A. & L. GRAPIN.

CARBURETER.

APPLICATION FILED NOV. 26, 1913.

1,148,378.

Patented July 27, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

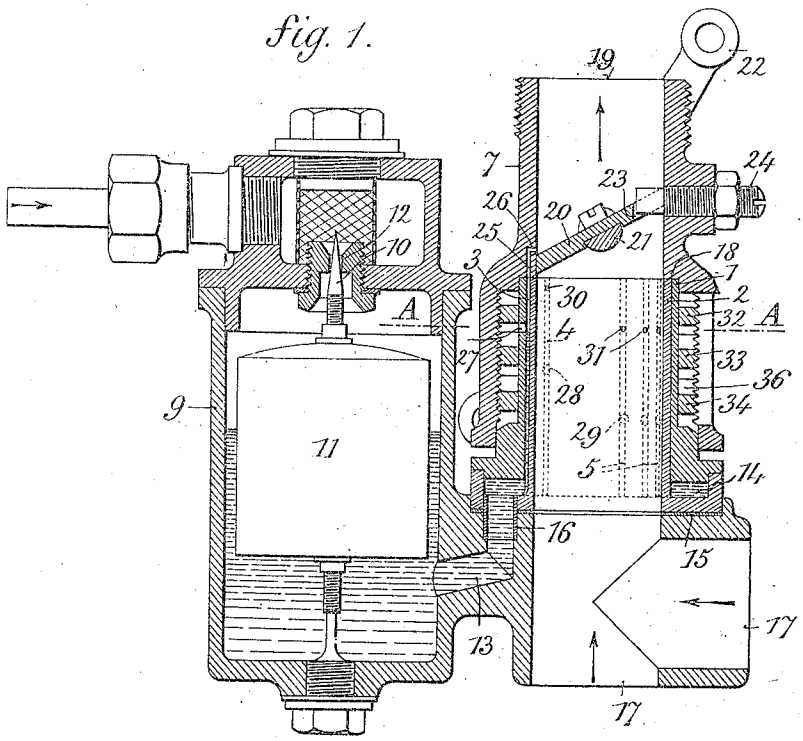
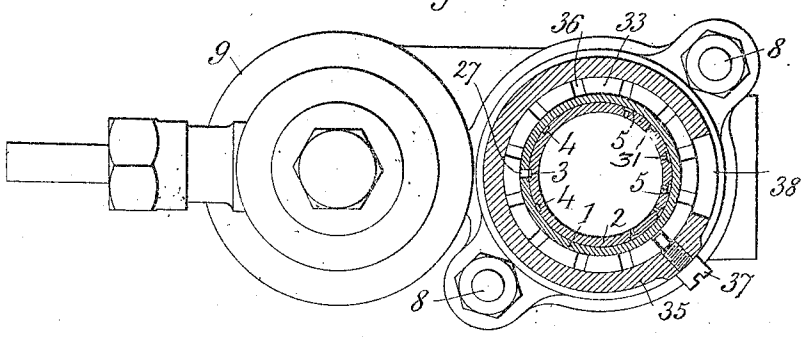


Fig. 2.



WITNESSES

W. C. Baker Jr.

R. D. Rollhaus

INVENTORS

Alfred Grapin

Lucien Grapin

BY Munn & Co.

ATTORNEYS

A. & L. GRAPIN.

CARBURETER.

APPLICATION FILED NOV. 26, 1913.

1,148,378.

Patented July 27, 1915.

2 SHEETS—SHEET 2.

fig. 4.

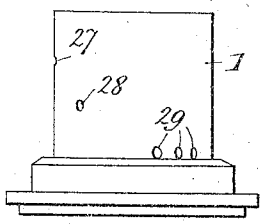


fig. 5.

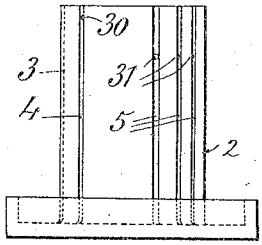


fig. 3.

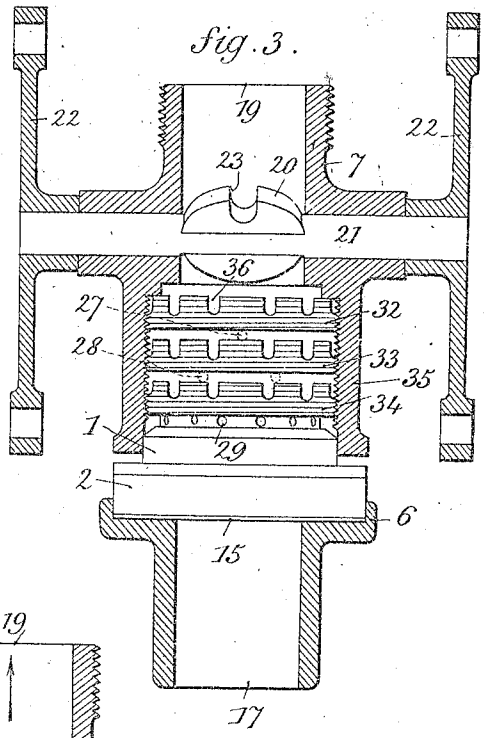
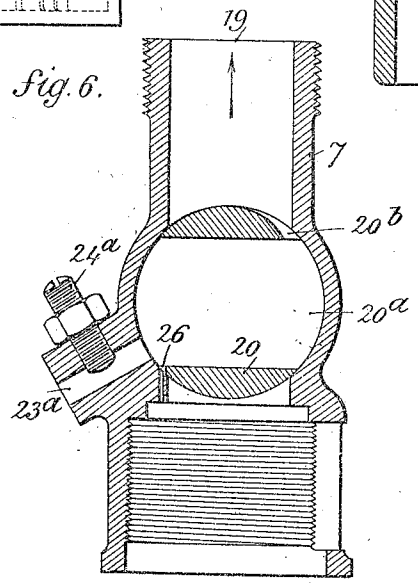


fig. 6.



WITNESSES

W. C. Baker Jr.

P. L. Rollhaus

INVENTORS

Alfred Grapin

Lucien Grapin

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALFRED GRAPIN AND LUCIEN GRAPIN, OF NEUILLY-SUR-SEINE, FRANCE.

CARBURETER.

1,148,378. Specification of Letters Patent. Patented July 27, 1915.

Application filed November 26, 1913. Serial No. 803,154.

To all whom it may concern:

Be it known that we, ALFRED GRAPIN and LUCIEN GRAPIN, citizens of the Republic of France, both residing at 94 Rue de Longchamps, Neuilly-sur-Seine, Seine, in the Republic of France, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to improvements in carbureters and the object of the invention is to provide a carbureter of simple construction and the operation of which is faultless.

Such improvements consist essentially in the use of a set of narrow jet channels vertically arranged in one vertical wall, such channels communicating at the bottom with a fuel container and communicating higher up, on one side, with a supply inlet for the atmospheric air and, on the opposite side, with a sucking chamber connected with the combustion chamber of the engine, the communications of the said channels with the sucking chamber being located higher up than their communications with the atmosphere.

On certain known carbureters are already channels through which the fuel and air are drawn. But the section of the passage for the mixture of air and fuel is relatively large commencing from the same point where the junction of said substances is effected. Contrariwise in the new and improved carbureter the section of the channel is just as narrow at one side as at the other of the place where the air laterally enters thereto, and this arrangement assures a greater division of the fuel and air and a more perfect mixture of said substances.

The wall provided with the jet channels is preferably in the shape of a socket of a large diameter which allows of multiplying easily the number of the jet channels as may be desired and according to the power of the engine.

One embodiment of the carbureter according to this invention is shown by way of example in the accompanying drawings, in which:—

Figure 1 is a vertical section of such carbureter. Fig. 2 is a horizontal section on the line A—A of Fig. 1. Fig. 3 is a vertical section in which the atomizer and its adjusting rings are shown in elevation. Figs. 4 and 5 show in elevation two tubular pieces which form the atomizer. Fig. 6 is a vertical section of a modification of the upper part of the carbureter.

The atomizer is made up of two tubular parts 1 and 2 slid into one another and which form the vertical socket. The inner part 2 is provided at its periphery with vertical grooves which form, when the two pieces are assembled together, narrow channels 3, 4, 5. Such socket is held between a lower body 6 and an upper body 7 which are connected together by bolts 8. The lower body carries the fuel container 9 in which the level of the fuel is constantly maintained by means of a valve 10 controlled by a float 11, such valve closing a supply channel 12 which is connected with a reservoir not shown. The lower body 6 is provided with a channel 13 which makes the container 9 communicate with an annular chamber 14, arranged in the base of the atomizer.

15 designates a washer of soft material insuring a tight joint between the bottom of the piece 2 and the top of the body 6; 16 is a tube tip secured in the bottom of the chamber 14 and engaged in the orifice of the channel 13. In addition, the body 6 is provided with large openings 17 through which the supply of outer air has free access to the bore of the piece 2. Furthermore, the upper body 7, resting by means of a shoulder 18 on the top of the socket 1, 2, is provided with a duct 19, which communicates at the bottom with the bore of the piece 2 and of which the upper end is designed to be connected with the combustion chamber of the engine; in such duct is located a throttle valve 20 which serves to regulate the passage of the combustion mixture to the engine. In the embodiment shown in Figs. 1 to 5, the throttle valve consists of a so-called butterfly disk, secured on the spindle 21 which carries the operating levers 22, and so shaped as to obstruct the passage 19 when it is placed obliquely as shown in the drawings. A small amount of air can however still pass through a slot 23, which is provided in the edge of the butterfly disk and which is obstructed in an adjustable manner by means of a screw 24 screwed into the body 7. In the body 7 there is also provided a small channel 25, located in line with the channel 3 of the atomizer and opening into the duct 19 at 26, a little above the lower part of the butterfly disk when the latter is closed.

The tubular piece 1 is provided with several air supply openings 27, 28 and 29 which open respectively into the channels 3, 4 and 5 at different levels. Furthermore, the tubular piece 2 is provided with small jet holes 30 and 31 which put the channels 4 and 5, respectively, in communication with the bore of such piece, and which are located at different levels. The passage of the air through the openings 27, 28, 29 is regulated by means of three rings 32, 33, 34 which turn frictionally around the piece 1 and which are screwed into a cylindrical extension 35 of the body 7. Such rings are provided with a set of slots 36 in which are adapted to be engaged three set-screws 37 only one being shown screwed to the axial prolongation 35 provided with a slot 38. In order to turn a ring, the respective screw 37 of the part 35 is withdrawn and engaged through the slot 38 in one of the grooves 36 of the ring and the latter is then caused to turn one or several times. Such slot 38 also serves to give access to the supply of the outer air to the openings 27, 28 and 29. The operation of such carbureter is as follows:—Before starting, the fuel lies in the channels 3, 4, 5, at a level a little above that of the fuel in the container 9, by reason of the capillarity, but a little below that of the lowest inlet openings 29 for the air.

When the butterfly disk 20 is in the closed position as shown in the drawings, the engine working slowly, a small amount of air is enabled to pass through the slot 23, but the depression produced in the bore of the piece 2 is too weak to give rise to a strong sucking action through the orifices 30 and 31 in the channels 4 and 5; on the other hand, a strong sucking action is produced at the orifice 26 located above the disk and gives rise to a quick stream of air through 27, 3, 25, 26; such stream of air makes the fuel in the chamber 14 rise in the channel 3 and carries it forward with itself; by reason of the very small area of such channel and the lateral penetration of the air at a great velocity, there is produced at the junction of the channel 3 and the opening 27 a complete atomizing of the fuel, so that there escapes through the orifice 26 very fine mist free of liquid drops. The screw 24 is so regulated that the mixture thus formed by such mist and by the supply of air through the slot 23 that it is enabled to insure a good combustion in the engine. The ring 32 allows furthermore of regulating the supply in reducing the same to what is strictly required to insure the running of the engine at slow speed.

On making the engine run at the normal speed, or when starting the same after a stop, the first thing to be done is to slightly open the butterfly disk, so that notwithstanding the slow speed of the engine, the air sucked in passes at high speed between the butterfly disk and the walls of the duct 19; a very strong sucking action is then produced in the orifices 26 and 30 located adjacent to such disk, while the depression on the orifices 31 is comparatively weak. The very quick streams of air then passing through the channels 3 and 4 carry the fuel forward and atomizes the same as aforesaid. The combustion mixture thus obtained can then be regulated by means of the ring 33.

When the engine is running at full speed and the butterfly disk is wide open, the sucking action is about the same on all the orifices 26, 30 and 31, so that all the jet channels are operating at the same time, each of the same injecting a fuel mist atomized by the stream of air rising through the bore of the piece 2. By means of the large diameter of such piece, it is possible to provide as many injection channels as required by the power of the engine in giving to each channel a very small area, this being necessary to insure a perfect atomizing with the means described herein. The ring 34 allows of regulating exactly the delivery of the fuel as required for the greatest efficiency of the engine without interfering with the regulation of the channels 3 and 4 affected respectively when running slowly or when starting again at the normal speed.

Fig. 6 shows a modification of the upper body 7, in which the throttle valve 20 consists of a cock key turning in a housing in the shape of a shell, such key having a large opening 20^a corresponding to the duct 19. In the drawings the throttle valve is shown in the position of slow speed; the opening 20^a then communicates with the top of the duct 19 through a slot 20^b of the key, so that the sucking action of the engine is enabled to act on the jet orifice 26. The outer air can enter the opening 20^a through a duct 23^a, which is bored in the body 7 and of which the area is regulated by means of a screw 24^a; such duct 23^a preferably opens near the orifice 26 for the purpose of making the speed of the supply of air from the duct to contribute to the suction of the fuel.

Of course, the division of the socket constituting the atomizer into two concentric parts is only for the purpose of facilitating the formation of the injector channels; such socket might be made of a single piece. Again, use may be made of any suitable means for moving and stopping the regulating rings, for instance, worms acting on the indentations of such rings.

Claims.

1. A carbureter for internal combustion engines comprising a vertical socket having in its wall a plurality of narrow vertical channels and lower and upper transverse openings from such channels and opening

respectively on both the faces of the wall of the socket, each of such channels being connected with one of the faces of the said wall by one of the said lower openings and with the opposite face of the said wall by one of the said upper openings, means whereby to bring fuel into the lower part of such channels, means whereby to bring the outer air into the said lower transverse openings and a suction tube communicating with the said upper transverse openings.

2. A carbureter for internal combustion engines comprising a vertical socket having in its wall a plurality of narrow vertical channels and transverse openings which put such channels in communication with the inside and with the outside of the said socket respectively, the said openings opening into the inside being located at a higher level than the openings opening into the outside, means whereby to bring fuel into the lower part of the said channels, and a suction tube communicating with the top of the socket, the inside of the socket communicating at the bottom with the atmosphere.

3. A carbureter for internal combustion engines comprising a vertical socket having in its base an annular chamber and in its wall a plurality of narrow vertical channels opening into the said chamber, such socket having also lower and upper transverse openings putting the said channels in communication with the opposite faces of the wall of the socket, a fuel container communicating with the said annular chamber, means whereby to bring the outer air onto both the walls of the socket and a suction pipe located above the socket and communicating with the said upper transverse openings.

4. A carbureter for internal combustion engines comprising a vertical socket having in its wall a plurality of narrow vertical channels and lower and upper transverse openings which put such channels in communication respectively with the inside and with the outside of the socket, means whereby to bring fuel into the lower part of the said channels, means for admitting air to the socket, rings movable on the socket and adapted to regulate the said lower transverse openings and a body located on the socket and comprising a suction pipe, a throttle valve and a cylindrical extension, the said pipe communicating with the top of the inside of the socket, such cylindrical extension being placed around the socket and having a lateral opening, and the said regulating rings being screwed to the interior of such extension.

5. In a carbureter for internal combustion engines, a vertical socket having in its wall a plurality of narrow vertical channels and lower and upper transverse openings putting such channels in communication with the two opposite faces of the wall of the socket, the said lower transverse openings being located at different levels and the said upper transverse openings being located also at different levels, said channels and openings being in communication with the fuel supply and with the outer air respectively, in combination with several regulating rings adapted to regulate respectively the said lower openings placed at different levels such rings being adjustable independently of one another.

In testimony, that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

ALFRED GRAPIN.
LUCIEN GRAPIN.

Witnesses:
HANSON C. COXE,
MAURICE ROUX.