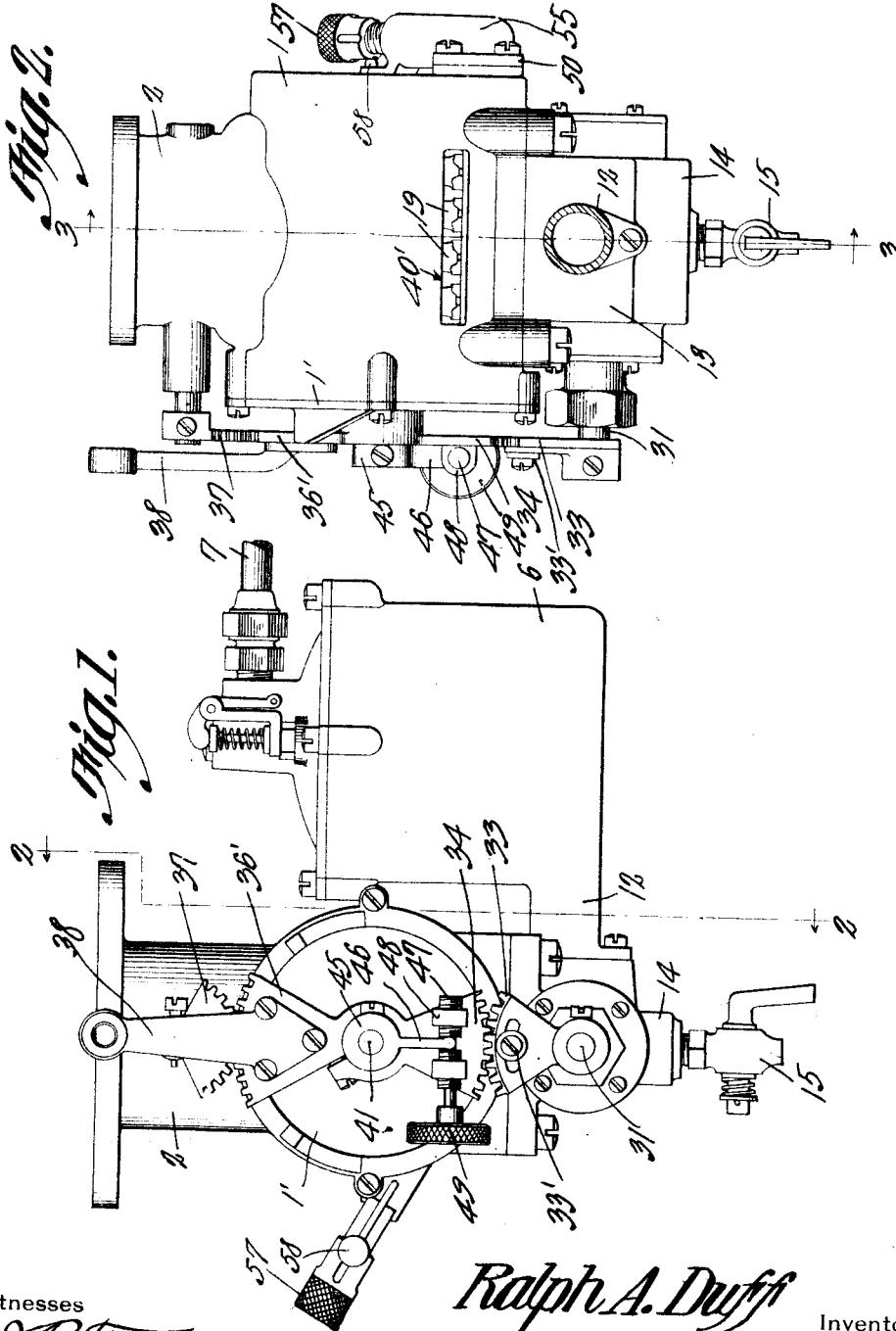


R. A. DUFF.
 CARBURETER.
 APPLICATION FILED APR. 25, 1913

1,120,185.

Patented Dec. 8, 1914

3 SHEETS—SHEET 1.



Witnesses
J. P. Toner
S. Willard

Ralph A. Duff Inventor
 by *C. A. Snow & Co.* Attorneys

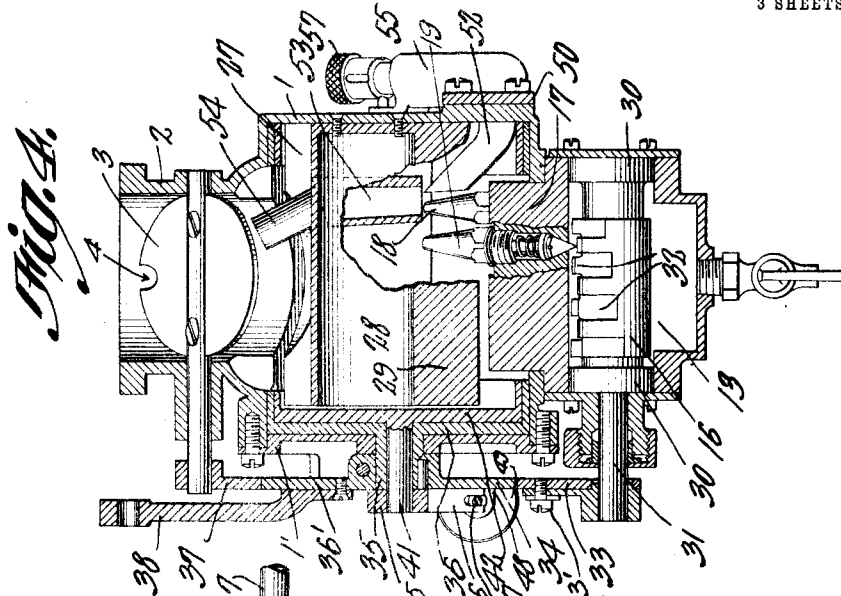
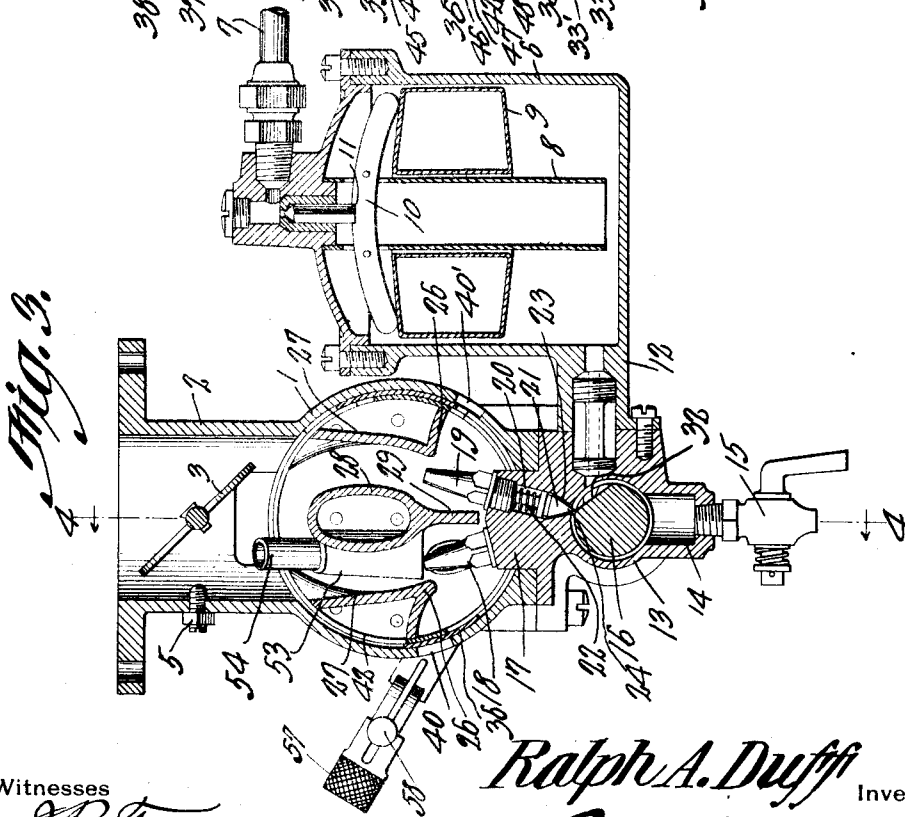
R. A. DUFF.
CARBURETER.

APPLICATION FILED APR. 25, 1913.

1,120,185.

Patented Dec. 8, 1914.

3 SHEETS-SHEET 2.



Witnesses

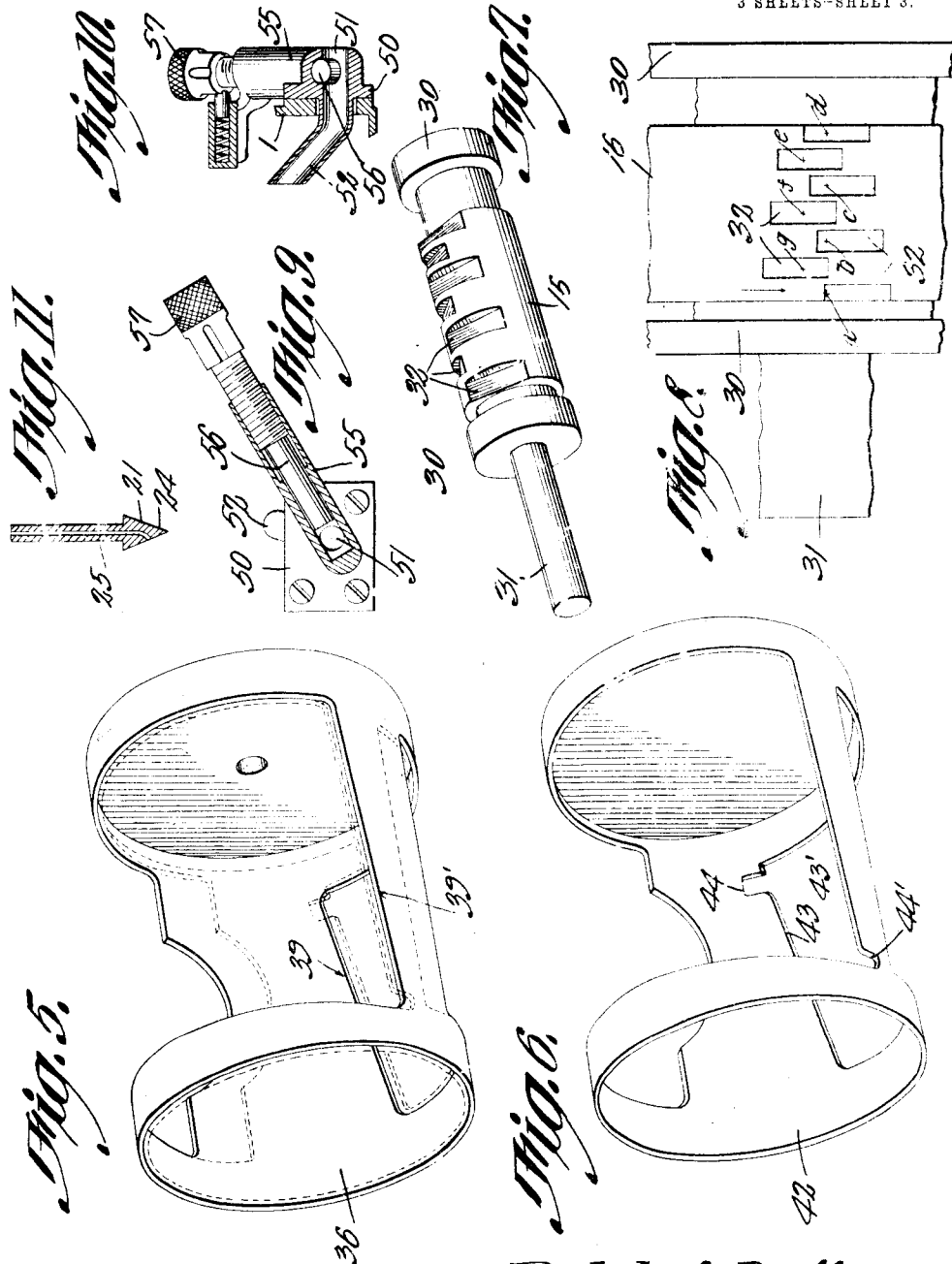
J. P. Tamm
E. Wilcox

Ralph A. Duff Inventor
by *C. A. Snow & Co.* Attorneys

1,120,185.

Patented Dec. 8, 1914.

3 SHEETS-SHEET 3.



Witnesses
J. P. Tomlin
S. Willow

Ralph A. Duff Inventor
by *C. A. Snow & Co.* Attorneys

UNITED STATES PATENT OFFICE.

RALPH A. DUFF, OF NEBRASKA CITY, NEBRASKA.

CARBURETER.

1,120,185.

Specification of Letters Patent.

Patented Dec. 8, 1914.

Application filed April 25, 1913. Serial No. 763,684.

To all whom it may concern:

Be it known that I, RALPH A. DUFF, a citizen of the United States, residing at Nebraska City, in the county of Otoe and State of Nebraska, have invented a new and useful Carbureter, (Case A,) of which the following is a specification.

The present invention relates to improvements in carbureters, one object of the invention being the provision of a carbureter having a mixing mechanism under the direct control of the operator, whereby the character or quality of the mixture may be varied to suit the load, means being provided for successively increasing and decreasing the atomization of the liquid and air so that the proper proportioned carburated air is delivered to the explosive engine regardless of the speed thereof.

A further object of the present invention is the provision of means for producing an attenuation of the air supply, as the same enters the carbureter, whereby the air will readily mix with the fuel, a deflector being provided, for the double purpose of receiving the air supply, and for directing the mixture of fuel and air, or carburated air, out of the carbureter to the manifold.

A further object of the invention is the provision of a novel and simple mechanism for successively opening the fuel inlets and another mechanism operated consonantly therewith for gradually increasing the effective area of the air port, as the fuel inlets are successively opened.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a view in elevation of the complete carbureter taken from the controlling side thereof. Fig. 2 is a section taken on line 2—2 of Fig. 1 looking in the direction of the arrow. Fig. 3 is a section taken through the complete carbureter upon the line 3—3 of Fig. 2. Fig. 4 is a section taken on line 4—4 of Fig. 3, a portion of the section adjacent to one of the fuel inlets being further cut away to illustrate the position of the valve thereof relatively

to the operating medium. Fig. 5 is a perspective view of the outer member of the air controlling means. Fig. 6 is a similar view of the inner member of the air controlling means. Fig. 7 is a perspective view of the fuel valve controlling means. Fig. 8 is a partial blank view thereof. Figs. 9 and 10 are detail sectional views of the low speed by-pass. Fig. 11 is a sectional view through one of the fuel control valves.

Referring to the drawings, the numeral 1 designates the cylindrical casing provided with a removable end 1', and having the manifold correcting and carburated air directing member 2 led therefrom. A butterfly valve 3 is mounted in the member 2 and is provided with the recess 4 in the periphery thereof which is adapted to coact with the adjustable screw 5 so as to adjust the portage at such point to control the supply of carburated air to the manifold when the butterfly valve 3 is in a horizontal plane.

The float chamber 6 is in communication with a fuel supply through the conduit 7, while disposed concentrically within the chamber or casing 6, is the tube 8, which provides a guiding means for the float 9, said float being disposed to operate upon the oppositely extending arms 10 to move the valve 11 into seating and unseating position.

Led from the float chamber or casing 6 is a hollow stem 12, which provides a connecting medium between the float chamber 6 and the casing 1 and also means by which the fuel is fed therefrom into the transversely disposed cylindrical chamber 13 having the drain chamber 14 and the drain cock 15.

The valve controlling and operating cylinder 16 is mounted for oscillation within the chamber 13 while carried by the transversely disposed upstanding rib 17 are a plurality of fuel injecting nozzles 18 and 19. There is a single jet or nozzle 18 and a plurality of nozzles or jets 19, such jets 19 being adapted, as will presently appear, to be controlled by the member 16, so that the same may be opened or closed successively, while the jet 18 is opened at all times, it not being provided with a valve, and is the initial or filling nozzle or jet of the carbureter. Each of the respective nozzles or jets 19, there being seven employed in this form, is disposed in one of the ports 20 of the upstanding rib 17 and the flow of fuel

therethrough is controlled by the valves 21, the detail structure of which is clearly shown in Fig. 11. This valve is normally seated by means of the spring 22, so as to prevent the introduction of the fuel from the chamber 13 through the conical valve seated port 23, the pointed end 24 of the valve 21 being normally projected through the port 23 into the path of to be engaged by the valve operating member 16. The nozzles 19 are arranged in two sets, one of three and the other of four, and the nozzle 18 being in line with the one set of three nozzles. A fuel conducting channel or bore 25 is provided in each valve member 21 and thus leads from the enlarged headed portion thereof throughout the length into the interior of its respective nozzle 19, which as clearly shown in Fig. 3 are disposed at divergent angles, at a point slightly above the angles 26 of the auxiliary deflecting members 27, which are mounted within the casing 1 and provide a longitudinally disposed channel or chamber therein outletting into the fuel distributing member 2. The nozzle 18 is in direct communication with the chamber 13. Mounted detachably within the casing 1 against the sealed head thereof and extending the full length thereof at equi-distance from the auxiliary deflectors 27 is the main deflector 28, the same being provided with an apron 29 disposed to project above the central portion of the rib 17 and downwardly between the two divergent sets of nozzle, so as to provide a fuel channel upon each side of the deflector 28 and the respective auxiliary deflectors 27.

The valve operating member 16, as clearly shown in Figs. 7 and 8, is provided with the journaling heads 30 at the respective ends thereof and with the operating stem 31, said stem 31 being controlled as will presently appear. The intermediate portion of the member 16 is provided with the respective recesses 32, there being one to each valve of the respective nozzles or jets 19, so disposed that the valve at the opposite end of the rib 17 as at *a* Fig. 8 and in the set of nozzles at the opposite side to the nozzle 18 will be the first of the valve controlled nozzles to be opened, the continued oscillation of the member 16 successively opening as at *b*, *c* and *d* Fig. 8, all of the valves of that set, and then finally successively opening as at *e*, *f* and *g*, Fig. 8, the ones in the same set with the normally opened valve jet 18.

Connected to the stem 31 is a toothed segment 33, upon the exterior of the casing, the teeth thereof being disposed to be engaged by the toothed segment 34, and the adjustment of such segment 33 being limited by the pin and slot connection 33'. The segment 34 is keyed to the hollow stem 35 of the air controlling member 36, best shown

in Fig. 5, and is provided with the upstanding toothed segment 36' which is in engagement with the segment 37 which controls the butterfly valve 3. The lever 38 is connected to the member 36, and thus provides a means whereby the member 16 and the air controlling member 36 and also the butterfly valve 3 are operated in consonance so as to produce the proper proportion between the air and fuel and the introduction of the carbureted air into the manifold of the engine.

The member 36 which is constructed in the form of a mutilated cylinder with a sealed end, is insertible within the casing 1 through the open end thereof, and is so formed as to have the inclined edges 39 and 39', which constitute a means, as will presently appear, for providing the proper gradual admission of the air or the cutting down thereof through the ports 40-40' disposed longitudinally of and at opposite sides of the casing 1, and as particularly shown in Figs. 2 and 3. These ports 40-40' are disposed to introduce the air into the space below the portions 26 of the auxiliary deflector 27, so that the air intruding at such points is caused to pass about the respective nozzles 19 and be deflected by the apron 29 upwardly into its respective channel between the auxiliary deflector 27 and the adjacent side of the main deflector 28 at which point the air is properly intermixed with the atomized fuel, there being an interception of the streams above the upper end of the main deflector 28 due to the formation of the inner walls of the auxiliary deflectors 27, so that when the carbureted air is directed through the member 2 into the manifold, the best possible mixture is provided with practically no streaks and in the proper proportion according to the load placed upon the engine.

The auxiliary deflectors are so mounted within the casing 1 as to provide the necessary space therearound adjacent the wall of the member 1 to permit of the proper introduction and oscillation of the air controlling member 36. It will also be noted in Fig. 4 that the hollow stem 35 is mounted for oscillation within the removable cover 1' of the carburetor while extended concentrically therethrough is the stem 41 which carries the auxiliary air controlling member 42, best shown in perspective in Fig. 6. The dotted lines shown in Fig. 5 illustrate the position of the member 42 within the member 36, the inclined edges 43-43' thereof being disposed to be adjusted relatively to the edges 39-39' of the member 36, to regulate as will presently appear, the size of the inlets 40-40' independently of the oscillation or movement of the member 36. The auxiliary controlling member 42 upon its respective edges

43—43' is provided with the notches 44—44', which are adapted to be disposed adjacent the nozzle 18 and the nozzle 19 in the opposite set and at the opposite end of the rib 17, so that even should the auxiliary member 42 be in the position to have its respective edges 43—43' projected beyond the edges 39—39' sufficiently to normally close the inlet ports 40—40', there will still remain the portage at 44—44' sufficiently to permit of the carbureter running under a low speed or at the time of initial starting.

In order to control the action of the auxiliary air device 42, there is connected to the stem 41 thereof beyond the tubular member 35 of the main air control member 36, the disk 45, having the depending arm 46. This depending arm 46 is fitted astride the screw 47 which is journaled in the lugs 48 carried by the segment 34, and controlled by the milled head 49.

It will thus be seen that by the rotation of the milled head 49, that the screw 47 will impart movement to the arm 46 and thus move the auxiliary air valve 42 so as to project the edges 43—43' within or beyond the edges 39—39', respectively, of the member 36 and thus provide a means for regulating the amount of air admitted through the respective ports 40—40' into the casing. It is also evident that by means of the handle 38, that the main air control valve 36 may be oscillated bodily and carry with it the auxiliary member 42, the control of the member 42 being independent of the member 36 so that according to the varying conditions due to temperature, altitude and quality of fuel, the member 42 may be adjusted at will.

In order to provide a means, whereby the initial jet 18 will properly direct the fuel so that the same will be properly converted into carbureted air and delivered into the manifold of the engine in the best possible explosive mixture, the device as particularly shown in Figs. 9 and 10 is employed. In this instance, the plate 50 is connected to the sealed end of the casing 1 and has its port 51 disposed in line with the lower end of the upwardly inclined air conducting tube 52, as clearly shown in Fig. 4, the outlet end thereof being disposed adjacent the upper portion of the nozzle 18 and outletting into the inlet or lower end of the tube 53 connected to and carried by the main deflector 28 at one side thereof. The outlet nozzle 54 of the member 53 is inclined toward the center of the casing 1 and projects within the directing member 2, as clearly shown in Figs. 3 and 4, so that the inrushing air carried by the tube 52 will be properly directed around the outlet end of the nozzle or jet 18 and into the lower end of the directing member 53, the mixture of carbureted air being thus directed through

the nozzle 54 into the member 2 of the casing 1 and consequently in a confined and properly mixed stream to be directed to the manifold of the engine.

The present device is adapted to be used at the initial starting of the engine and also under low speeds, it being possible to introduce a sufficient quantity of the mixture and in the proper proportion to impart to the shaft of the engine a slow rotation to produce the necessary low speed when the engine is running free. In order to manually control the introduction of the air through the port 51 and into the nozzle or conduit 52, the casing 55 is carried by the plate 50 and has mounted therein the cylindrical valve member 56 controlled by the handle 57 in ready access to the operator. The locking device 58 is provided to engage the handle portion 57 and thus maintain the valve 56 in the desired adjustment.

From the foregoing description taken in connection with the drawings, it is evident that when the parts are in normal position, that all of the valves controlling the nozzles 19 are closed, the respective recessed portions 32 being adjacent the inner ends thereof, so that the springs 22 will maintain the same closed, the nozzle 18 however being open, so that the fuel is injected therefrom concentrically of the lower inlet end of the air directing member 53. At the same time, the air controlling member 36 is positioned to close the ports 40—40', the respective edges 39—39' being thereabove, one being farther above the other, so that the port 40' will be opened before the port 40 as the jets or nozzles 19 upon the side adjacent to the port 40' will be the first set to successively open after the initial starting of the motor through the operation of the jet 18 and the air controlling device as shown in Figs. 9 and 10.

In order to start the motor, the valve 56 is open and the engine in the usual way is cranked to produce the necessary suction, which causes air to rush through the port 51 into the conduit 52 about the outlet end of the nozzle 18 and through the air directing auxiliary manifold 53 and 54 into the manifold of the engine.

What is claimed is:

1. A carbureter, including separate sets of fuel inlets, and having an air port for each set of inlets, means for opening the fuel inlets in succession, means for gradually opening the air ports, as the fuel inlets of the corresponding set are successively opened, and an independent adjusting means carried by the air port controlling means.

2. A carbureter, including a plurality of fuel inlets, and having an air port disposed in air directing and concentrating relation to the fuel inlet, means for opening the fuel inlets in succession, and means operated in

consonance therewith for gradually opening the air portage as the fuel inlets are successively opened, the latter means including two telescopic sleeves one of which is adjustably mounted within the other to control the active area thereof.

3. A carbureter, including a cylindrical casing provided with a longitudinally disposed air port in one side thereof, a plurality of fuel inlets disposed within the casing to receive the air from the port, an oscillatory means for controlling the air portage mounted in the casing, said latter means including two telescopic cylindrical members, the outer one of which controls the air port and the inner one of which controls the active area of the other member.

4. A carbureter, including a cylindrical casing provided with a longitudinally disposed air port in one side thereof, a plurality of fuel inlets disposed within the casing to receive the air from the port, an oscillatory means for controlling the air portage mounted in the casing, said latter means including two telescopic cylindrical members, the outer one of which controls the air port and the inner one of which controls the active area of the other member, and means for adjusting the two members relatively to each other.

5. A carbureter, including a cylindrical casing provided with a longitudinally disposed air port in one side thereof, a plurality of fuel inlets disposed within the casing to receive the air from the port, an oscillatory means for controlling the air portage mounted in the casing, said latter means including two telescopic cylindrical members, the outer one of which controls the air port and the inner one of which controls the active area of the other member, means for adjusting the two members relatively to each other, means for operating the fuel inlets progressively, and means for operating the last means and the air controlling means in consonance.

6. A carbureter, including a cylindrical casing provided with a longitudinally disposed air port, the edges of which are parallel, a plurality of fuel inlets mounted in the casing, means for opening the inlets in succession, and means for gradually open-

ing the air port as the fuel inlets are successively opened, said latter means including a member mounted in the casing for oscillation and provided with an inclined edge for passage across the air port of the casing to gradually increase the air portage from one end thereof throughout its length.

7. A carbureter, including a cylindrical casing provided with a longitudinally disposed air port, the edges of which are parallel, a plurality of fuel inlets mounted in the casing, means for opening the inlets in succession, means for gradually opening the air port as the fuel inlets are successively opened, said latter means including a member mounted in the casing for oscillation and provided with an inclined edge for passage across the air port of the casing to gradually increase the air portage from one end thereof throughout its length, and adjustable means for controlling the active area of such inclined edge.

8. A carbureter, including a cylindrical casing provided with a longitudinally disposed air port, the edges of which are parallel, a plurality of fuel inlets mounted in the casing, means for opening the inlets in succession, means for gradually opening the air ports as the fuel inlets are successively opened, said latter means including a member mounted in the casing for oscillation and provided with an inclined edge for passage across the air port of the casing to gradually increase the air portage from one end thereof throughout its length, a member telescoping the first member and provided with an inclined edge for movement into and out of registration with the inclined edge of the first member, said edge being further provided with a recessed portion near one end, whereby the active area and a greater portion of the air portage is reduced while the recess produces a confining air admitting port for one of the fuel inlets.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

RALPH A. DUFF.

Witnesses:

SELINA WILLSON,
I. E. SIMPSON.