Dec. 27, 1932. R. M. DILWORTH 1,892,301

CARBURETOR

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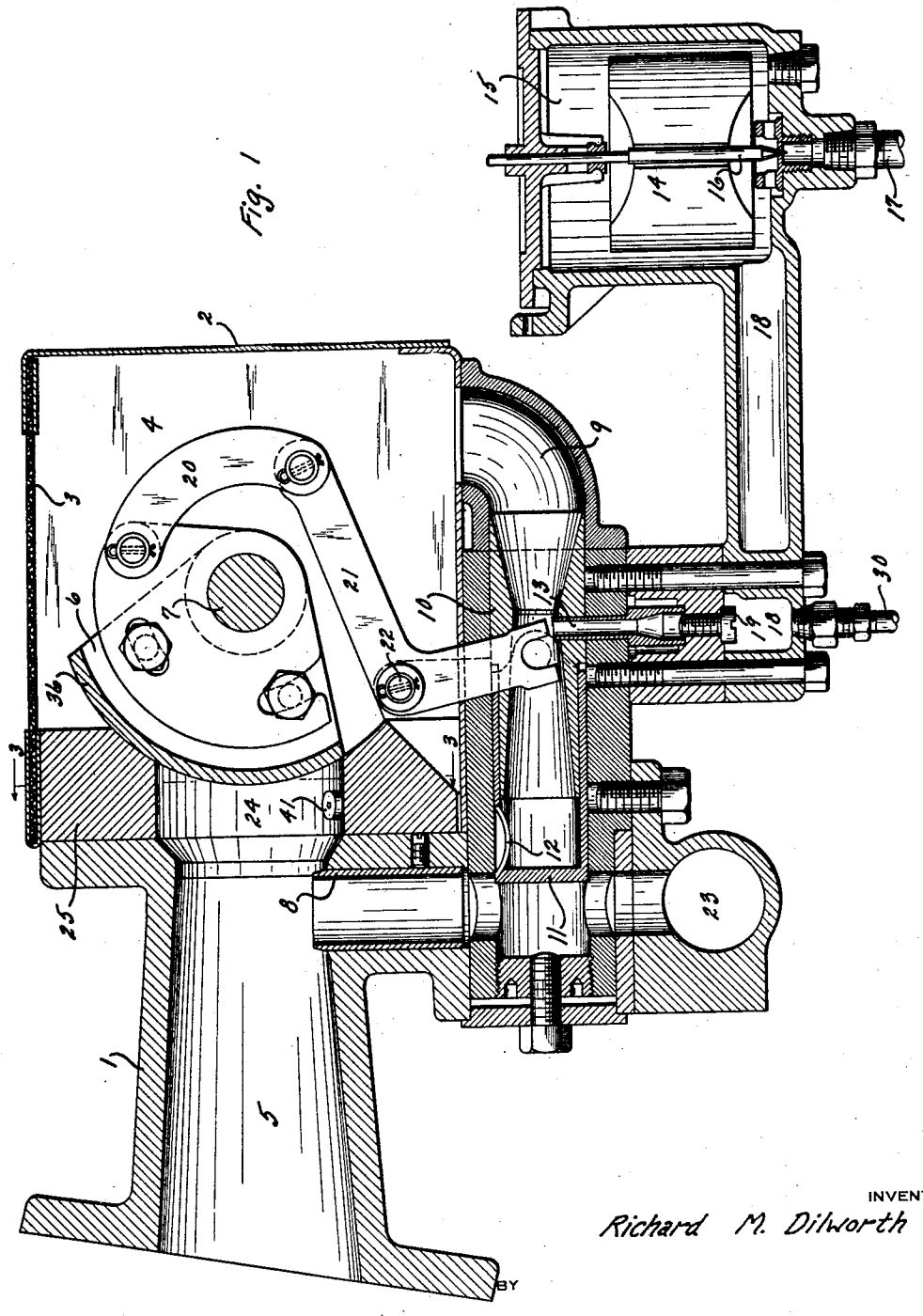
Fig. 1



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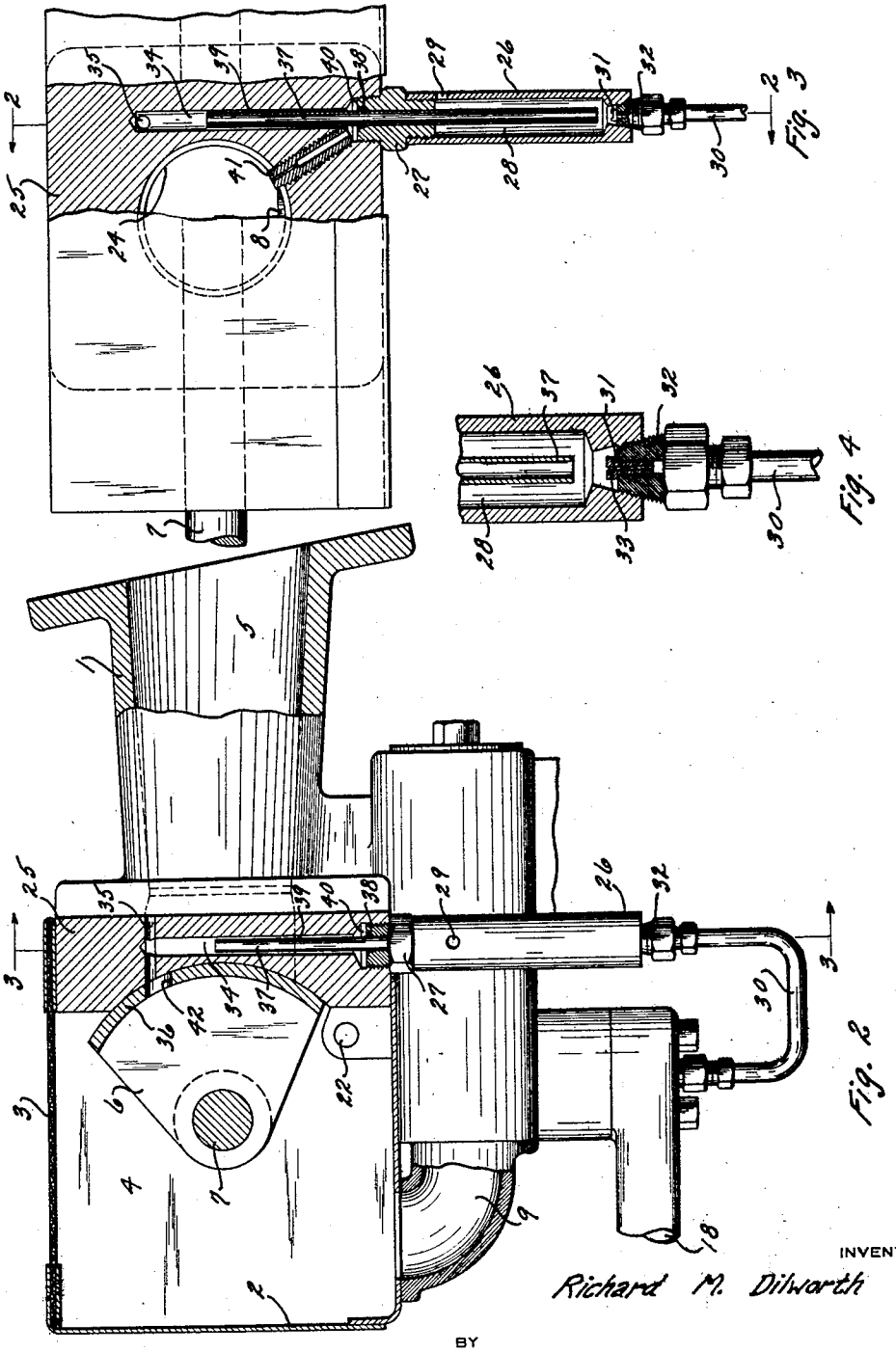

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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed May 8, 1930. Serial No. 450,786.

This invention relates to carburetion devices and more particularly has to do with auxiliary accelerating means in carburetors having mechanical control of the proportions of air and fuel.

In any simple carburetor, when operating on closed or nearly closed throttle, there is a very decided differential in pressures on the two sides of the throttle, the pressure on the engine side being much below atmosphere, and that on the other side being approximately atmospheric. If the throttle is suddenly opened there is an immediate rush of air therepast, but owing to the difference in specific gravities of air and fuel, the acceleration of the air is much greater than that of the fuel, so that the mixture is temporarily leaned.

While auxiliary means for enriching this inadequate mixture have been heretofore provided, it is the object of this invention to provide an auxiliary accelerating means of novel form and operation.

Where in the carburetion device, the proportions of fuel and air are mechanically controlled, as by including an air passage with a throttle therein and a separate throttled passage for overly rich mixture, the two passages converging before the output mixture is complete, the problem of rapid acceleration has been found to present particular difficulties Obviously in such a device, as the two throttles are suddenly opened the rush past the air throttle will have much more rapid acceleration than that past the fuel throttle.

It is a further object of this invention to apply to such a carburetor, auxiliary accelerating means particularly adapted thereto.

The exact nature of this invention together with further objects and advantages thereof will be apparent from the following description taken in connection with the accompanying drawings, in which Fig. 1 is a typical sectional elevation of a carburetion device of the class described; Fig. 2 is an elevation partly in section showing the application of my auxiliary accelerating means thereto; Fig. 3 is generally a section in the transverse plane of line 3—3, Fig. 2, showing details of the accelerating means, the section of Fig. 2 being as in the plane of line 2—2, Fig. 3; and Fig. 4 is an enlarged detail of parts appearing in Fig. 3.

With reference now to the drawings, 1 is the outlet of the shown carburetor arranged for connection in the usual manner with the engine to be served. 2 is the air inlet box of the carburetor, being open to atmosphere through a screen 3. The chamber 4 of the box 2 has communication with the outlet passage 5 of the outlet 1 subject to a valve 6 carried by a shaft 7. The unit shown Fig. 1 is designed to deliver directly to a single cylinder of the engine, other similar units being provided for other cylinders, so that the shaft 7 will extend along the engine and carry a number of valves 6 corresponding to the number of engine cylinders.

Fuel is supplied to the outlet passage 5 through a fuel pipe 8 leading thereinto; and to this end the pipe 8 communicates with the chamber 4 by way of an elbow 9, Venturi tube 10, sleeve 11 thereabout and opening 12 in the sleeve. The sleeve 11 is movable from the position shown, to register the opening 12 with the pipe 8 to allow a flow of air induced by the suction effect of the engine, by way of the parts just described, which way will be observed as constituting a bypass around the air throttle 6 but controlled by adjustment of the sleeve 11 acting as a separate fuel throttle valve. Fuel is introduced into this bypass way from a nozzle 13 located at the neck of the venturi 10, the liquid fuel level at the nozzle being regulated by the float 14 in chamber 15; the float being effective upon the usual needle valve 16 to control inlet to the chamber 15 from the fuel supply line 17; and communication from the chamber 15 to the nozzle 13 being had by way of the passage 18 and the regulating screw 19.

The valve 6 and sleeve 11 are so associated together by a linkage including a link 20 and bell crank lever 21 moving about the stud 22, that as the valve 6 opens so does the member 11 move to the left Fig. 1 to allow air flow past the nozzle 13.

A manifold 23 is arranged to convey to the pipes 8 of the several units, from a separate carburetion device, a starting and idling

mixture; delivery through the manifold 23 being obviously had only when the valve 11 is moved to the right as indicated in Fig. 1. Obviously the valve 11 acts to control fuel delivered to the pipe 8, opening to allow delivery from the nozzle 13 as it cuts off delivery from the manifold 23, and vice versa.

The proportion and arrangement of the parts are such that the flow through the pipe 8 is of a fuel mixture overly rich for proper combustion, whereas this mixture, commingled with the air flow past the valve 6, forms in the outlet passage 5 a suitable combustible mixture for the engine.

It will be observed that the positions of the air valve 6 and of the fuel valve 11 by their described mechanical association, always correspond, so that theoretically the mixture delivered by the carburetion device is of uniform quality; and this is true provided the valves are not suddenly moved from closed position.

What has thus far been described is not new; but it will be apparent that when the valves are suddenly opened and the passage from the chamber 4 to the outlet 5 is unrestricted, acceleration of flow directly through the air passage 24 uncovered by the valve 6 and immediately therebeyond will be much greater than that through the comparatively devious bypass passage re-entrant through the pipe 8, and particularly greater than that of any actual fuel delivered by the nozzle 13.

My invention makes correction for such temporary conditions, taking advantage of the initial surge in the air passage 24, as follows:

According to this invention I provide an auxiliary container 26 carried by a stud 27 and having a chamber turned into the seat block 25 for the valve 6. The container 26 has a chamber 28 open to atmosphere as by an opening 29 in its upper end, and arranged to be supplied with liquid fuel from the float chamber 15 by means of piping 30 connecting the lower extremity of the container 26 with the passage 18. The arrangement of the parts is such that the normal liquid level in the chamber 28 will be about midway of its ends, this level being established with that in the float chamber 15 and limited by the usual functioning of the float 14.

Flow from the float chamber 15 to the chamber 28 is restricted by a screw plug 31 set into the nipple 32 which is turned into the end of the container 26 to effect coupling with the pipe 30, flow being allowed in limited amount by a suitable small opening 33 through the plug 31.

The seat block 25 is drilled as at 34 concentric with the container 26 to communicate with a drilled lead 35 which opens onto the seat for the valve plate 36 of the valve 6, and is closed at its opposite end by a flange portion of the outlet casting 1.

The stud 27 has a central through opening in which is fitted a tube 37 preferably soldered as at 38, which tube extends downwardly into the chamber 28 adjacent the lower extremity thereof and upwardly into the drill 34; thus providing a passage from the chamber 28 to the drill 34, and an annular passage 39 from the lead 35 to a small clearance chamber 40 immediately above the stud 27. A threaded opening into which is fitted a nozzle 41 leads from the chamber 40 into the air passage 24.

The plate 36 of the air valve 6 is provided with an opening 42 so located as to register with the open end of the lead 35 when the valve 6 is positioned to cut off direct air flow from the chamber 4 into the outlet passage 5; and to close the lead 35 as the valve 6 opens to admit air to the passage 24.

Operation will be as follows, assuming the air and fuel throttles 6 and 11 closed, the engine running on an idling mixture supplied through the manifold 23, and the chamber 28 containing fuel up to the level allowed by the float 14. There is a high vacuum beyond the valve 6, so that the pressures in the passage means 35, 34, 39 and 40 are well below that of the atmosphere. Owing to the opening through the nozzle 41 and the opening 42 in the air valve, however, an air bypass is provided so that such pressure depression does not affect the level in the chamber 28, or that in the tube 37 sufficiently to cause any overflow of liquid therethrough from the latter.

Suppose, however, the valves 6 and 11 to be suddenly opened, the mouth of the lead 35 simultaneously closing, the vacuum then becomes effective upon the liquid in the chamber 28 by way of the nozzle 41, causing a shot of liquid fuel to be injected into the air stream inrushing toward the engine; this liquid rising in the tube 37, overflowing therefrom downwardly through the annular passage 39, through the chamber 40 and the nozzle 41. By the time normal delivery of the proper fuel charge commences through the pipe 8, the chamber 28 is substantially emptied, the parts being properly proportioned to this end.

By this time also, the pressure in the inlet passage 24 has sufficiently approached that of the atmosphere that suction effect through the nozzle 41 is negligible. Fuel, therefore, flows by way of the piping 30, slowly by virtue of the restriction of the screw 31, into the chamber 28 until the proper level therein is re-established, the well in the tube 37 being deep enough that overflow does not follow from suction through the nozzle 41.

Thereafter, closing of the throttle 6 does not effect overflow from tube 37 because of the additional or neutralizing air passage through the nozzle 41 and the reopening of the passage 35 as described. However, upon

sudden reopening of the throttle 6 another accelerating shot of fuel is injected through this nozzle. Should the valve 6 be opened sufficiently slowly that fuel may be continuously supplied through the pipe 8, so that no additional accelerating fuel is necessary, no fuel from the chamber 28 will overflow the tube 37, which may extend upwardly sufficiently to prevent overflow except under inertia due to such sudden pressure changes as have been described.

What I claim is:

1. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container having connection with the outlet passage of the device by which flow of fuel may be induced into said passage by pressure depression therein, and air bypass means associated with said throttle valve to render said pressure depression ineffective to induce said flow when the throttle valve is closed.

2. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container, fuel passage means associating said container with the outlet passage of the device, by which flow of fuel may be induced into said outlet passage by pressure depression therein, an air bypass connecting said outlet passage with said fuel passage, whereby said pressure depression may be rendered ineffective to induce said flow, and valve means for controlling said bypass and associated with said throttle valve to open said bypass when the throttle valve is closed.

3. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container, fuel passage means associating said container with the outlet passage of the device, by which flow of fuel may be induced into said outlet passage by pressure depression therein, an air bypass connecting said outlet passage with said fuel passage, whereby said pressure depression may be rendered ineffective to induce said flow, and valve means for controlling the bypass and associated with said throttle valve to close as the throttle valve opens.

4. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container of limited capacity having connection with the outlet passage of the device by which the contents of said container may be induced into said passage by pressure depression therein, and air bypass means associated with said throttle valve to render said pressure depression ineffective upon said contents when the throttle valve is closed.

5. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container, fuel inlet connections for said container and having associated means for regulating the fuel content therein, said container having connection with the outlet passage of the carburetion device by which the contents of said container may be induced into said passage by pressure depression in the latter, and air bypass means associated with said throttle valve to render said pressure depression ineffective upon said contents when the throttle valve is closed.

6. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container, fuel inlet connections for said container and having associated therewith means for limiting the fuel content therein and means for regulating the flow of fuel thereto, said container having connection with the outlet passage of the carburetion device by which the contents of said container may be induced into said passage by pressure depression in the latter, and air bypass means associated with said throttle valve to render said pressure depression ineffective upon said contents when the throttle valve is closed.

7. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container of limited capacity having connection with the outlet passage of the device by which the contents of said container may be induced into said passage by pressure depression therein, and means associated with the said throttle valve to render said pressure depression ineffective upon said contents when the throttle valve is closed, said connection including a tubular member extending adjacent the lower extremity of the container whereby the container may be substantially emptied when said pressure depression is effective.

8. In a carburetion device of the class described and having a throttle valve, auxiliary accelerating means comprising an auxiliary fuel container, fuel inlet connections for said container and having associated means for limiting the fuel content therein, said container having connection with the outlet passage of the carburetion device by which the contents of the container may be induced into said passage by pressure depression in the latter, air bypass means associated with said throttle valve to render said pressure depression ineffective upon said contents when the throttle valve is closed, and means associated with said fuel inlet connection for regulating the fuel flow to said container, and hence to regulate fuel flow from said container when said pressure depression is effective upon the contents thereof.

In testimony whereof I hereby affix my signature.

RICHARD M. DILWORTH.