

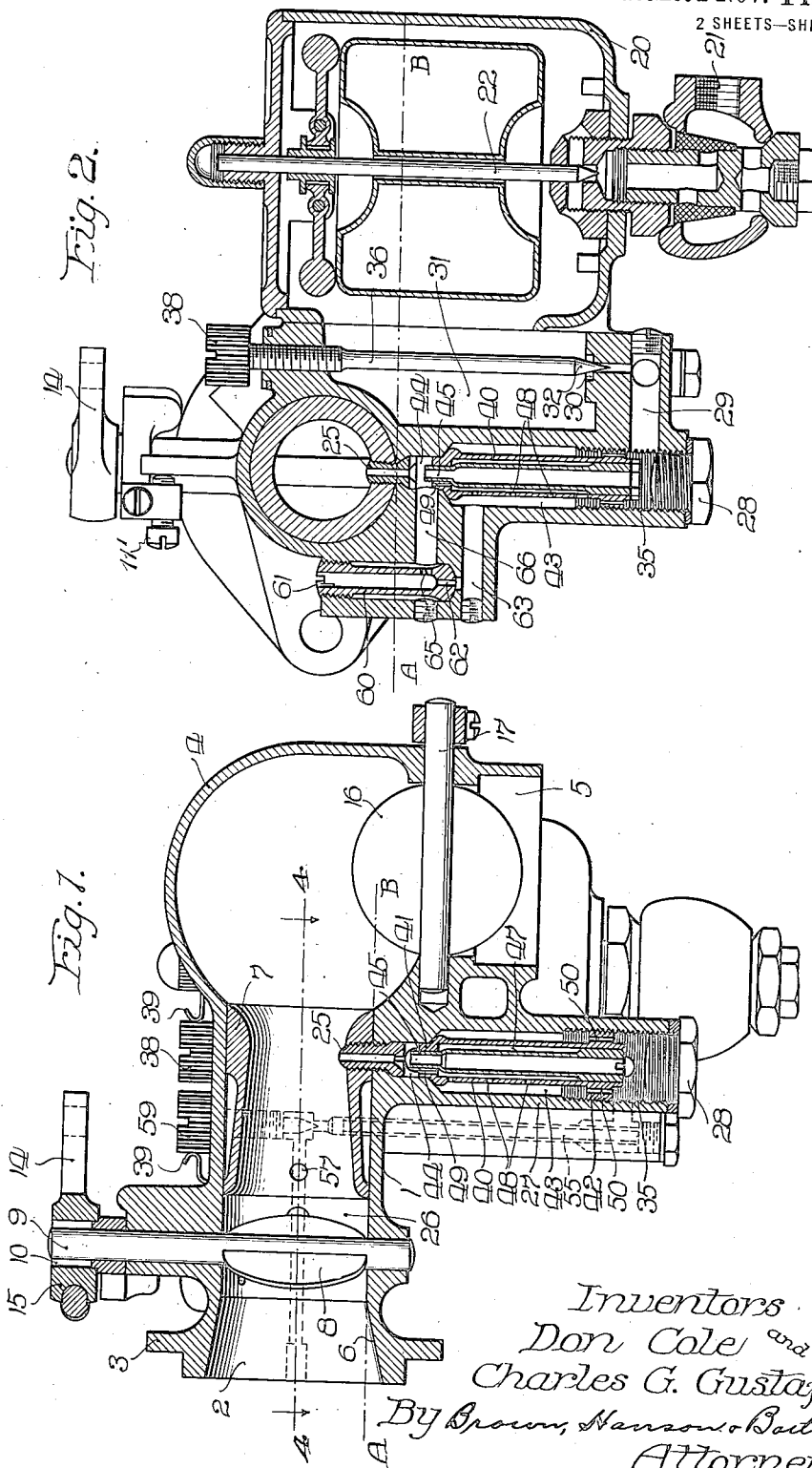
D. COLE AND C. J. GUSTAFSON.
CARBURETOR.

APPLICATION FILED FEB. 11, 1918.

1,435,151.

Patented Nov. 14, 1922.

2 SHEETS—SHEET 1.



Inventors
Don Cole and
Charles G. Gustafson
By Brown, Hanson & Baithen
Attorneys

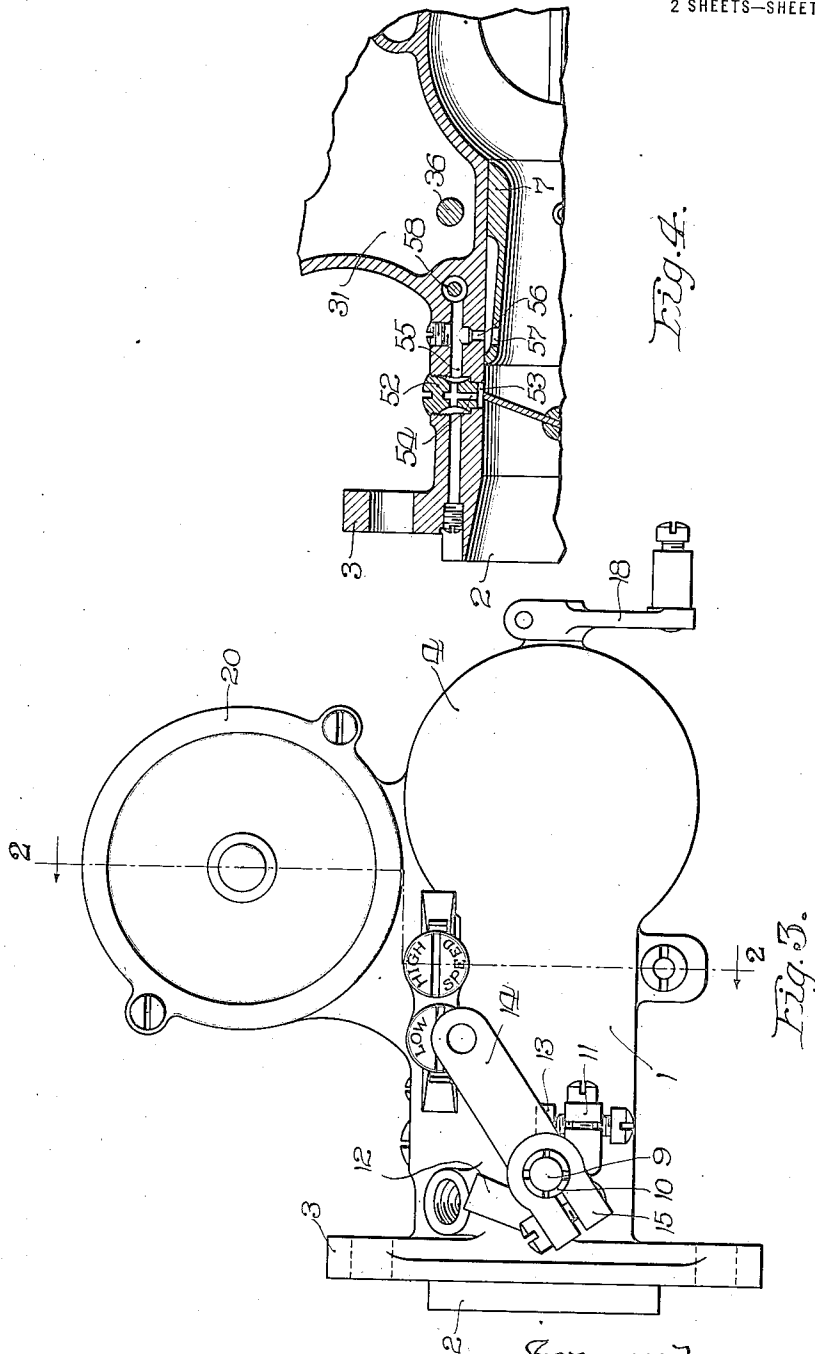
D. COLE AND C. J. GUSTAFSON.
CARBURETOR.

APPLICATION FILED FEB. 11, 1918.

1,435,151.

Patented Nov. 14, 1922.

2 SHEETS—SHEET 2.



Inventors
Don Cole and
Charles G. Gustafson
By Brown, Hanson & Bottcher
Attorneys

UNITED STATES PATENT OFFICE.

DON COLE AND CHARLES J. GUSTAFSON, OF CHICAGO, ILLINOIS, ASSIGNORS TO STROMBERG MOTOR DEVICES COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CARBURETOR.

Application filed February 11, 1918. Serial No. 216,438.

To all whom it may concern:

Be it known that we, DON COLE and CHARLES J. GUSTAFSON, respectively a citizen of the United States and a subject of the King of Sweden, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Carburetors, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to carburetors.

The chief aim of our invention is to provide a simple and inexpensive carburetor, effective in providing a proper mixture of liquid fuel and air for forming a combustible charge for internal combustion engines and the like.

In order to secure a proper fuel feed over a range of engine speed, we employ an air vented fuel jet. We find that not only does it give the desired characteristics of mixture ratios, but it also serves to subdivide the fuel better and thus secure greater economy.

For the purpose of securing the proper air bleeding and atomizing effect, we employ the atomizing chamber and jet described and claimed in the co-pending application of Frank C. Mock, Serial No. 187929, filed August 24, 1917.

We have combined with that form of sensitive jet and chamber, an accelerating well of novel structure and action. An accelerating well, to be useful throughout the working range of the carburetor must be responsive over the entire range of suction. If the column of gasoline or other fuel were directly responsive to the suction, a column of great height would be required to be effective over the whole range.

We have invented an accelerating well structure which provides in small compass a device responsive over substantially the entire working range. We have combined this function with the constant mixture function in the preferred form of our invention.

The accelerating well provides a column of liquid which is made responsive in a certain proportion to the suction. A variable amount of air is admitted to one end of

the column but it is by-passed by small openings which are successively uncovered as the column is changed by increased suction. The air that is by-passed is conducted into the atomizing chamber and aids in maintaining a constant mixture proportion throughout the speed range of the engine as well as atomizing the fuel.

We have found that there is a distinct advantage in leading the by-passed air to the atomizing chambers by a route separate from the fuel jets. No irregularities of the fuel feed are occasioned. If the by-passed air should be introduced into the jet of fuel, bubbles would then form and fill the cross-section of the jet or nozzle, producing an irregular action of the feeding of fuel.

Other incidental improvements will be apparent from the following detailed specification, in which we describe a particular embodiment of our invention.

In the accompanying drawings,

Figure 1 is a vertical, axial, longitudinal sectional view of a structure embodying the improvements of our invention;

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 3, looking in the direction of the arrows;

Figure 3 is a top plan view;

Figure 4 is a fragmentary horizontal sectional view taken on the line 4—4 of Figure 1, looking in the direction of the arrows.

The carburetor comprises a main barrel member 1, having an outlet 2 which is provided with an attaching flange 3. The opposite end of the main barrel member 1 is provided with an enlarged elbow 4 and an open intake 5.

The inner bore of the main barrel 1 is of less diameter than the diameter of the outlet 2, these parts being joined together by a tapered portion 6. The bore of the barrel 1 is further restricted by a venturi restriction 7, the entrance to which adjoins the enlarged elbow chamber 4. A throttle valve 8 is provided between the venturi 7 and the outlet 2, this valve being mounted on a rocking shaft 9 pivoted vertically in the main barrel 1. The rocking shaft 9 is provided with a split sleeve 10, this sleeve carrying stop arms 11—12 the former carrying a set screw 11' for engaging the sta-

tionary lug 13 to control the limit of the movement of the valve 8. A throttle operating lever 14 has a split hub 15 which is adapted to be clamped about the split sleeve 10 to clamp the adjustable stop mechanism and the lever 14 in place upon the end of the shaft 9.

A butterfly valve 16 mounted upon a rock shaft 17 controls the inlet 5. The rock shaft 17 is provided with an operating arm 18, this arm being adapted to be operated by any suitable means. A float chamber 20 is formed preferably integral with the barrel member 1 and is disposed at one side of the same. The float chamber 20 is provided with a gasoline supply pipe 21 and a float controlled needle valve 22 for maintaining a substantially constant level of gasoline, or other suitable liquid fuel, in the float chamber 20. A main nozzle 25 projecting through the lower wall of the barrel member 1 and through the venturi restriction 7 opens into said venturi a short distance beyond the most restricted portion thereof. Between the nozzle 25 and the throttle valve 8 there is defined a space which is termed the "carbureting chamber" 26.

A well casing 27 extends from the barrel member 1 downward below the main nozzle 25. This well casing is hollow and has its lower end closed by means of a plug 28. The lower end of the space in the well casing 27, which, as will be hereafter described, constitutes the primary well, communicates by way of a fuel supply passageway 29 through a valve port 30 with the space 31, which is a direct continuation of the float chamber 20. The needle valve 32 co-operates with the valve port 30 to form a restriction between the interior of the float chamber and the passageway 29 to the primary well 35. The needle valve 32 has a stem 36 which is threaded to the upper wall of the space 31 and has a knurled head 38 at its upper end held by the spring finger 39 against accidental turning.

It will be noted that the valve stem 36 enters the space 31 upon the float chamber side of the restriction or valve port 30 so that leakage of air past the threads of the stem 36 can have no effect upon the fuel supplied to the main jet.

Within the hollow well casing 27, a sleeve 40 provided with an upper head 41 and a lower head 42 divides the interior of the casing into three compartments, namely, the primary well 35, the accelerating well 43, and the atomizing chamber 44. The atomizing chamber 44 comprises a chamber considerably larger than the bore of the main nozzle 25. A fuel supplying nozzle 45 opening at its lower end into the primary well 35 projects through the two heads 41-42 and has its upper end slightly above the head

41 which forms the floor of the atomizing chamber 44. A cylindrical space 47 is left between the sleeve 40 and the sleeve of the nozzle 45. This space 47 communicates with the accelerating well 43 through a series of small openings 48 in the side wall of the sleeve 40. This space 47 also communicates with the atomizing chamber 44 by means of a plurality of small passageways 49, which open into the atomizing chamber 44 adjacent the nozzle 45. The lower head 42 is pierced by a plurality of small passageways 50 which provide communication between the accelerating well 43 and the primary well 35.

An idling jet is formed under the lip of the throttle by the plug 52, which has its inner end depressed slightly below the cylindrical surface of the barrel of the carburetor to form a small passageway 53, under the edge of the throttle. The bore 54 of the plug 52 forms a passage which passage communicates with a horizontal passageway 55. A port 56 through the side walls of the carburetor permits air from the carbureting chamber to pass into the horizontal passageway 55. The venturi 7 has an opening 57 over the air port 56 to permit air to enter in the desired amount to the idling jet. The horizontal passageway 55 communicates with a vertical passageway 58, the connection between which passageways is controlled by a needle valve 59. The vertical passageway 58 communicates with the float chamber 20.

As the opening 57 for the air intake to the idling jet is located in the surface of the venturi tube 7, this opening will be subject to the action of the venturi. The amount of air that enters may be controlled by properly placing the opening 57 along the walls of the venturi tube. That is to say, placing the opening 57 near the throat of the venturi causes the idling jet to drop out of action earlier because of the suction effect exerted by the venturi restriction. If the opening 57 is moved out further toward the end of the venturi the time period of suction is decreased and air will pass around through the port 56, passageways 55 and 52, over a greater part of the range of operation of the device. Upon starting, when the movement of air through the venturi 7 is relatively low, no appreciable effect is caused and air enters the opening 57 freely.

The air inlet for the atomizing chamber 44 and for the accelerating well 43, is formed through a thimble or sleeve 60, which is set in an opening in the body of the carburetor.

The sleeve 60 set in the body of the carburetor has a central passageway 61 which is restricted at 62 to a predetermined size and communicates with the accelerating well by way of the horizontal passageway 63, and also communicates with the atom-

70

75

80

85

90

95

100

105

110

115

120

125

130

izing chamber 44 through a calibrated opening 65 and a horizontal passageway 66.

The calibrated orifice or opening 62 controls the amount of air admitted to the accelerating well for admitting air to the same. The air admitted by way of the calibrated orifice 65 to the atomizing chamber 44, compensates the jet and atomizes the fuel prior to its discharge from the nozzle 25.

The operation of the device is as follows:

The level of liquid fuel normally stands on about the line A—B shown in Fig. 4, such level lying above the accelerating well and the atomizing chamber and filling the passages connected therewith. Upon starting of the engine the inlet valve 16 is moved toward the closed position and the engine is turned over. The fuel which had accumulated in the bore 61 of the sleeve 60 and in the horizontal passageway 66, is thrown out and furnishes a supply sufficient to release enough volatile matter to form a combustible charge for starting. Under such conditions most of the fuel drawn by the engine at starting is derived from these passages.

When the engine is idling the throttle valve 8 is substantially closed and air passes under the edge or lip of the throttle by way of the passageway 53, picking up fuel from the idling jet 54. Air is admitted to the nozzle 54 by way of the opening 57 in the venturi 7 and the port 56 in the side walls of the barrel of the carburetor.

As the throttle valve 8 is moved slightly toward the open position the suction upon the nozzle 54 is increased and the engine speed picks up. When the throttle is still further opened, the main jet 25 begins to function and supplements the action of the idling jet 54. This is due to suction ceasing to have a material effect upon the idling jet. Fuel from the float chamber flows past the valve 32, passage 29, into the primary well 35. Thence it is drawn up through the nozzle 45 into the atomizing chamber 44. Air entering the sleeve 60 by way of passageway 61, calibrated orifice 65 and horizontal passageway 66, strikes the entering fuel as it emerges from the tip of the nozzle, breaking the same up into a spray or fog and discharging the same through the nozzle 25.

At the same time air passes from the bore 61 of the sleeve 60 through the calibrated orifice 62, horizontal passageway 63 into the accelerating well structure and through the upper opening 48 into the space 47 between the nozzle 25 and the sleeve 40, and is discharged into the atomizing chamber 44, through the openings or passageways 49. The admission of this air permits the accumulated fuel in the accelerating well to be drawn down through the openings 50 into the well 35, thence to the engine.

There is a certain relation between the

calibrated orifice 62 and the capacity of the passageways 49, such that a certain proportion of atmospheric pressure is present in the horizontal passageway 63 and the top of the well, over the range of suction corresponding to engine feed. Thus when the throttle is opened by a relatively sudden movement and acceleration of the engine is desired, the increased suction on the jet 45 is not quite satisfied by the air moving through the upper opening 48 and through the passageway 49 and as a consequence a portion of the liquid in the accelerating well 43 is discharged through the lower openings 48 and the openings 50 in the lower head 42 and passes out through the nozzle 45. This increase in the amount of fuel discharged causes acceleration of the engine as desired.

In reducing our invention to practice, and as an example of one application of the device to practical use, the same was designed with the sizes hereinafter itemized for use on an engine having a displacement of 212 cubical inches. The carburetor had a 51/64 inch engine venturi and the following itemized list of sizes of openings are the sizes of openings which were used, respectively, in this carburetor:

Nozzle.....	25	Size No. 42,	.0935 diameter in inches.	95
Port.....	48	" " 60,	.04 " " "	
Port.....	49	" " 60,	.04 " " "	
Port.....	54	" " 56,	.0465 " " "	
Passageway.....	62	" " 65,	.035 " " "	
Passageway.....	65	" " 65,	.035 " " "	

The principal improvement in the present invention which we desire to lay emphasis upon is that of the thorough atomization of the fuel by delivery first from one nozzle, second through the other nozzle, via a chamber into which air is bled, preferably by the suction established by the engine. It will be apparent that the air admitted through the opening 62 must have freer passage than that which is permitted to leave from the opening 49 as it is necessary that this air assist in evacuating the accelerating well upon acceleration. Air is permitted to pass through the opening 65 so that as the column of liquid fuel issues from the nozzle 45 the same will be broken up into very fine particles before being actually discharged from the nozzle 45. In this manner a double atomization of the fuel is provided which insures a non-changing mixture ratio throughout the range of engine speed the accelerating well affording a practically unfailing excess supply of liquid fuel for starting.

The air which passes through the opening 49 in the upper head 41, passes into the atomizing chamber 44, aiding in atomizing the fuel and maintaining constant the mixture.

The adjustments for the idling jet 54 and for the main jet 25 are provided in the

needle valves 58 and 36 having the adjusting head 59 and 38 respectively. These heads are fluted and are adapted to engage the holding springs 39 for holding the valves in adjusted position.

We claim:

1. In a carburetor, a main barrel having a well casing secured thereto, said well casing having a nozzle at its upper end communicating with the interior of the barrel, a sleeve having a head at each end in said well casing, dividing said well casing into three compartments, an upper atomizing chamber, a lower primary well, and an intermediate accelerating well, a second sleeve or nozzle inside the first sleeve forming a communication between the primary well and the atomizing chamber directly, said sleeves having a space between them, passageways from said space through said upper head and passageways from said space through the side wall of said first sleeve to the accelerating well, a passageway from the accelerating well through said

lower head to the primary well, and means for supplying fuel to the primary well.

2. In a carburetor, a carbureting chamber having an air inlet and a mixture outlet, a constant level liquid fuel supply chamber, a passageway terminating at both ends above the fuel level in said supply chamber and having means for the admission of air at one end and terminating at the other end in a fuel nozzle discharging into said carbureting chamber, a restricted connection between said constant level fuel supply chamber and said passageway below the fuel level in said supply chamber, a well fed from said constant level chamber and independently discharging into said passageway, said well having air admissible thereto and there-through to said passageway.

In witness whereof, we hereunto subscribe our names this 7th day of February, A. D. 1918.

DON COLE.
CHARLES J. GUSTAFSON.