

May 10, 1932.

W. STURM

1,857,889

CARBURETOR

Filed Sept. 23, 1929

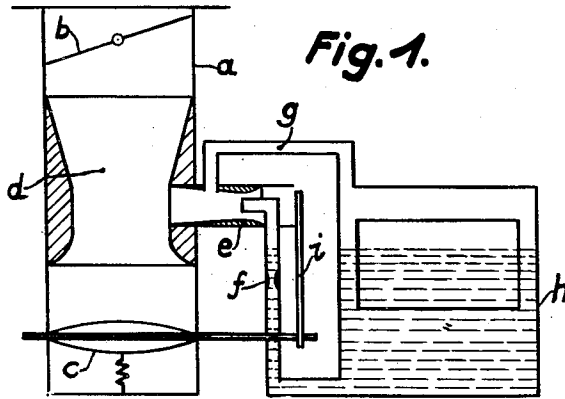


Fig. 1.

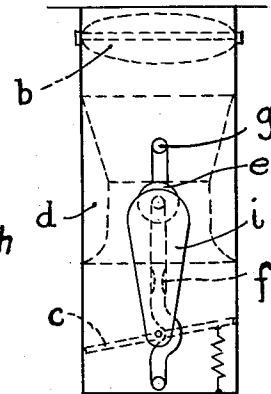


Fig. 4.

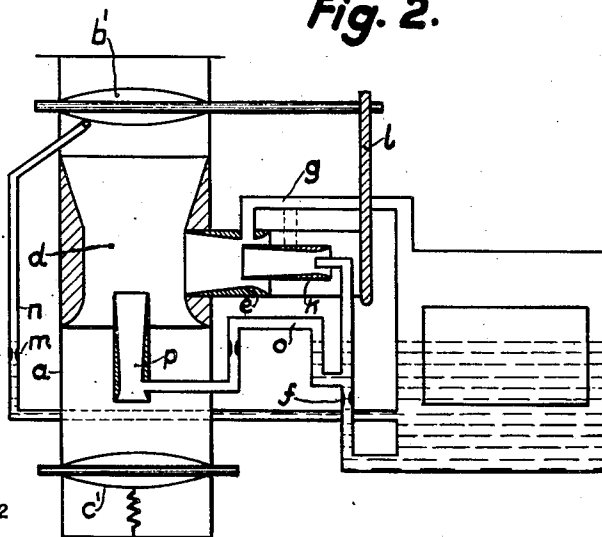


Fig. 2.

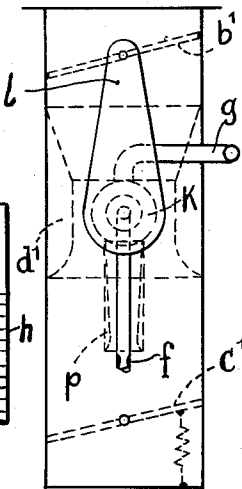


Fig. 5.

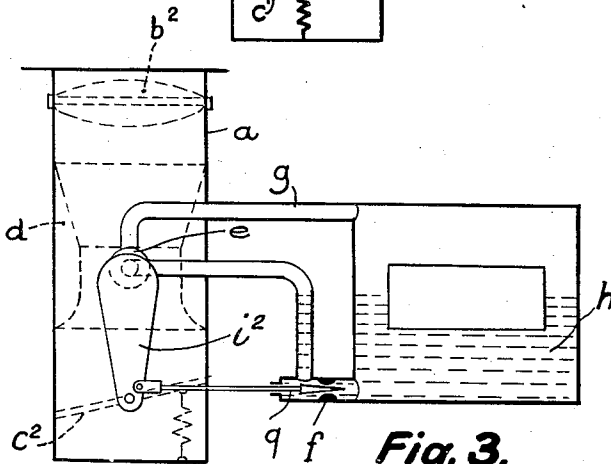


Fig. 3.

Inventor
 Wilhelm Sturm
 by Steward & Ke Key
 his attorneys

UNITED STATES PATENT OFFICE

WILHELM STURM, OF STUTTGART, GERMANY, ASSIGNOR TO ROBERT BOSCH AKTIEN-
GESELLSCHAFT, OF STUTTGART, GERMANY

CARBURETOR

Application filed September 23, 1929, Serial No. 394,662, and in Germany October 26, 1928.

The present invention relates to carburetors.

A carburetor has already been proposed in which the total cross sectional area of the carburetor pipe before the fuel nozzle is regulated by a mechanically actuated air throttle and the cross-sectional area of an air passage in an auxiliary air chamber outside the choke tube by a second throttle adjustable corresponding to this air throttle. The vacuum for raising the fuel from the main tank into the float chamber and from the latter into the carburetor housing is set up in choke tubes arranged behind one another in the carburetor housing. This arrangement has the disadvantage that principal parts of the carburetor are difficult of access and assembly is difficult. According to this invention a carburetor is considerably simplified by using a mixture throttle located to the rear of the choke tubes as a mechanically actuated main throttle, instead of a main air throttle, and by having the choke tubes for feeding the fuel into the float chamber and sucking it out of the same attached radially and outwardly to the mixing pipe or main choke tube in the mixing pipe which is controlled by the air throttle. The vacuum in the float chamber is thereby maintained on running light and with the main throttle slightly open by an automatic regulating device.

Several forms of construction of the invention are shown in section in the accompanying drawings.

Figure 1 shows a carburetor with one auxiliary choke tube.

Figure 2 shows a carburetor with two auxiliary choke tubes and a light running device.

Figure 3 shows a regulating arrangement for the fuel pipe.

Figure 4 is a view of Figure 1, partly in section, taken to the left of a vertical line located between the valve *i* and the float chamber *h*.

Figure 5 is a view of Figure 2, partly in section, taken to the left of a vertical line located between the valve *i* and the float chamber *h*.

An adjustable mixture valve *b* and an air throttle valve *c* which automatically adjusts

itself according to the speed of the engine or the position of the throttle *b* are arranged in a mixing pipe *a* as shown in Figure 1. An auxiliary choke tube *e*, the end of which opens directly into the atmosphere is attached radially to a main choke tube *d* in the mixing pipe *a*. The nozzle of a fuel pipe having a metering constriction or jet *f* in the bore thereof is arranged at the point where the maximum vacuum is obtained in this auxiliary choke tube whilst a connecting duct *g* opens at a point where the vacuum is low. A valve *i* is mounted on the air throttle *c* and automatically adjusts itself according to the mixture throttle *b* and alters the free cross sectional area of the auxiliary choke tube according to the position of the air throttle *c*. When the mixture throttle *b* is closed or nearly closed the valve *i* reduces the free cross-sectional area of the auxiliary choke tube to a minimum in order to maintain a sufficient vacuum in the float chamber even when running light. The vacuum at the nozzle of the fuel pipe is thereby also reduced.

In the form of construction shown in Figure 2, a further auxiliary choke tube *k* is arranged on the axis of the auxiliary choke tube *e*, which receives the nozzle of the fuel pipe. The float chamber *h* is connected with the auxiliary choke tube *e* by the duct *g*. It may however equally well open into the choke tube *k* at a point where a lower vacuum obtains than at the fuel nozzle.

A valve *l* is built on to the mixture throttle *b'* which keeps the free aperture of the auxiliary choke tube closed on running light and up to a predetermined opening of the throttle *b'*. The fuel is in this case supplied through a slow running device *m; n*.

If the speed of the engine drops without the throttle *b'* being closed when the load on the engine is greater, the air throttle or choke valve *c'* closes the mixing pipe correspondingly. The suction air current therefore passes principally through the auxiliary choke tube and there sets up sufficient vacuum to suck the fuel into the float chamber. This vacuum is however in excess of that required to suck the fuel from the float chamber and the fuel delivery past the jet *f* must

therefore be suitably regulated. This can be effected in various ways.

In the form of construction shown in Figure 1 the velocity with which the air passes through the choke tube *e* varies with the position of the valve *i* of the automatic throttle or choke valve *c'*. The amount of fuel delivered past the jet *f* varies accordingly.

The carburetor in Figure 2 regulates the delivery of fuel by venting the fuel pipe. For this purpose the latter is connected by a duct *o* and a choke tube *p* with the chamber controlled by the air throttle *c'*. The choke tube *p* can be omitted in cases where direct entry of air into the duct *o* is suitably reduced when the throttle *c'* is fully open. In contrary cases two auxiliary choke tubes *p* (not shown) may also be arranged one inside the other.

Figure 3 shows a mechanical regulation of the fuel metering orifice *f*. In this case a needle *g* is positively displaced according to the position of the automatic throttle or choke valve, thereby altering the cross-section of the said orifice.

Each of these types of regulation can be used with all the forms of construction of the carburetor.

What I claim is:

1. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, at least one choke tube directly extending into the atmosphere radially outwards from the mixing chamber of said mixing tube at a point between said throttle valves, said air throttle valve directly controlling the whole air flow to the mixing chamber except the air flow entering through said radially extending choke tube, a float chamber, a fuel pipe leading from the fuel space of the float chamber to a point of high vacuum in a radially extending choke tube and a connection from the air space of the float chamber to a point of lower vacuum in a radially extending choke tube.

2. A carburetor comprising a mixing tube, a manually operated mixture throttle valve and an automatically operated air throttle valve in said mixing tube, at least one choke tube extending radially outwards from said mixing tube between said throttle valves and directly proceeding from the mixing chamber of said mixing tube into the atmosphere, said air throttle valve adapted to directly control the whole air flow to said mixing chamber except the air flow entering through said choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in a radially extending choke tube and a connection from the air space of the float chamber to a point of lower vacuum in a choke tube radially extending.

3. A carburetor comprising a mixing tube,

a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, an auxiliary choke tube extending radially outward from said main choke tube, a second auxiliary choke tube partly within and extending axially outwards from said auxiliary choke tube, a float chamber, a connection between the air space of the float chamber and said auxiliary choke tube and a fuel pipe leading from the fuel space of the float chamber to said second auxiliary choke tube.

4. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in a second auxiliary choke tube within the first auxiliary tube, a connection between the air space of said float chamber and a point of lower vacuum in one of said auxiliary choke tubes and automatic valve means controlling the free cross-sectional area of the mouth of the radially outermost choke tube and adapted substantially to close said mouth when the engine is running at light load.

5. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in a second auxiliary choke tube within the first auxiliary tube, a connection between the air space of said float chamber and a point of lower vacuum in one of said auxiliary choke tubes, and valve means operatively connected with the mixture throttle valve controlling the free cross-sectional area of the mouth of the radially outermost choke tube.

6. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, an auxiliary air tube embodying at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube in said air tube, a connection between the air space of said float chamber and a point of lower vacuum in an auxiliary choke tube in said air tube, and valve means operatively connected with the air throttle valve controlling the free cross-sectional area of the mouth of the auxiliary air tube.

7. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, an auxiliary air tube embodying at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube in said air tube, a connection between the air space of said float chamber and a point of lower vacuum in an auxiliary choke tube in said air tube, valve means controlling the free cross-sectional area of the mouth of the auxiliary air tube, and a slow running fuel duct extending from the float chamber to a point in the mixing tube on the suction side of the main choke tube.

8. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube, a connection between the air space of said float chamber and a point of lower vacuum in a second auxiliary choke tube surrounding said first auxiliary tube, valve means controlling the free cross-sectional area of the mouth of the radially outermost choke tube, and valve means controlling the effective cross sectional area of the fuel pipe in accordance with the free cross-sectional area of the air passage through the mixing tube.

9. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube, a connection between the air space of said float chamber and a point of lower vacuum in a second auxiliary choke tube, said auxiliary choke tubes being arranged one within the other, valve means controlling the free cross-sectional area of the mouth of the radially outermost choke tube, an auxiliary choke tube in the mixing pipe located in advance of the main choke tube and an air duct extending from said auxiliary choke tube to the fuel pipe.

10. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube, a connection between the air space of said float chamber and a point of lower vacuum in a second auxiliary choke tube, said auxiliary choke tubes being arranged one within the other, valve means controlling the free cross sectional area of the mouth of the radially outermost choke tube, and valve means operatively connected with the air throttle valve for controlling the flow of fuel in the fuel pipe.

11. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe

leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube, a connection between the air space of said float chamber and a point of lower vacuum in a second auxiliary choke tube, said auxiliary choke tubes being arranged one within the other, valve means controlling the free cross-sectional area of the mouth of the radially outermost choke tube, and a regulating air duct extending from the fuel pipe to a point in the mixing tube in advance of the main choke tube.

12. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube, a connection between the air space of said float chamber and a point of lower vacuum in a second auxiliary choke tube, said auxiliary choke tubes being arranged one within the other, valve means controlling the free cross-sectional area of the mouth of the radially outermost choke tube, an auxiliary choke tube in the mixing pipe located in advance of the main choke tube and an air duct extending from said auxiliary choke tube to the fuel pipe.

13. A carburetor comprising a mixing tube, a mixture throttle valve and an air throttle valve in said mixing tube, a main choke tube in said mixing tube intermediate of said throttle valves, at least one auxiliary choke tube extending radially outwards from said main choke tube, a float chamber, a fuel pipe leading from the fuel space of said float chamber to a point of high vacuum in an auxiliary choke tube, a connection between the air space of said float chamber and a point of lower vacuum in a second auxiliary choke tube, said auxiliary choke tubes being arranged one within the other, valve means controlling the free cross-sectional area of the mouth of the radially outermost choke tube, and means for supplying air to the fuel pipe intermediately of the fuel nozzle and the float chamber.

In testimony whereof I have hereunto affixed my signature.

WILHELM STURM.

120

125

130