line with the axis of the bore 2, thus placing the equatorial plane of the valve across the bore, the valve 3 will close or nearly close the bore, and reduce the flow of air through the carburetor to a minimum. As indicated by the numeral 13, the valve 3 even when it occupies the position shown in Figure 6, will be separated from the inside surface of the bore 2 around its periphery by a small annular space 13, and this space will be considerably larger when the valve is turned to its fullest open position as shown in Figures 1 and 5. At one side of the casing the spindle 6 is engaged by an external bearing 14 and at the opposite side of the spindle, it turns in another outside bearing 15.

As I shall describe more fully below, the shape of the combined air regulating valve and spray nozzle 3 is such that the bore 2 can be opened to permit more and more air to flow therethrough in direct proportion to the degree of angular displacement of this valve from the position shown in Figure 6 to that of Figure 1; that is, when the valve is turned from the position shown in Figure 6 through 45 degrees towards full open position, it will permit twice as much air to flow past it, as when it is turned through only 22½ degrees, and when it is turned through 90 degrees to full open position, it allows twice as much air to flow past it, as when it is turned through only 45 degrees; thus the quantity of air which flows through the casing 1 is increased or decreased in the same ratio as the angular distance of the valve towards or from the position shown in Figure 6, is increased or decreased.

The valve 3 and its cooperation with the casing 1 are recited in the claims of my copending application, Serial No. 49,963 filed of even date herewith.

The extremity of the shaft 6 which is supported in the bearing 14 may be solid and integral, but the opposite extremity which turns in the hollow external projection or bearing 15, is hollow and comprises at least two parts or members for the convenient admission and regulation of gasoline and air to the carburetor. Thus the portion of the shaft 6 which contains the axial duct 10 delivering through the two ports or nozzles 9 to the chamber 7, is expanded on the outside of the casing 1 to provide a disc or head 16, provided with a rim 17; making in effect a cup-shaped member which forms one section of the valve for regulating the gasoline supplied to the carburetor. This valve for supplying and regulating the gasoline is shown fully in Figures 1, 7, 8, 9, 10 and 11 inclusive. The rim 17 of the disc 16 above mentioned, consists of two portions 18 and 19, the portion 18 being of less height than the portion 19, to provide a pair of shoulders 20, each portion being substantially half of a circumference. The other section of this valve is provided by a similar disc 16, integral with a journal 6A in axial alinement with the main portion of the shaft 6, and this section also has the form of a cylinder cup with a rim 17 comprising as before, two portions 18 and 19 of unequal depths, measured in the direction of the axis of the cup, to provide two similar shoulders 20. Therefore, when the two sections of this valve are assembled by bringing them together as indicated in Figures 1, 8, 9, 10 and 11, rim to rim, with the shoulders 20 of one engaging the shoulders 20 of the other, they must obviously rotate in unison when the valve 3 is rotated. In the portion 19 of the rim 17, of greater depth, on the disc 16, attached to the journal 6A, is cut a notch or recess 21, this notch beginning at the point a, Figure 7, and extending along a straight diagonal line b, to a shouder c, the recess being about 90 degrees in extent, and with its extremities, namely the point a and the shoulder c equidistant from the two shoulders 20. Hence, when the two sections of this valve are assembled rim to rim, the recess will permit communication with the interior of the valve, so that gasoline can flow through this recess which will serve as an inlet for the gasoline to pass into the rotary valve to the duct 10. At its outer extremity, the projection 15 has internal threads 22, to engage external threads upon a perforated element or nut 23, between which and the extremity of the bearing 15, is clamped a washer or packing 24. This nut is perforated and serves as a bearing for the journal 6A.

The projection 15 has an extension 25 receiving in its outer extremity a gland 26 to secure therein a gasoline supply conduit 27 having a bore 28. See Figure 6. This bore 28 leads to an inlet opening 29 in the side of the projection 15 and when the port formed by the triangular recess 21 in the hollow rotary valve disposed within the bearing 15, uncovers this inlet 29, gasoline can, of course, flow freely into the valve for regulating the gasoline in the projection 15, and thence by way of the duct 10, through the nozzles 9 to the chamber 7 in the valve 3. In practice, the rims of the two sections of this valve do not quite make contact with each other, but are separated to a slight extent, as indicated in Figures 1, 8, 9 and 11; and for this purpose I place inside of the valve a compression spring 30, which seats against the two opposing discs 16 and normally tends to move the two sections of the rotary gasoline valve apart.

Figure 7 shows the two sections of the valve for regulating the gasoline, in perspective, before assembling; while Figure 8 shows these two sections brought together rim to rim with the triangular recess forming the inlet port which leads to the interior of this valve, on top. The axis of the extension 25 is at right angles to the axis of the bore 2, so that when the casing 1 is vertical, both the projection 15 and extension 25 will lie in a horizontal plane, and, therefore, the conduit 27 will communicate with the interior of the valve for controlling the gasoline through the inlet 29, through the side of the projection 15. The location of the conduit 27 is indicated in Figure 8 with reference to the axis of the spindle 6 only; but when the valve 3 is in such position that it closes as much as possible, the bore 2, the valve for controlling the entrance of gasoline to the carburetor, will be in such position that the point a of the notch or port 21 will be substantially in line with the bore 28 through the conduit 27, as indicated in Figure 9. No gasoline at all, or only enough for idling, at most, will now be enabled to flow into the carburetor. As, however, the valve 3 is turned to bring its polar axis more and more transverse to the axis of the bore 2, the diagonal edge b of the port or recess 21, will pass across the inlet 29 and expose a larger and larger portion of the area of the bore 28, and thus admit more and more gasoline to the inside of the valve and the duct 10. When the valve 3 has come to such position that it opens the bore 2 as much as possible, the sections of the valve for controlling the gasoline will occupy the position shown in Figures 1 and 11 with the shoulder c adjacent the inlet 29 and with the area of the bore 28 in the conduit 27 uncovered to the maximum extent.

By turning the nut 23, the position of the diagonal edge of the notch or port 21 can be so adjusted that the extent to which the inlet 29 will be uncovered, as the valve for admitting the gasoline is rotated, can be adjusted and increased or decreased at will. The turning of the nut 23 forces the two portions 18 and 19 together against the spring 30 and thus makes the notch or recess 21 narrower throughout its whole length so that it may be uncovered less than the whole area of the duct 29; while turning the nut 23 outward permits the spring 30 to move the parts 18 and 19 away from each other and thus permit the recess or opening 21 to uncover more of the duct 29.

As the edge *b* of the notch 21 is diagonal with reference to the spindle 6, it is clear that more and more gasoline will be admitted in direct proportion to the angular degree of rotation of the valve for controlling the gasoline in the same manner as the supply of air is regulated by the oblate spheroidal valve 3. That is, in the positions of the parts shown in Figure 1, twice as much air and twice as much gasoline will be admitted to the carburetor, as when the parts occupy positions 45 degrees distant, and so for all other positions, so that while the quantities of air and gasoline may be varied, the amounts of the two ingredients are always present in the same ratio, and the composition of the fuel which results from the action of the air upon the gasoline is rendered constant. At the same time, precise and complete regulation as to the amount of air and gasoline admitted can always be secured, and the quantity of each will be increased in exact proportion to the extent of angular movement of the valve 3, and the valve for controlling the gasoline supply which must always move with the air valve.

With the parts in the positions occupied in Figure 1, the direction of rotation of the shaft 6 to move the valves towards closing position is indicated by the arrow A; while the arrows in Figures 3 and 6 indicate the direction of rotation to open position.

The end of the shaft 6 adjacent the bearing 14 has affixed thereto an arm 31, and on the corresponding end of the shaft 5 is a similar arm 32. These two arms 31 and 32 are united by a link 33, to be operated together.

On the interior of the casing 1, between the valves 3 and 4 is a tubular member 34, presenting a relatively large end to the valve 3, and secured around its periphery at this end to the inside surface of the bore 2. The opposite end of this member is smaller, and separated from the inside of the bore 2 by an annular space 36. Between its ends the member 34 is contracted, as shown at 37, somewhat like a Venturi tube. Opposite the contraction 37, the casing 1 has an air inlet port 38, controlled by an arc-shaped strip or shutter plate 39, with a curved slot 40 therein. To the convex edge of the plate 39 at the middle is affixed an arm 41, bent to extend towards the lever 31, with an opening 42 to give passage to the end of the spindle 6; and having a transverse slot 43, to receive a screw 44, entering a threaded opening 45 in the arm 31. By means of this screw and slot, the arm 41 and plate 39 can be adjusted within the necessary limits.

The arm 31 is perforated at 51 to be united to a link connected to an actuating lever, and the valves 3 and 4, of course, move together. As the valve 3 and the valve for the gasoline in the projection 15 are opened farther, and farther, more air and more gas are admitted to flow through the casing in exact proportion to the degree of movement of these valves from fully closed to fully open position; but the ratio of the quantity of gasoline to the quantity of air is always the same and is, of course, selected according to the known capacity of air to vaporize the gasoline as the latter is admitted to the carburetor. The vaporization begins in the chamber 7 of the valve 3, and the gasoline issues from the nozzles 9 in the form of bubbles; because as the gasoline flows into the duct 10, enough air is entrained from the inside of the gasoline valve in the projection 15, to cause bubbles to appear; the air entering the inside of the gasoline valve through a channel 6' in the journal 6A; this channel or port opening through the outer end of the journal and the disk 16 attached thereto. From the chamber 7 the air and the gasoline taken up by it are sprayed through the slot 8, and drawn into the member 34 by air flowing around the valve 3 through the bore 2, the slot 8 being turned towards the member 34, as the valve 3 moves to fully open position. Upon passing the contraction 37, the air and vaporized gasoline tend to expand, but this tendency is overcome by air entering the port 38, and flowing through the annular space 36, where it tends to expand toward the axis of the bore 2. Thus air coming in by way of the inlet 38 blows through the space 36 towards the axis of the bore 2, all around the member 34, forcing the spray of air and gasoline inward, and further dividing and vaporizing the gasoline; so that when the intake manifold is reached, a perfectly dry and uniform gaseous fuel has been produced. Hence the member 34 facilitates vaporization with the annular air space 36 and inlet 38, through which air flows and escapes as a thin annular stream, to envelop and surround the spray of air and gasoline proceeding from the air regulating valve and spray nozzle 3. This annular stream of air surrounds the spray and drives any unvaporized particles of the mixture that may reach this point, away from the surrounding wall of the casing to the axis of the bore 2, and greatly increases vaporizing action. As many of these annular air streams and members 34 may be employed as may be found necessary to secure a satisfactory degree of vaporization.

The part of the carburetor for admitting air by way of port 38, and the member 34 are recited in the claims of my application, Serial No. 687, above-mentioned.

The ratio between the quantity of air and the quantity of gasoline is kept constant, as above stated; though the amounts of air and gasoline may vary as the valves are opened or closed, to a greater or less extent. But a constant-air-gasoline ratio is impossible with any device wherein the vacuum or "pull" upon the gasoline is variable. It is essential that a steady, constant pressure be applied to the gasoline at all times and under all conditions, if we expect to produce a steady, constant flow thereof; and such flow cannot be procured with any carburetor wherein the vacuum and consequently the unbalanced pressure on the gasoline is variable or fluctuating.

The normal vacuum in the intake manifold of an internal combustion engine is known to vary in proportion to the opening or closing of the air inlet valve; for example, the throttle valve **4**; and this variation may be such that the vacuum ranges from 20 inches of mercury displacement when the throttle valve is closed, to one-half an inch when the throttle is fully open. Clearly, a pressure equivalent to 20 inches of mercury displacement will force a greater quantity of gasoline through an orifice in a given time, than will a pressure equivalent to but one-half an inch of mercury displacement; therefore, the normal vacuum cannot be relied upon to supply a steady and regular flow of gasoline to the carburetor.

If the gasoline entering the valve and spray nozzle **3** is exposed to this fluctuating vacuum and the gasoline tank placed at a level lower than the carburetor, it will be found that in every case a surplus of gasoline will be in evidence when the throttle is closed; and, if the level of the gasoline is more than six inches below the carburetor, no gasoline will be supplied at all when the throttle is full open. In view of this fact, the usual fluctuating vacuum of a gasoline engine cannot be depended upon as the force for supplying gasoline to a self feeding carburetor; but means for producing a constant, not a variable, pressure upon the gasoline must be found. It is imperative to decrease the maximum normal vacuum and increase the minimum normal vacuum until the two extremes meet on common ground which cannot be less than an equivalent of three inches of mercury displacement, or a fuel lift of 36 inches necessary when automobiles are on grades.

Reference to Figure 1 will show how I secure the end under consideration.

Plainly, if the valve **4** be closed, no vacuum or unbalanced pressure can act upon valve and nozzle **3**, and if the valve **4** be turned to fully open position, the total vacuum or unbalanced pressure possible will take effect on the valve and nozzle **3**.

Also, if a hole, say one-sixth of an inch in diameter, be drilled through valve **4**, or a slight free air space such as the space **13**, is provided between the inside wall of the casing and the periphery of the valve **4**; and the engine is then started; there will result a relatively higher or major vacuum in the intake manifold, (which will be connected to the upper end of the carburetor), and a relatively low or minor vacuum between the valves **3** and **4**. Increasing this opening in the valve **4** increases the vacuum on the valve **3**; and decreasing this opening, decreases the vacuum acting on the valve **3**, but as the valve **4** also governs idling conditions, the air passage through the valve **4** cannot be greater than that demanded for idling conditions. Instead of an opening through the valve **4**, this valve may be arranged to be closed not entirely, but to leave a small space **46** between its edge and the inside of the casing **1**.

The relation of valves **4** and **3** and the respective volumes of air permitted to pass them when the valves are closed and in idling positions, is important in this dicussion. If the volume of air passing the valve **4** is equal to the volume passing the valve **3**, the vacuum in the manifold above the valve **4** will be equal to the vacuum between the valves **3** and **4**. If the volume of air passing the valve **4** is less than the volume passing the valve **3**, the vacuum in the manifold above the valve **4** will be greater than the vacuum between the valves **3** and **4**; and if the volume of air passing the valve **4** is greater than the volume passing the valve **3**, the vacuum between the valves **3** and **4** will increase in exact ratio to the increase in volume of air permitted to pass the valve **4**.

From these easily demonstrated facts it is clear that if we set the valve **4** to allow air for idling to pass, we may make a free air space **13**, around the periphery of the valve **3** and provide for a wide range of vacuum or unbalanced pressure or force on the valve and nozzle **3**; and consequently upon the air and gasoline within it; while the parts are in idling and low speed positions. In practice it has been found that the free air space around the valve **3** should, in cross section or area, be five times the cross section or area of the required idling air stream passing through the bore **2**. These proportions will reduce the maximum vacuum of about 18 inches of mercury displacement in the manifold to approximately 3 inches on the valve **3**, and the gasoline entering it.

One must bear in mind that the arms **31** and **32** are joined by the link **33**; and any movement of one arm thus imparts a corresponding movement to the other.

Having shown how the maximum vacuum is reduced to the desired point, it is necessary to explain how to increase the minimum normal vacuum on the gasoline, when the valves are in full open position as shown in Figure 1.

Reference to Figure 1 shows that if air control valve and nozzle **3** were a thin disc of metal like the valve **4**, there would be, with both valves fully open, substantially no resistance to the air passing through the device and consequently no vacuum to speak of. To obviate this condition and increase the vacuum or unbalanced pressure on the valve **3** and the gasoline when the valves are in fully open position, I employ the hollow oblate spheroidal air valve and spray nozzle **3** already described.

When the valve **4** is fully open, it offers substantially no resistance to the air stream and, therefore, produces substantially no vacuum. On the contrary the oblate valve **3** even when fully open greatly reduces the free air passage or bore **2**, through the body of the device, and increases the vacuum on this valve **3**, and the gasoline and air within it. Owing to its special shape, this valve **3** always, in any of its positions, will necessarily reduce the air passage between its circumference, and the inner wall of the casing **1**, to the size essential for maximum speed and efficiency; and though the vacuum above the valve **4** may tend to fluctuate widely, the vacuum at the valve and nozzle **3** remains substantially constant and of the degree needed.

It has been amply demonstrated that if the bore **2** through the body **1** be 1 and $\frac{1}{8}$ inches in diameter, the polar diameter P of the valve **3** may be $\frac{3}{4}$ of an inch, thus leaving a free air passage around the valve $\frac{3}{16}$ of an inch in width. This air passage has been found sufficient to supply air freely at maximum speed for all engines having from 192 to 250 cubic inches of piston displacement; and at the same time, it produces a vacuum sufficient to draw the fuel from the tank at the rear of the car; even when on steep grades and under most trying conditions.

The slot **40** in the shutter-plate **39** is not as long as the plate, but leaves unperforated portions of the same area at the ends of the plate. When the air regulating valve **3** is closed as in Figure 6, one end of the plate **39** closes the port **38**, and when the valve 3 is turned by the lever 31 to fully open position as in Figure 1, the other end portion of the shutter-plate 39 also closes the port 38; but on passing from closed to fully open position of valve 3 or vice versa, the slot 40 in the plate 39 exposes the air inlet port 38, and admits air throughout a turn of 90 degrees. When the valve 3 is closed, the air inlet 38 is closed to allow the engine to idle; and the inlet 38 is also closed when the valves 3 and 4 are opened fully for starting, but at intermediate positions of the valves 3 and 4, the air inlet is exposed through the slot 40.

At its lower end, the casing may have the usual air-choke valve 47, mounted on a shaft 48, rotating in bearings 49, and carrying an operating arm 50. The arm 31 has one or more openings 51 to attach it to an operating lever.

In some cases, I may dispense with the arc-shaped shutter-plate 39, and adopt the construction shown in Figure 12. The outer end of the boss surrounding the inlet 38 is internally threaded, and into this boss is screwed a bushing 52, bearing a poppet valve 53, seating on its inner extremity. This bushing has screw threads 54 on its outer end to receive a perforated cap 55, with a central bearing 56, in which the valve stem 57 can slide. This stem has threads 58 at its outer end to be engaged by a nut 59, and between the nut 59 and the cap 55 is a spring 60, holding the valve normally shut. The nut enables the tension of the spring to be adjusted as required. This modification operates as above to admit air during normal running of the engine.

At the top of the casing is a flange 61 to enable the carburetor to be bolted to the end of the conduit leading to the intake manifold of the engine.

While I have mentioned gasoline herein, I wish to be understood as asserting that I am not limited thereto, but any other volatile hydrocarbon may also be employed.

Sometimes the passage 6′ may be omitted and the journal 6A closed entirely.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. A casing with a bore therethrough, a hollow rotary valve on the outside of the casing, and a spindle secured to said valve extending into the bore, the spindle having a duct leading to a delivery nozzle, and the valve having a circumferential opening controlling according to its angular position, an inlet port delivering to the interior of said valve, the latter comprising parts to regulate the opening.

2. A casing with a bore therethrough, a hollow projection on the outside of the casing, a rotary valve in said projection, the valve comprising sections engaging each other to rotate in unison, one of said sections having a recessed rim to provide a port leading to the interior of said valve, said sections being adjustable to regulate the area of said port, the projection having an inlet opening, said port being shaped to cover and expose said opening, and the valve having a duct to deliver fluid to the bore in said casing.

3. A casing with a bore therethrough, and a rotary valve to control admission to said bore, said valve comprising cup-shaped sections assembled rim to rim with engaging shoulders to enable said sections to turn in unison, the rim of one section having a recess forming with the edge of the other rim a triangular inlet to control a supply port, a spring in said valve tending to move said sections apart to enlarge said inlet, and an element to control said spring.

4. A rotary regulating valve, comprising separate sections, each section having an axial extension projecting from one end, the valve having an inlet port in its side, and the sections being longitudinally adjustable.

5. A rotary regulating valve, comprising separate sections, each section having a hollow axial extension projecting from one end, the sections being longitudinally adjustable, the valve having an orifice in its side, so that suction applied to one projection will cause a flow through said orifice and said projection.

GUY L. KENNEDY.