

Aug. 30, 1932.

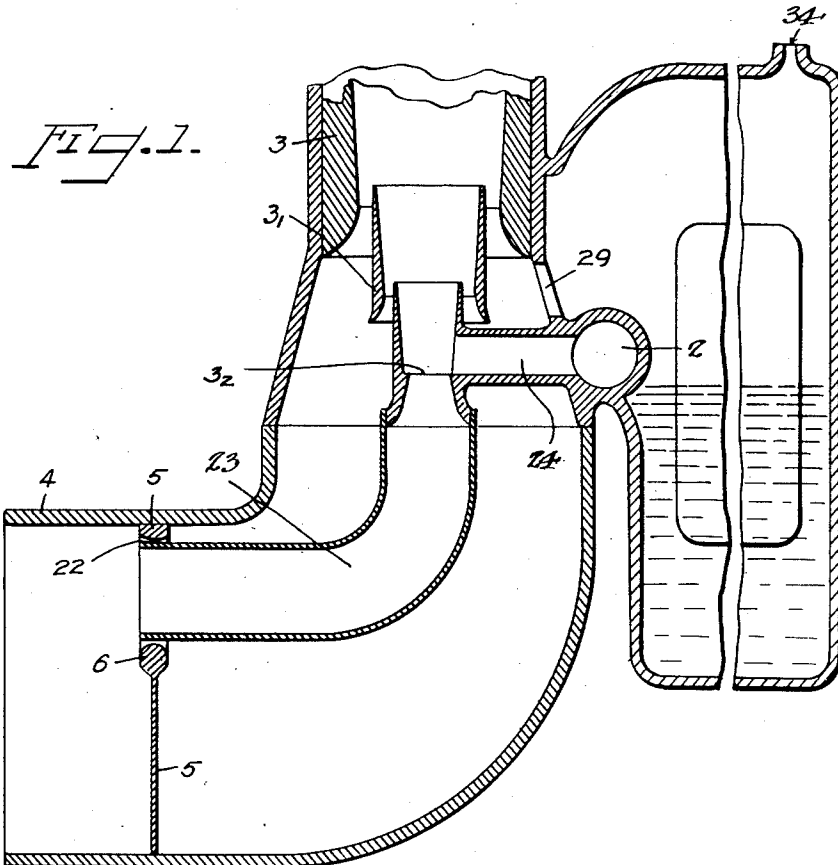
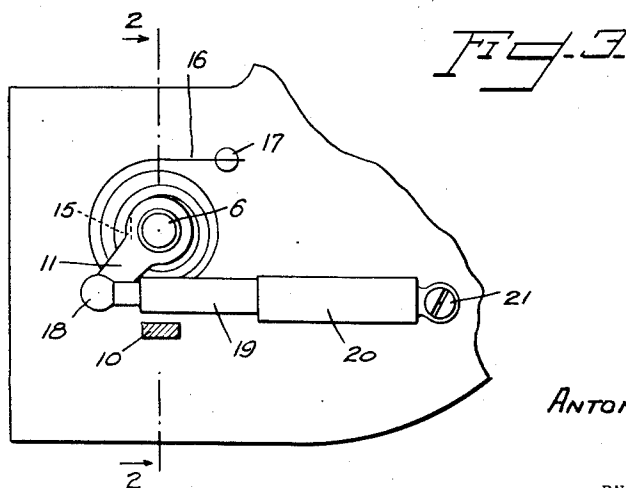
A. BOULADE

1,874,233

CARBURETOR

Filed June 12, 1928

2 Sheets-Sheet 1



ANTONIN BOULADE
INVENTOR

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2 Sheets-Sheet 2

Fig. 2.

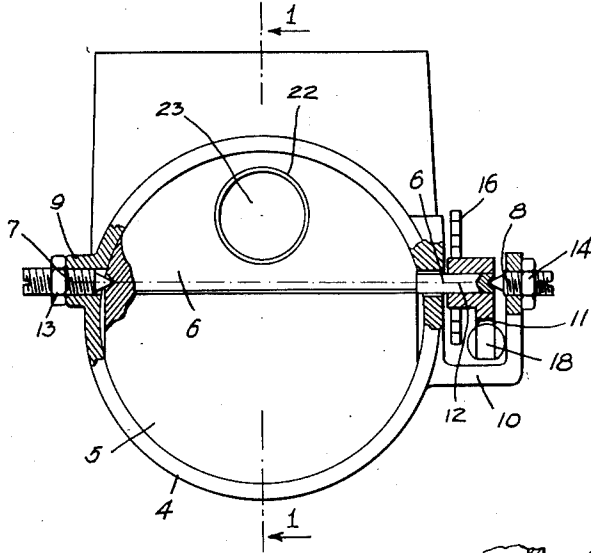
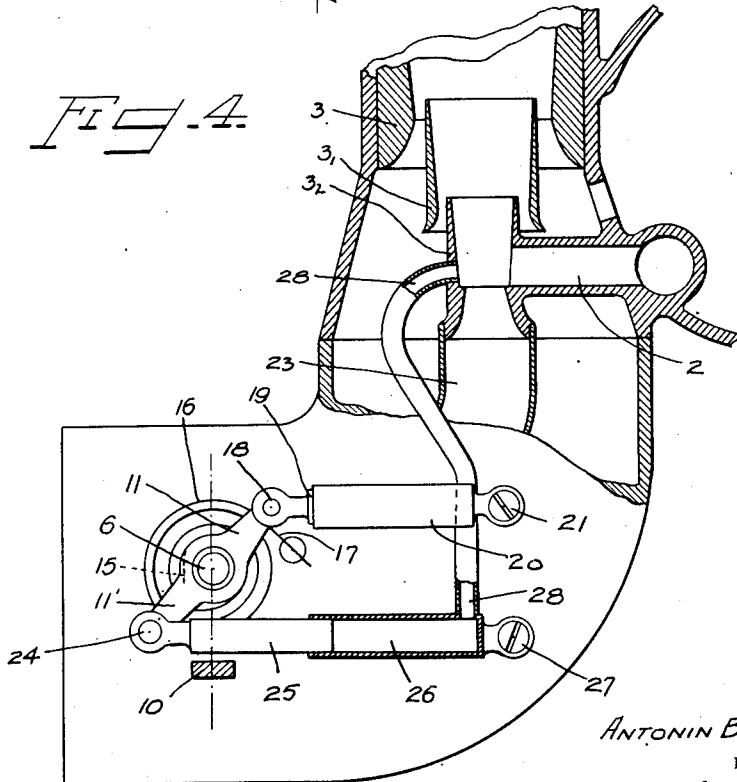


Fig. 4



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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed June 12, 1928, Serial No. 284,789, and in France June 17, 1927.

My invention relates to improvements in carburetors of the constant section type, wherein the cross-section of the diffusing means is constant.

5 In carburetors of this type, if the section of the diffusing means is adequate to assure operation at full power it is too large for starting or for running at low speeds. As a matter of fact, in these two cases there is at
10 the same time but slight depression and low speed of the air to the level of the spraying orifice. Atomization of the carburant is extremely defective and its entrainment by the air is poor.

15 These disadvantages are obviated by the present invention which consists, essentially, in arranging at the air intake a movable shield, having negligible inertia, in such manner that the kinetic energy of the air drawn
20 in by the motor tends to open the shield against a substantially constant antagonistic couple, the shield constantly leaving free a channel of relatively small section for the passage of air to the place where the carburant is sprayed.

23 The invention also comprehends means to limit the charging rate of the motor by providing for the shield a relatively strong antagonistic couple which may be reduced in
30 accordance with the increase in speed through the intermediary of a pneumatic device connected to the vaporizing chamber and consequently, acting on the shield as a function of the depression prevailing in said
35 chamber.

Upon inflow of air the action of the shield maintains a constant minimum depression in the vaporizing chamber, i. e., at starting or in charging at low speeds, the depression cannot fall below that necessary to overcome the antagonistic couple acting on the
40 shield.

Furthermore, the small section air channel directs towards the carburant spraying
45 orifice the air at relatively high speed when the shield substantially obstructs the air proper, and this high speed assures good atomization and perfect entraining of the carburant.

50 In the case of the device serving to limit

the charging rate, the engine may have a high volumetric compression without danger of faulty operation, the true compression being limited by reason of the limitation of the charging rate, whatever may be the detail
55 structure of the movable shield.

Finally, it is possible to obviate a too great richness of the mixture which may occur at low engine speeds, by reason of the increase of suction to the spraying point, due to the
60 presence of the shield, by placing the constant level reservoir or float chamber at a depression more or less near that which prevails in the air intake below the shield.

The invention also relates to certain novel
65 structural features and combinations of parts hereinafter described and claimed and illustrated in the accompanying drawings in which Fig. 1 is a longitudinal vertical section on the line 1—1 of Figure 2 showing a
70 carburetor comprising the automatic shield and the supplementary air inlet channel; Fig. 2 is an elevation in partial section on the line 2—2 of Fig. 3; Fig. 3 is a side view of the air intake with the pivot support of the shield
75 broken away, and Fig. 4 shows a carburetor with the air intake forming automatic limiting means for charging.

The carburetor is provided with a constant
80 level chamber 30 from which the carburant flows by way of the channel 2. It will be assumed that the carburetor has three Venturi tubes 3, 3¹ and 3², but it will be understood that the invention is not limited to this type of
85 carburetor.

The air inlet tube 4 has its admission end obstructed by a shield 5 in static equilibrium on a shaft 6 (Fig. 2) about which the shield may turn. The shaft 6 is arranged outside of the diametrical plane of the shield so that
90 the same may be divided into two unequal segments whereby the pressure of the air drawn in by the engine tends to automatically open the shield. The shaft 6 is supported by two adjustable bearing points 7 and 8
95 which assure pivotal action with a minimum of friction. The bearing 7 threads into a boss 9 of the tube 4 while the bearing 8 threads into a special support 10 so that from
100 this side the shaft 6 traverses without fric-

tion, the wall of the tube 4 and may be provided with a lever 11 secured by a pin 12. The bearings 7 and 8 are secured in position by lock nuts 13 and 14.

Secured to the median part of the lever 11 at 15 is a spiral spring 16 the other end of which is secured at 17 to the body of the air intake, this spring tending constantly to oppose the opening of the shield 5.

The end of the lever 11 is articulated at 18 to a rod 19 forming a light friction piston in a cylinder 20 articulated at 21 to the body of the air intake, the entire assembly forming a pneumatic brake or dash-pot.

The small segment of the shield 5 is pierced with a small orifice 22 with the front of which communicates the supplementary air inlet channel 23, the other end of which opens to the fuel inlet channel, i. e., to the venturi 3² in the form illustrated in the drawings. As shown in Fig. 1 the channel 23 is always clear even when the shield 5 is entirely closed.

An orifice 29 provides communication between the upper part of the constant level reservoir or float chamber 30 with the air intake. Hence, air will be drawn from the float chamber through said orifice 29 into the air intake in response to the suction of the engine. On the other hand, air will enter the float chamber through the orifice 34 which, as usual, connects the upper part of said float chamber to the atmosphere. It will be readily understood that the air pressure within said chamber will depend upon the amounts of air which are simultaneously sucked in and out, and hence upon the relation of the section of the orifice 29 to the orifice 34. When the suction in the air intake tends to increase to an undesirable degree at low speeds of the engine, a greater quantity of air is withdrawn from the float chamber and consequently the pressure upon the fuel within said chamber and the supply of fuel to the spraying means will be lowered accordingly.

The operation will be now readily understood:

When the engine revolves below a certain speed, all the required air flows through the channel 23, the shield 5 remaining closed. There is obtained in this manner an appreciable depression (suction) on the spraying means 24 and a very considerable air speed, resulting in good atomization and good entraining of fuel.

When the speed of revolution increases the depression or sub-pressure behind the shield 5 increases to a point at which it opens the shield against the spring and the kinetic energy of the current of air maintains the shield open. The antagonistic couple of the spring being substantially constant, the opening is proportioned to the speed of revolution and the sub-pressure in the vaporizing chamber remains at the optimum value as well as the

speed of the air flowing in through the channel 23.

Upon a sudden increase of the speed after the engine has been running at slow speed, the shield 5 maintains a sufficient sub-pressure and air speed in the vaporizing chamber to assure atomization and satisfactory entraining of the fuel.

The shield is in static equilibrium; its inertia is negligible; friction is practically nil. It thus instantly responds to all variations in the speed of the air. Furthermore, the small air-brake 19—20 renders the device aperiodic and obviates the pulsatory phenomena of resonance.

Fig. 4 discloses a modification in which the control of the shield is such as to obtain a substantially constant rate of charge of the motor, a result much sought for in high volumetric compression motors for the purpose of limiting true compression.

The spring 16 is made substantially stronger than that in the form of Fig. 2. The lever 11 is a double arm lever (the first arm 11 being reversed as compared with Fig. 1, this arrangement presenting no difficulty as the brake 19—20 acts equally well in both directions). The second arm 11 is articulated at 24 to the piston 25 which moves in a cylinder 26 articulated at 27 to the body of the air intake. A flexible tube 28 connects the cylinder 26 to the venturi 3².

The sub-pressure prevailing in the vaporizing chamber is thus transmitted to the cylinder 26 and tends to aid the opening of the shield 5 by the sub-pressure prevailing in the rear thereof in the conduit 4. It will be understood that at low speeds, speeds at which the charge is almost complete in the case where ordinary constant air carburetors are used, the shield 5 will not open except in the case of very great sub-pressure in the conduit 4 and that the shield will cause an appreciable loss of charge, limiting the charging of the engine cylinders to a suitable rate, while at high speeds the cylinder 26 counteracting the action of the spring 16 the shield 5 will open more easily and cause a substantially less loss of charge thus permitting advantage to be taken of the increased volumetric compression of the engine.

It is to be understood that the details herein described and illustrated are not to be taken as limiting the scope of the invention defined by the appended claims as substantial modification is possible within the spirit of the invention. Thus the spring 16 may be of any suitable type and may be replaced by a weight the inertia of which may be compensated by a dash-pot. The supplementary tube 23 may open to atmosphere at the side of the channel 4 without traversing the shield 5 which need not then be perforated. The cross sections of the conduits may, for example, be rectangular or of any

other desired shape, the shield 5 being correspondingly formed and arranged. Communication between cylinder 26 (Fig. 4) and the venturi 3² may be through the intermediary of the shaft 27 of the cylinder.

I claim:

1. In a carburetor with a diffusing channel of unvariable section, the arrangement within the air intake of a pivoted shield, the surfaces of the shield subject to air pressure being unequal at opposite sides of the pivotal axis, whereby the shield is displaced under the action of the air, an aperture provided in the shield on one side of the pivotal axis, in order to provide a permanent connection between the portions of the air intake situated on either side of said shield, the weights of the shield portions on each side of the pivotal axis being adapted to make up for each other so that said shield is in static equilibrium in all positions, and means adapted to permanently urge said shield into its closing position.

2. In a carburetor with a diffusing channel of unvariable section, the combination of a pivotally mounted shield provided within the air intake, the pivotal axis passing through the center of gravity of the shield but away from its center of area, whereby the latter is adapted to open under the action of the air, means for affording a permanent connection between the portions of the air intake situated on each side of said shield, and means adapted to permanently urge said shield into its closing position.

3. In a carburetor as claimed in claim 1, the further feature residing in that a channel of relatively small cross-section is provided in register with said aperture in the shield and extends within the air intake as far as said diffusing channel, so that the air which flows through said aperture even when the shield is closed, will have a speed proper to a good diffusion of the fuel since it moves within a channel of small cross-section instead of being spread over the whole cross-section of the air-intake.

4. In carburetor having an air intake and a diffusing channel of unvariable section, the combination of a pivotally mounted shield provided within the air intake, the pivotal axis lying eccentrically within the area of the shield, a passageway of relatively small cross-section affording a permanent communication between the portions of the air intake situated respectively ahead of and beyond said shield, a channel member within said air intake and beyond said shield, said channel member having one end in register with said passageway and prolonging same as far as said diffusing channel and means adapted to permanently urge said shield into its closing position.

5. In a carburetor as claimed in claim 4, in which the diffusing channel comprises a

plurality of Venturi tubes of various cross-sections and concentrically disposed; the said channel member having fluidtight connection with the inlet of the Venturi tube having the smaller cross-section.

6. In a carburetor, the combination of an air intake, a diffusing channel of unvariable section, a pivotal shield within said air intake, the pivotal axis lying eccentrically within the area of said shield, an aperture of relatively small cross-section in said shield, whereby a permanent communication is afforded between the portions of the air intake situated respectively ahead of and beyond said shield, a channel member within said air intake and beyond said shield one end of said channel member registering with said aperture and the other end extending as far as said diffusing channel, and fuel inlet means opening into said channel member adjacent said diffusing channel.

7. In a carburetor with a diffusing channel of unvariable cross-section and a float chamber, the combination of a shield provided within the air intake and adapted to open automatically under the effect of the suction caused by an associated engine, a separate channel affording a connection between the outer air and the diffusing channel when the shield is closed, the cross-section of said channel being much smaller than the section of the air intake and a passageway connecting the air space of the float chamber to the region of the air intake adjacent the spraying means.

8. In a carburetor having an air intake, spraying means and a diffusing channel of unvariable cross-section, the combination of a shield pivotally mounted within the air intake, the pivotal axis of said shield lying eccentrically within the area of the shield, will open automatically in response to the suction produced by an associated engine, antagonistic means for permanently urging said shield into its closing position, and additional means responsive to the suction in the diffusing channel adjacent the spraying means and operatively connected to said shield for aiding in opening the same.

In testimony whereof I affix my signature.
ANTONIN BOULADE.