

May 10, 1938.

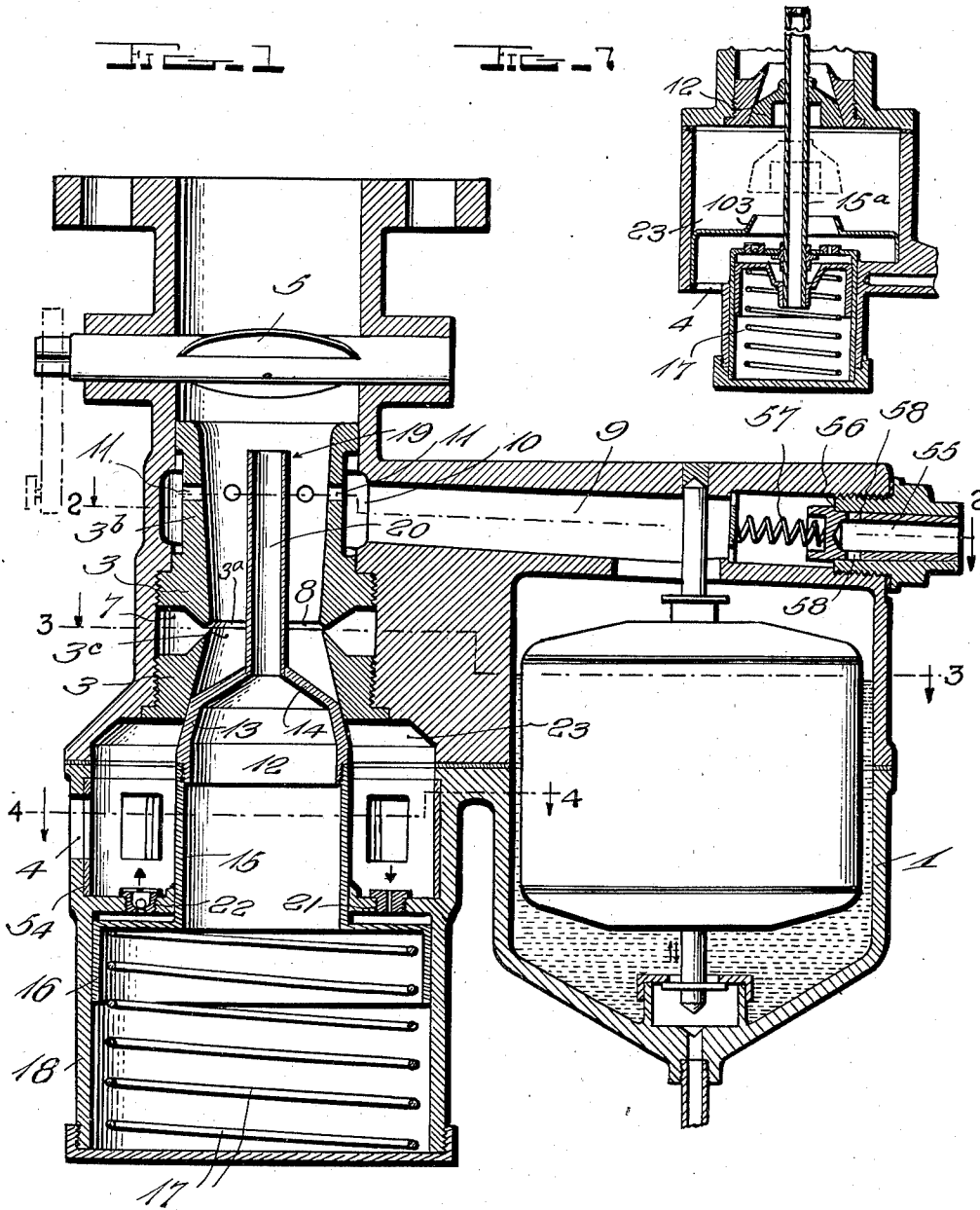
E. F. C. SEIGNOL ET AL

2,116,608

CARBURETOR

Filed Nov. 16, 1933

3 Sheets-Sheet 1



INVENTORS:
Edouard F. C. Seignol,
Francis J. Monier,

BY
Townsend & Decker,
ATTORNEYS.

May 10, 1938.

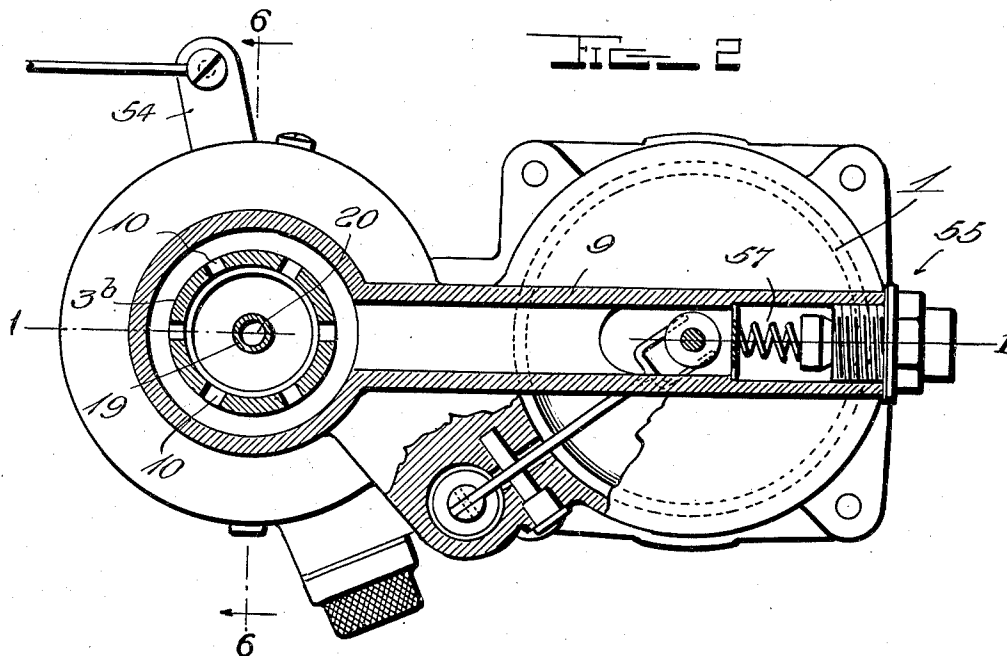
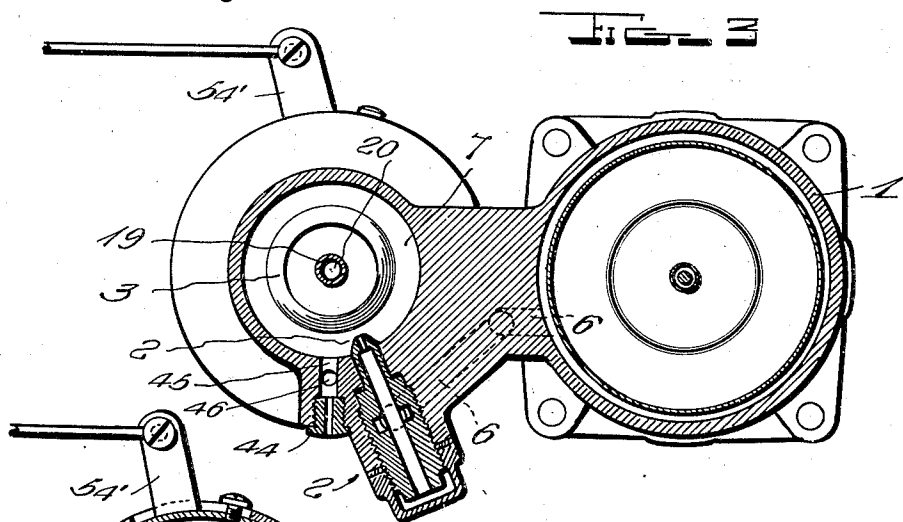
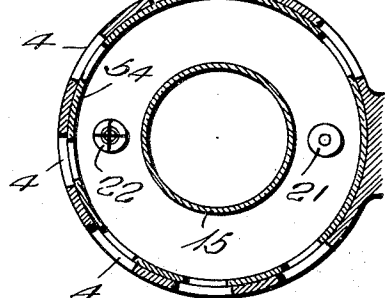
E. F. C. SEIGNOL ET AL

2,116,608

CARBURETOR

Filed Nov. 16, 1933

3 Sheets-Sheet 2



INVENTORS:
Edouard F. C. Seignol,
Francis J. Monier,

BY
Townsend & Decker,
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,116,608

CARBURETOR

Edouard Frédéric Charles Seignol and Francis Jules Monier, Paris, France, assignors to Société Auxiliaire Pour le Développement D'Industries Mecaniques S. A. D. I. M., Neuilly, France, a corporation of France

Application November 16, 1933, Serial No. 698,252
In France November 21, 1932

8 Claims. (Cl. 261—72)

This invention has for its object an improved carburetor having a differential feed action and of the fuel lift type which draws fuel from a supply tank disposed at a lower level than the fuel nozzle of the carburetor.

According to the invention the regulating of the air is insured through the combination of the following means:

(a) An air admission regulator located at the entrance of the diffuser of the carburetor, said regulator preferably operating automatically under the action of the vacuum in the diffuser at every given moment;

(b) An air entrance chamber in which works the regulator;

(c) A control device or throttle valve located either at the entrance or at the discharge end of the carburetor and simultaneously controlling the positions of the regulator and the engine speed.

The admission regulator comprises a tube the diameter of which is substantially equal to the outlet of the carburetor and on which are secured: on the one hand, a frusto-conical valve of such size that it may close the convergent part of the diffuser of the carburetor, the small base of said truncated cone being preferably equal to the diameter of the neck of the diffuser multiplied by

$$\sqrt{2}$$

and, on the other hand, a piston sliding in a cylinder. In the case of an automatic regulation the piston is controlled by variations of vacuum in the diffuser.

A dash-pot means is preferably provided so that the regulator may freely move in its closing direction and is braked in its movements in its opening direction. The air entrance may be so arranged that the air admitted to the carburetor is directed under the large base of the regulating valve, so that the valve is braked in the sense of its opening and, furthermore, that from the complete opening of the valve the underside of this latter acts to reduce the entrance of the air.

The control device insuring the automatic working of the regulator is formed of a control valve which is located either at the delivery or at the entrance end of the carburetor.

The arrangement of the control valve at the delivery end of the carburetor has the advantage, on the one hand, to avoid too great vacuum values on the free surface of the fuel which, in certain conditions of temperature, may cause boiling phenomena and, on the other hand, to render

the operation of the suction regulator independent of the static vacuum variations in the admission pipe.

The entrance of the air into the carburetor is insured preferably through openings provided along a circumference which is concentric with the axis of the expansion chamber, the sum of the entering air quantities being substantially equal to the diameter of the delivery end of the carburetor. A circular ring valve provided with a control handle or member permits either the closing of said openings for insuring the operating of the automatic starter hereunder described or for varying the section of said openings so as to act as a regulating valve.

The arrangement of the control valve at the entrance of the carburetor provides advantages which, in certain cases, may be such that said arrangement should be preferred, more particularly when the engine is not submitted to sudden and frequent variations of its normal speed. One of said advantages is that the control valve, when it is located at the entrance, cannot be jammed by frost.

The entrance of the carburetor can also be formed, in the ordinary manner, of an air admission pipe in which a regulating valve is arranged.

The fuel delivery is submitted to the action of a corrector or rather of an economizer which acts on the vacuum producing the fuel delivery as the opening of the throttle valve is diminished. Said corrector may be an automatic one, or may be manually actuated.

The special carburation for starting is obtained by means of a starter operated either manually or automatically, said starter having for its effect to diminish the vacuum acting on the free level of the fuel without acting on the vacuum on the nozzle.

The starter, when it is an automatic one, is regulated in such a manner that all the vacuum values at the level of the diffuser during the operation of the carburetor cannot act on the same and that only vacuum values which are notably greater are capable of acting on the said starter.

The illustrations of the appended drawings show, by way of example, a lifting carburetor constructed according to the invention.

In the drawings:

Fig. 1 is a vertical section, on line I—I of Fig. 2, through a carburetor embodying our invention.

Figs. 2, 3 and 4 are sectional plan views taken, respectively, on the lines 2—2, 3—3 and 4—4 of Fig. 1.

Fig. 5 is a diagrammatic view in section illustrating the fuel passages shown in Figs. 1 to 4, inclusive.

Fig. 6 is a section on line 6—6 of Fig. 2.

Fig. 7 is a sectional view showing a modified form of the invention.

In order to facilitate the description similar members and pieces are designated by the same reference numerals.

In the embodiment according to Figs. 1 to 6, inclusive, the carburetor comprises a constant level receptacle 1 supplied from a tank 1a, a nozzle 2, a diffuser, 3, circularly arranged air inlets 4 and a throttle valve 5. A rotary air entrance valve 54 having an operating handle or member 54' is provided to regulate the inflow of air through inlets 4.

In the convergent part 3c of the diffuser is located the regulator 12 comprising a valve having a lower conical surface 13, of an angle conforming to and which is parallel with the convergent part of the diffuser, and an upper conical surface or apex portion 14 of a greater angle relative to the convergent part of the diffuser than that of the conical part 13, the angle of the conical surface 14 being such as to progressively increase or diminish the size of the air admission aperture formed between said surface 14 and the wall of part 3 of the diffuser as the valve in its working action moves downwardly or upwardly to different degrees in the air chamber 23.

Said double cone is connected through a cylindrical tube 15, the diameter of which is substantially equal to the diameter of the outlet of the diffuser, with a driving piston 16 which can move against the action of the spring 17 in a cylinder 18.

A tube 19 carried by the cone 14 connects through its opening 20 the driving face of the piston 16 with the expansion chamber formed by the divergent part 3b of the diffuser.

A dash-pot means formed of a calibrated air entrance 21 and a valve 22 brakes the movements of the piston 16 downwards and leaves said piston free in its upward movement.

The circular openings 4 form the air entrance proper of the carburetor. The constant level receptacle 1 is closed and connected with the neck 3a of the diffuser: on the one hand, at its lower part, through the conduit 6, the fuel nozzle 2, the chamber 7 and the slot 8 in the neck 3a of the diffuser, and on the other hand, in its upper part, above the free level of the fuel, through the conduit 9, the annular chamber 10 and one or more holes 11 with the divergent part 3b of the diffuser.

As the vacuum in the neck 3a of the diffuser is always greater than the vacuum before the opening or openings 11, the fuel is drawn by the action of the engine into the diffuser through the nozzle 2, but the delivery of the same is constantly braked by the vacuum transmitted through the conduit 9 above the free level of the fuel, said vacuum varying between two values, the one a maximum value and the other a minimum value, in a direct ratio with the opening of the regulator 12.

Said vacuum values, which are always maintained at a high rate by the construction of the regulator, are sufficient if the carburetor is not supplied with fuel from above, for drawing in, in all cases up to the constant level receptacle, the fuel from a container located therebelow.

The operation of the carburetor is as follows:

When the throttle valve 5 is opened the suction exerted in the divergent part 3b of the diffuser on the end 20 of the tube 19 opening into the same is transmitted to the driving face of the piston 16 and opens regulator 12 in such a manner that it automatically takes a position corresponding to the opening of the regulating valve 5.

The wider the valve 5 is opened, the greater the amount of air permitted to enter the diffuser.

The feed delivery of fuel from the nozzle 2 to the chamber 7 of the diffuser is governed by the action of an automatic differential corrector and economizer shown in Fig. 6. The construction and operation of this corrector and economizer is as follows:

A calibrated air entrance in the form of a nipple 44 communicates through a port 45 with a channel or conduit 46 connected with the chamber 7 and through a port 47 with the chamber 10. Another channel or conduit 48 communicates at one end with chamber 10 and passage 46 directly or through port 47 and communicates at its opposite end with the mixture passage posteriorly of the valve 5, said channel 48 providing a by-pass about valve 5. Conduits 46 and 48 serve as idling mixture feed passages for idling speeds, and passage 46 also acts to convey gases from 11, 10 to 7, 8 for a circulatory mixing action during such times as there exists certain differences in pressure between 11 and 8, as hereinafter described. The nipple 44 supplies air to form the idling mixture for idling speeds and at high speeds it acts as an economizer by venting the chamber 7 and thereby reducing the suction on the fuel supply. It will be understood that at lowest idling speed with valve 5 in closed or almost completely closed position passage 48 serves to maintain a desired vacuum in the diffuser 3 and passage 9 and to allow feed of fuel to the engine. In such position of the valve 5 the vacuum values between 7 and 10 are very near one another and air for the idling fuel feed is supplied through nipple 44 for the production of the no-load emulsion or mixture in the chamber 7 and conduit 46. This mixture is drawn into the engine through conduits 46 and 48, but in case any of the mixture enters the venturi through slot 8 it will also be drawn through openings 11 and chamber 10 for passage through conduit 48 to the engine. At higher idling speeds or intermediate speeds, with valves 5 and 12 open to small degrees, through the change of vacuum differential occurring between 10 and 7 there is a tendency for the production of a circulatory current of a portion of the gaseous mixture from the divergent part of the venturi downward through openings 11 and chamber 10 to chamber 7 and thence through slot 8 back into the venturi for upward travel therein. The volume and velocity of this current tend to increase in proportion to the degree of opening movement of valve 12, but such current is checked and controlled against its volume and velocity becoming excessive at all idling and intermediate speeds by the relief action due to the induced greater flow of air at such times through the nipple 44. This circulatory current so produced is not detrimental to a proper feed action but on the contrary results, through the increased agitation which it causes, in the formation of a better mixture for use at such speeds and an economizing action at intermediate speeds by venting the chamber 7 and reducing the suction on the fuel supply.

At the end of the conduit 9 is an automatic starting device formed of a hollow valve needle 55 resting upon the seat 56 against which it is pressed by a spring 57. The openings 58 permit the atmospheric air to enter the conduit 9 when the valve needle 55 has been lifted from its seat.

The operation of the automatic starter is as follows:

When the air entrance ring or choke valve 54 is closed the total vacuum of the suction pipe establishes itself in the diffuser 3, the openings 11, the chamber 10 and the conduit 9. Under the action of this great vacuum the valve needle 55 is drawn in, compressing the spring 57 and uncovering the openings 58, thus permitting the atmospheric air to enter the conduit 9, which has for its effect to diminish the vacuum in the upper part of the constant level receptacle and therefore, to increase the quantity of fuel entering the diffuser.

In the embodiment according to Fig. 7 the air chamber 23 freely communicates with the atmosphere through the holes 4 which are circularly arranged around the axis of the chamber 23 and in such a number that their total section is at least equal to the section of the diffuser. In the air chamber 23 is disposed a nozzle 103 the section of which is approximately the same as the section of the diffuser of the carburetor and which collects the air in a rising current in line with the valve 12. The air flows into the chamber 23 before reaching the diffuser. The rising air current brakes or checks the movement of the valve 12 in the direction downwards and tends to push it to the closed position, the air pressure in this case thus acting in the manner as the spring 17 in Fig. 1.

By arranging the nozzle 103 in such a manner that from the complete opening of the diffuser the lower base of the valve 12 reduces the air supply in a predetermined measure, the quantity of air which is admitted will never exceed a predetermined fixed value.

What we claim is:

1. In a carburetor elevating fuel from a lower reservoir and having an air entrance, a diffuser having a constricted portion, a diverging portion posterior to said constricted portion and leading therefrom and a converging portion anterior to said constricted portion and disposed between the same and the air entrance, a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, an air entrance to the carburetor a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion and the supply of air admitted thereto from the air entrance, a tube connected to the said regulating valve and opening at one end into the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to the other end of said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through said tube, means acting to con-

stantly push the regulating valve towards the closing position of the same, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, a restricted air feed connection between the atmosphere and the said conduit and chamber surrounding the constricted portion of the diffuser for supplying air thereto, and a starting valve for establishing communication between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle.

2. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, an air entrance to the carburetor, means acting to constantly push the regulating valve towards the closing position of the same, a valve located at the air entrance of the carburetor and varying the cross section of the said entrance from zero to its maximum, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, a restricted air feed inlet communicating with said conduit and chamber, and a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle.

3. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, means acting to constantly push the regulating valve towards the closing position of the same, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, an always

open restricted air feed connection between the atmosphere and said conduit and chamber, a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle, and a manually operable control throttle valve located posterior to the diffuser to vary from a small value to its maximum the section of the conduit leading from the diffuser to the engine fed by the carburetor.

4. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, means acting to constantly push the regulating valve towards the closing position of the same, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, a nipple having a restricted air passage leading from the atmosphere for supplying air to the chamber surrounding the constricted portion of the diffuser, and a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle.

5. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging part, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, an air intake entrance to the carburetor means acting to constantly push the regulating valve towards the closing position of the same, a means at the air entrance of the carburetor for varying the cross section of the said entrance from zero to its maximum, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, an air supply connection between the atmosphere

and said conduit and the chamber surrounding the constricted portion of the diffuser, a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle, a spring holding the said valve in its closing position and the value of the strength of which is such that it allows the starting valve to open when the vacuum in the constant level receptacle is substantially higher than the normal vacuum therein corresponding to the normal operation of the carburetor, due to the closing of the air entrance of the carburetor for starting the engine fed by the carburetor, and a control throttle valve located posterior to the diffuser to vary from a small value to its maximum the section of the conduit leading from the diffuser to the engine fed by the carburetor.

6. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper portion of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, means acting to constantly push the regulating valve towards the closing position of the same, an air entrance to the carburetor, a hand operated valve located at the air entrance of the carburetor for varying the cross section of the said entrance from zero to its maximum, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, a restricted air feed connection between the atmosphere and said conduit and chamber surrounding the constricted portion of the diffuser for supplying air thereto, a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle and a spring holding the said valve in its closing position and the value of the strength of which is such that it allows the starting valve to open when the vacuum in the constant level receptacle, is substantially higher than the normal vacuum therein corresponding to the normal operation of the carburetor, due to the closing of the air entrance of the carburetor for increasing at will and incidentally the pressure in the constant level receptacle.

7. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser

at a point posterior to the constricted portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, a dash-pot means cooperating with the piston and cylinder for exerting a braking action on the opening movement of the regulating valve, means acting to constantly push the regulating valve towards the closing position of the same, an air entrance to the carburetor, a valve located at the air entrance of the carburetor for varying the cross section of the said entrance from zero to its maximum, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, a restricted air feed connection between the atmosphere and said conduit and the chamber surrounding the constricted portion of the diffuser for supplying air thereto, and a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle.

8. In a carburetor elevating fuel from a lower reservoir to a closed constant level receptacle, a conduit leading from the bottom of the said receptacle to the constricted portion of the diffuser of the carburetor through a nozzle of predetermined section opening in a chamber surrounding the constricted portion of the said diffuser and communicating therewith, a conduit leading from the upper part of the said constant level receptacle to the diverging portion of the said diffuser at a point posterior to the constricted

portion of the same, a frusto-conical regulating valve located in the converging portion of the diffuser and longitudinally movable therein and adapted to vary the cross section of the said converging portion, a tube connected to the said regulating valve and opening in the diverging portion of the said diffuser at a point posterior to the constricted portion of the diffuser, a piston connected to said tube, a closed cylinder in which slides the piston and which communicates with the diverging portion of the diffuser through the tube, means acting to constantly push the regulating valve towards the closing position of the same, a conduit leading from the diverging portion of the diffuser to the chamber surrounding the constricted portion of the diffuser, a restricted air feed connection between the atmosphere and the said conduit and said chamber surrounding the constricted portion of the diffuser for supplying air thereto, a starting valve interposed between the atmosphere and the upper part of the constant level receptacle and opening in the direction of said receptacle, means cooperating with said valve to open the same for starting the engine fed by the carburetor, an air entrance to the carburetor, an air chamber interposed between the air entrance of the carburetor and the air entrance of the converging portion of the diffuser, and an air conduit surrounding the regulating valve carrying tube and of a section not larger than the greater base of the said regulating valve, the distance between said conduit and the regulating valve when in its closing position being such that the flow of air penetrating in the air chamber brakes the opening movement of the regulating valve and automatically limits to a predetermined extent the flow of air entering the carburetor.

EDOUARD FRÉDÉRIC CHARLES SEIGNOL.
FRANCIS JULES MONIER.