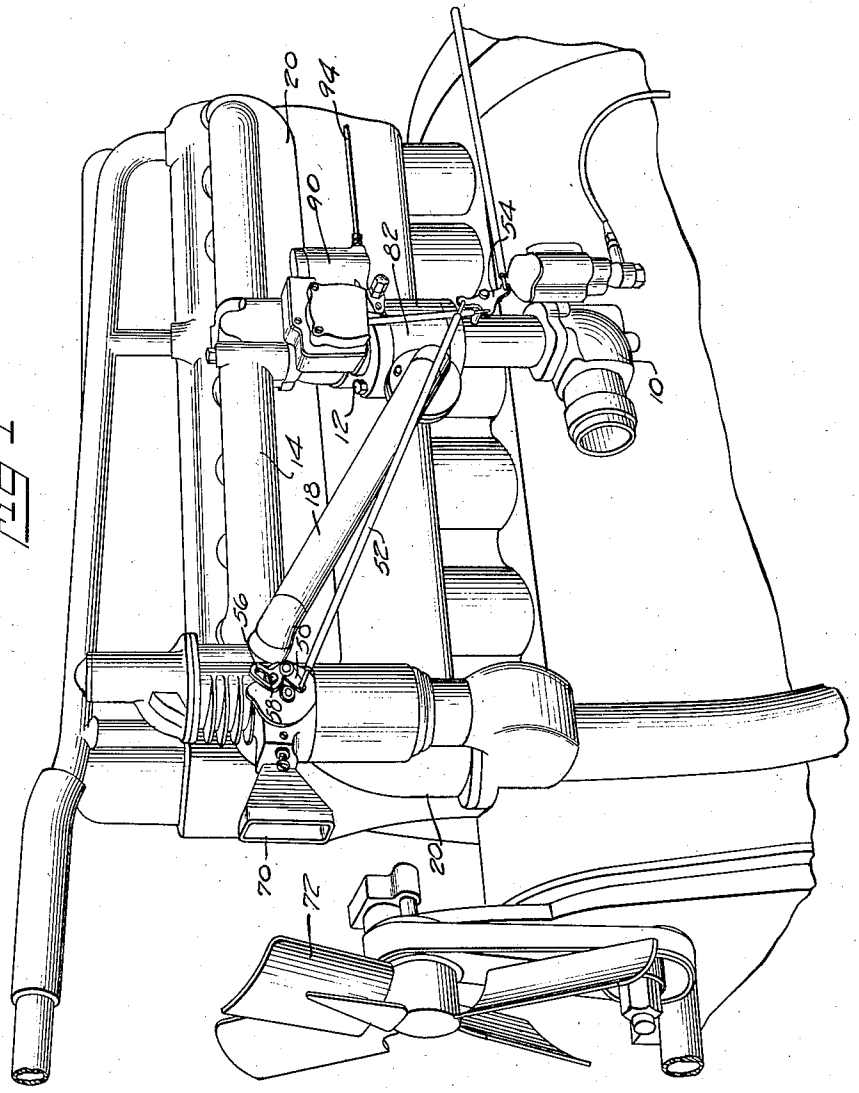
Sept. 20, 1932. A. MOORE 1,877,937

AUXILIARY FUEL SUPPLY MEANS FOR INTERNAL COMBUSTION ENGINES OF LOW INTAKE DEPRESSION

Filed May 2, 1927 3 Sheets-Sheet 1

Fig 1



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AUXILIARY FUEL SUPPLY MEANS FOR INTERNAL COMBUSTION ENGINES OF LOW INTAKE DEPRESSION

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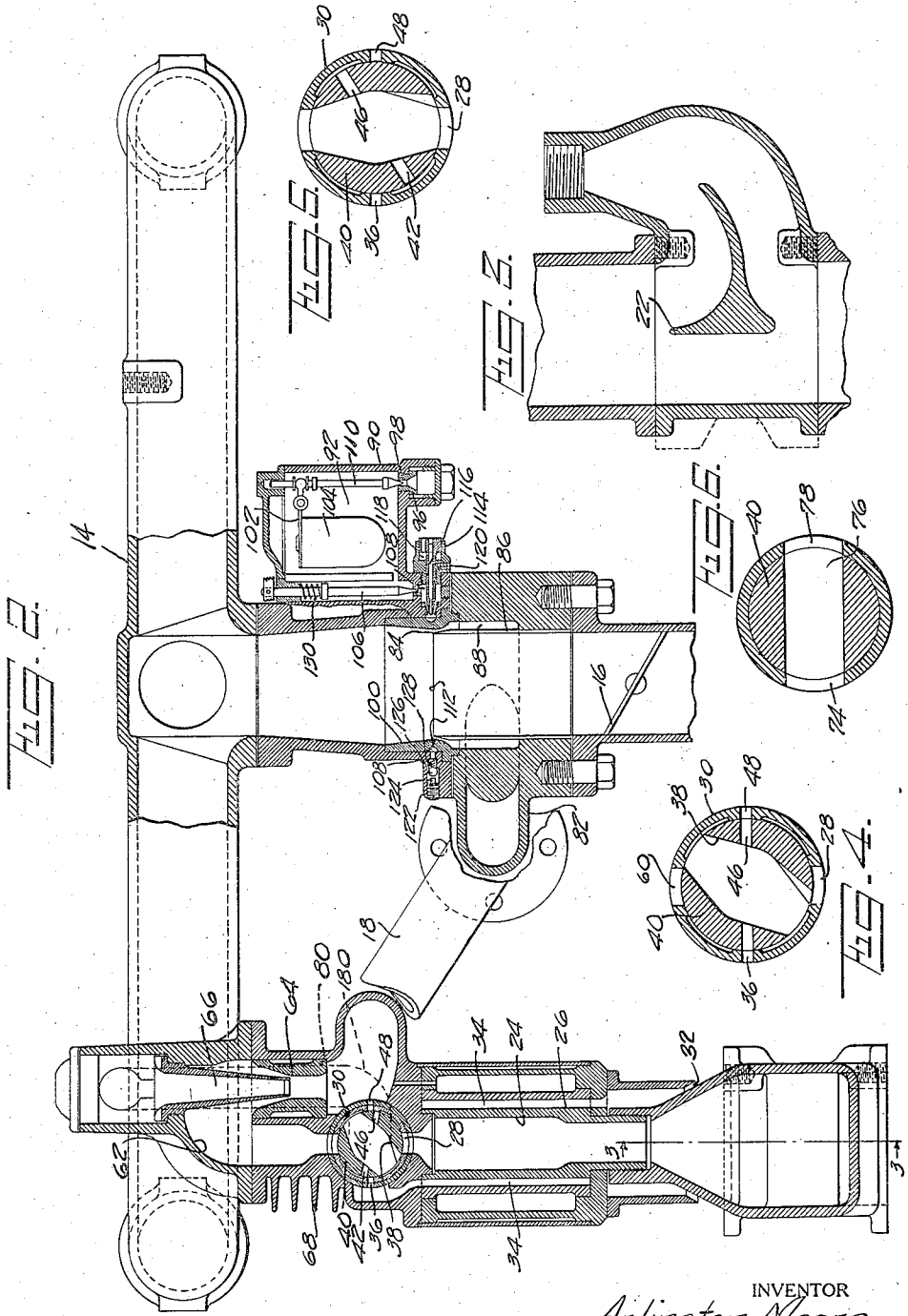


FIG. 2.

FIG. 5.

FIG. 3.

FIG. 6.

FIG. 4.

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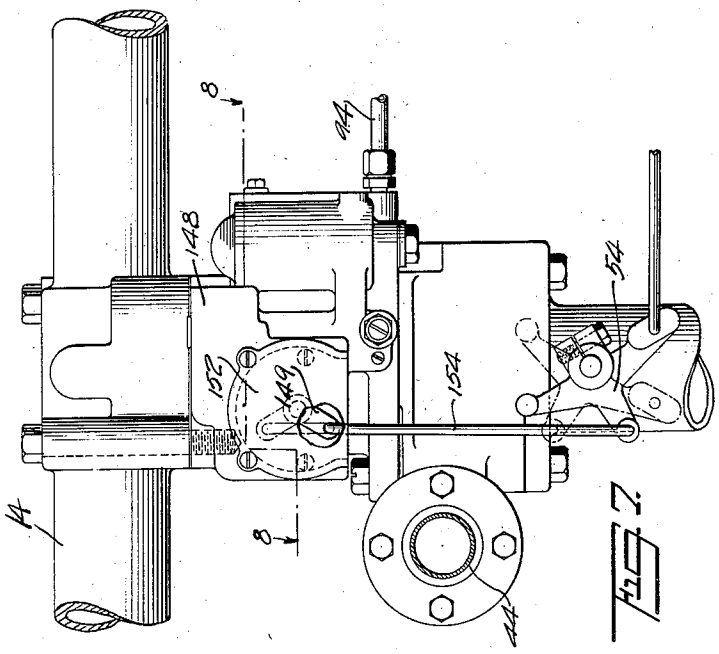


Fig. 7.

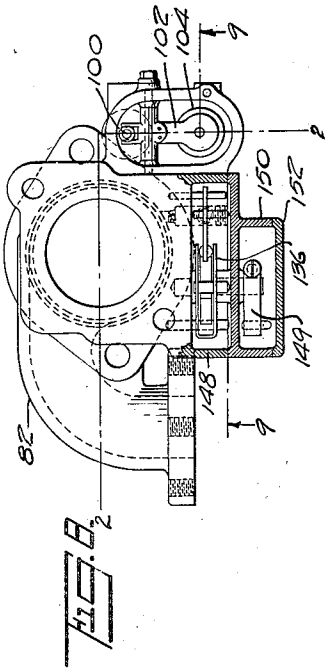


Fig. 8.

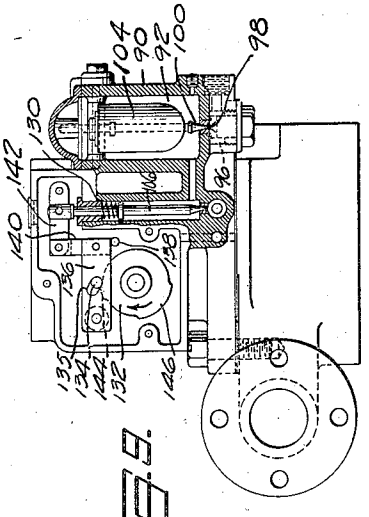


Fig. 9.

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UNITED STATES PATENT OFFICE

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AUXILIARY FUEL SUPPLY MEANS FOR INTERNAL COMBUSTION ENGINES OF LOW INTAKE DEPRESSION

Application filed May 2, 1927. Serial No. 188,326.

My invention relates to internal combustion engines, and particularly internal combustion engines having large diameter intake passages and also having provision for introduction of supplemental gases to the intake above the throttle. In engines so equipped the intake depression is much less than with ordinary engine practice.

Large intake manifolds with easy sweeping turns are desirable because of increased weight of charge introduced into the engine cylinders, reduction of skin friction and the like. These desirable effects are especially notable in full power operation of engines, such as stationary engines, boat and airplane engines and the like, which are run for long periods under full power.

The present tendency, however, is toward constricted intake manifolds with sharp bends used to keep heavy parts of the fuel in suspension and off the manifold walls by high velocity travel and buffeting of the charge.

By supplying supplemental gases above the throttle into direct admixture with the charge and supplying therewith sufficient heat to gasify all parts of the liquid hydrocarbon fuel, this need for constriction is eliminated, and it becomes possible, so far as considerations of fuel suspension are concerned, to make use of large intake manifolds, which are preferable for reasons indicated above.

When the entire supply of fuel to the engine cylinders is obtained by the fuel lifting effect of the ingoing air stream passing a fuel jet, comparatively strict limits are imposed upon reduction of pressure in the intake passage, since fuel lifting capacity decreases rapidly with decrease of air velocity passing the jet.

Increasing the extent of throttle opening for the purpose of obtaining acceleration reduces intake depression, and reduces fuel lifting capacity at the same time that increased fuel supply is required, and unless provision is made for extra fuel at such times, an engine of low normal intake depression and depending for fuel supply upon air velocity past a fuel jet is likely to backfire through the carburetor, to have a slow pick-up, and in extreme cases to stop entirely, and this is especially true if the carburetor is set for a lean adjustment with the purpose of securing economical operation. With such lean carburetor adjustment or jet setting, which is well adapted, for example for general operation of an automobile engine, the mixture will also be unduly lean for best power production at high engine loads, and particularly, in case of high power operation at low speed, fuel lifting capacity is cut down.

My invention provides for supply of extra fuel to the intake conduit independently of air stream velocity and intake depression, as for example, by delivery of fuel thereto under a gravity head, at times when the throttle is being opened, and for a short interval thereafter, and also when the throttle is open wide for full power operation. The supply of extra fuel in this way permits an economical, lean carburetor adjustment to be retained, thus securing substantially maximum economy for general operation, and enabling full advantage to be taken of the lowered intake depression obtainable with large, freely-flowing manifold passages and delivery thereto of supplemental gases above the throttle. While making provision for extra fuel supply under the conditions referred to, I so arrange the control means that no extra fuel is supplied during deceleration upon reducing the extent of throttle opening.

By providing extra fuel upon merely opening the throttle, I am enabled to secure quick and certain starting of the engine without resort to use of a choke, which is a principal cause of crank case dilution by introduction in large quantities of heavy ends of fuel into the engine cylinders in order to get in enough of the lighter and more volatile ends to obtain the fuel vapor necessary to start the engine.

With the foregoing and related objects in view, my invention will be best understood from the following description of an illustrative embodiment thereof.

In the accompanying drawings:

Fig. 1 is a perspective view of an internal

combustion engine for carrying volatile liquid fuel and embodying my invention.

Fig. 2 is a side view partly in section of the intake manifold riser and associated parts, the section being taken in part on the broken line 2—2, Fig. 8.

Fig. 3 is a section on the line 3—3, Fig. 2.

Fig. 4 is a section similar to a corresponding part of Fig. 2, and showing the rotor ports for exhaust gas and preheated air in position corresponding to a partial opening of the throttle.

Fig. 5 is a view similar to Fig. 4 and showing the rotor ports in position corresponding to full or practically full throttle opening.

Fig. 6 is a section through the cold air inlet ports of the rotor, and showing same in wide open position corresponding to full or practically full opening of the throttle.

Fig. 7 is a side elevation of the intake riser and associated parts.

Fig. 8 is a section on the line 8—8, Fig. 7, and

Fig. 9 is a section on the broken line 9—9, Fig. 8.

The low intake depression in the construction shown is due to two causes. The first of these is the large passages in carburetor 10, intake riser 12, and intake manifold 14, each of which is preferably about one and one-quarter (1¼) times the diameter of present day standard practice; that is to say, for example, in an engine ordinarily using a one-inch carburetor, I use a one and one-quarter inch carburetor and enlarge the inlet passages accordingly. The other factor in producing low intake depression is the supply of supplementary, largely inert, gases to the intake manifold riser 12, above the throttle 16, through the conduit 18.

The means for supplying supplementary gases through conduit 18 is described in other copending applications which I have filed, as, for example, application Serial No. 181,711, filed April 7, 1927, and will be referred to herein only briefly.

At part throttle, low-load conditions exhaust gas from the exhaust manifold 20, diverted by the Pitot or impact tube member 22, passes through the chamber 24 in the heater 26 to the stationary port 28 in the meter sleeve 30. Air admitted at 32 is heated in passages 34, 34 around heater 26 and delivered to stationary port 36. The exhaust gas entering port 38 in rotor 40, and the preheated air entering rotor 40 through port 42 are admixed in predetermined proportions and pass to conduit 18 through the metering ports comprising rotor port 46 and stationary port 48.

Rotor 40 is actuated adjunctively to throttling, being operated by cam lever 50, which is linked by link 52 to the crank 54 of throttle 16. A cam slot 56 is formed in cam 50, its formation being such as to secure suitable coordination of movement between the throttle 16 and the metering rotor 40. The rotor 40 is turned by its rotor crank 58 working in cam slot 56.

Further rotation of rotor 40 beyond the low load position shown in Fig. 4 closes off the preheated air port and sends the exhaust gas through port 28 and stationary port 60 out the passage 62 and through the Venturi tube 64 around the cold air nozzle 66. In the course of its movement from rotor 40 to Venturi tube 64, the exhaust gas is cooled by radiation fins 68.

Cold air is driven in through funnel 70 exposed to a blast, as of the motor fan 72, and passes through the stationary port 74, port 76 of the rotor 40 and stationary port 78 (Fig. 6) and through passage 80, indicated in dotted lines in Fig. 2, to the nozzle 66.

The supplementary gases controlled by rotor 40 and supplied through conduit 18 are delivered to the intake riser through the elbow member 82 interposed between the riser 12 and the carburetor 10, the throttle 16 being contained in an upward extension of the carburetor casing. Delivery of the supplementary gases to the intake is through an annular nozzle 84 surrounding the thin tube 86, which forms substantially a continuation of the charge passage through the carburetor. The supplemental gases, being delivered substantially tangentially to the annular passage 88 surrounding tube 86, swirl therearound and issue through annular nozzle 84 in the direction of flow in the intake riser and in a state of cyclonic agitational movement well adapted to secure thorough admixture with the charge stream coming through the carburetor. The agitational mixing is increased by a slight enlargement of the intake passage above annular nozzle 84, followed by a corresponding contraction thereof, as shown in Fig. 2. Delivery of supplemental gases in this or other ways above the throttle results in materially reducing the intake depression, that is, the pressure in the intake is raised and approaches nearer to the pressure of the surrounding atmosphere. This in turn acts to reduce the speed of the air stream past the carburetor fuel jet.

The means for supplying extra fuel and thereby compensating for reduced fuel lifting capacity at certain times is preferably attached directly to the intake riser, so that the fuel will be immediately available when and where it is needed.

Constant level flow control means are preferably provided, so that the fuel will be available from a constant level supply which is automatically renewed as fuel is consumed.

In the construction shown, a bowl 90 containing a float chamber 92 is mounted on the intake riser 12 and connected by a pipe 94 to a fuel supply means from which fuel is sup-

plied to the carburetor, as a vacuum tank, for example. The fuel, after passing through a strainer 96, enters the chamber 92 through inlet port 98 controlled by float valve 100 actuated through a lever 102 by a float 104. Float 104 is preferably made fairly long, so as to be received in the space available and to secure effective control of supply valve 100.

As previously stated, the extra fuel is preferably delivered under a gravity head. As shown, its delivery is controlled by a needle valve 106, which controls the supply of fuel to a passage 108 leading from the bottom of chamber 92 and encircling the Venturi tube 110, which tube 110 surrounds the annular nozzle 84 for delivery of supplemental gases to the intake passage. Fine passages 112, bored through tube 110, serve to deliver the fuel in subdivided state into the path of the supplementary gases coming through the annular nozzle 84, which complete the breaking up of the fuel.

A fine air duct 114 in the fuel measuring screw 116 supplies a limited quantity of air for aerating and breaking up the auxiliary fuel supply, and the space 118 under the head of screw 116 can be filled with filtering material such as absorbent cotton, which will permit air to pass and prevent dirt from getting through. The opening 114 is so small as not to materially lean out the mixture at idling. By adjusting screw 116 and securing it in adjusted position by set screw 120, the supply of auxiliary fuel can be controlled as desired.

The fuel passage 108 has one or more air inlets with spring check valve control, and is so arranged that, while air is excluded when the throttle is completely or nearly closed and the intake depression is at or near its maximum, the air can get through and enter with and break up the fuel at other times and especially at full load operation of the engine. One such air inlet means is shown at 122, Fig. 2. With this arrangement, air opening 124 is controlled by a ball valve 126, which is opposed by spring 128. When intake depression is at or near its maximum, the spring 128 is compressed, the ball check is drawn to its seat and the air shut off, but when intake depression is less or practically absent, as at wide open throttle, the expansion of spring 128 pushes the ball 126 away from its seat, and air is admitted to assist in breaking up the auxiliary fuel. Thus, while the air supplied in this way does not interfere with engine idling or low power operation, the air can be admitted in plentiful quantities for securing thorough fuel aeration and subdivision in case auxiliary fuel is supplied when the intake depression is sufficiently low to permit valve 126 to be opened by spring 128.

The valve 106 for controlling the gravity supply of auxiliary fuel is normally held closed by spring 130. It is actuated for opening against said spring by a cam 132 coacting with a roller 134 running in inclined slots 135 in the two-part lever member 136, said lever being supported by a stop 138 and being connected by link 140 to a second lever 142, which operates valve pin 106.

The inclination of slots 135 is such that when cam 132 is turned in the direction of the arrow in Fig. 9, which movement corresponds to opening movement of the throttle 16, the roller 134 is frictionally pushed toward the lower end of slots 135 and the lever 136 is raised and valve 106 opened by engagement with roller 134 of either the narrow projection 144 of cam 132, which is the first to come into engagement with roller 134, or of the wider cam projection 146, which engages roller 134 at and near full throttle opening. Upon any return movement of cam 132, however slight, the roller 134 rides to the high end of the slots 135 and the fuel delivery valve 106 closes, whatever the position of the cam 132 and projections 144 and 146 thereof.

The parts just referred to are preferably enclosed in a housing 148 carried on the intake riser 12. The crank 149 of cam 132 extends through the wall of housing 148 into a bonnet 150 open at its lower part and provided with a cover 152, so that the crank 149 will be protected and cannot be tampered with.

Link 154 serves to connect crank 149 of cam 132 to an arm of the throttle crank 54, so that the cam 132, and thereby the fuel valve 106, is automatically operated adjunctively to throttling, and without requiring separate attention or manual manipulation.

If desired, a cam lever and slot connection can be resorted to for this connection, as in the case of the rotor 40, for metering of supplementary gases, but a simple crank is ordinarily all that is needed.

It will be observed that no choke is illustrated, notwithstanding the unusually large sized intake passages. At or just before starting, the throttle is opened up once or twice sufficiently to produce opening of the auxiliary fuel valve 106 by means of the first cam projection 144. This supplies fuel at 112 for starting and the engine can be started in the usual way, except, of course, that there is no choke. The cam projection 144 is so narrow that the roller 134 cannot dwell thereon for any considerable length of time, so that while fuel will be supplied sufficient for starting and warming up the engine, there is none of the flooding that takes place in starting with the usual choke. Each time the throttle is opened up for speeding up the engine, the valve 106 is opened and fuel supplied in addition to that taken from the carburetor fuel jet, either by the first cam projection 144, or, in the case of opening the throttle wide, by first this narrow cam pro-

jection 144 and then the second relatively elongated or wide projection 146, and by then gradually closing the throttle to get the desired running condition, the extra fuel supply is shut off and the engine can be operated efficiently and economically at a lean and economical fuel rate on the fuel supply from the carburetor fuel jet.

When the throttle is opened up and kept open for full power running, the valve 106 is held open so long as the throttle opening is maintained and auxiliary fuel is fed by valve 106, the quantity fed being controlled by the initial adjustment of the fuel metering and air bleeding needle 116.

The auxiliary fuel, when fed, is always aerated and broken up by air admixture through the fine passage 114 in needle 116, and when the pressure in the intake manifold rises sufficiently to reduce the pressure differential inside and outside the riser 12 to permit spring 128 to expand and move ball check 126 from its seat, the auxiliary fuel is further aerated and broken up by air supplied through the opening or openings 124.

It will be seen that my invention eliminates practically all of the objectionable features encountered in internal combustion engines which are subject to frequently recurring variations in the requirements for power and speed, such as automobile engines. With the lowering of intake depression, I get a notable decrease in pumping losses and suction of oil past the pistons and an equally notable increase in cylinder pressures and power. I can operate economically on lean mixtures by using a main or principal fuel jet adapted to furnish such mixtures and take care of any temporary deficiency of such fuel supply by supplying auxiliary fuel in proper quantities when and only when it is needed. The hot supplementary gases supplied above the throttle during operation at low loads gasifies the fuel and raises the temperature to or over the point of initial oxidation, so that by the time it enters the cylinders, it is in condition best adapted for complete combustion and its thoroughly gasified state permits the use of wide, full intake passages without the loading up of fuel in the cylinder walls, which has hitherto prevented the use of such intake passages, powerful acceleration is obtained by opening the throttle, the extra fuel delivered by gravity when the throttle is suddenly opened serving to generate a piston speed sufficient to reestablish the proper function of the carburetor, and when considerations of getting full power are paramount, as in steep hill climbing, for example, the necessary fuel for a high power mixture is forthcoming automatically, without any special attention or manual manipulation. The choke is taken off the engine, and with it goes a principal source of dilution of lubricant on the cylinder walls and in the crank case, while starting is much more easy and certain than with the vicious mode of starting the engine with the old choke.

This application is in part a continuation of my application Serial No. 181,711, filed April 7, 1927. Subject matter of the invention disclosed herein and not claimed is disclosed and claimed in my copending applications Serial No. 164,349, filed January 28, 1927 and Serial No. 176,410, filed March 18, 1927.

I claim:

1. The combination with the carburetor and intake conduit of an internal combustion engine for consuming volatile liquid fuel, of auxiliary constant level fuel supply means communicating with said intake conduit, and a valve controlling the fuel passage from said constant level means to the intake and operated adjunctively to engine throttling, said fuel passage and said valve being disposed below the level of the fuel in said constant level fuel supply means for effecting gravity delivery of fuel to the intake conduit.

2. The combination with an internal combustion engine comprising a throttle and intake conduit, of constant level fuel supply means having a fuel passage communicating with the intake conduit above the throttle, and means operated adjunctively to throttling for releasing fuel into the intake conduit from said supply means through said passage when the intake depression is temporarily lowered.

3. The combination in an internal combustion engine of an intake conduit, a carburetor, a throttle, means operated adjunctively to throttling for supplying supplemental gases including exhaust gas and air to the intake over the throttle, and means operated adjunctively to throttling for supplying auxiliary fuel to said gases in the engine conduit.

4. The combination in an internal combustion engine of an intake conduit, a carburetor, a throttle, valvular means operated adjunctively to throttling for supplying inert gases to the intake over the throttle, and valvular means operated adjunctively to throttling for supplying auxiliary fuel to the engine conduit upon opening movement only of the throttle.

5. In an internal combustion engine, a carburetor, an intake conduit, a throttle, a constant level fuel container supported on the intake conduit above the throttle, a valved passage provided from the lower part of said container to the interior of the intake conduit, and means for opening said valve upon opening throttle movement and permitting flow of fuel to the intake conduit.

6. In an internal combustion engine, a carburetor, an intake conduit, a throttle, an annular passage opening into the conduit adja-

cent to its bore walls, means for supply of gaseous products of combustion from the engine cylinders to the intake conduit through said annular passage, and means for delivering auxiliary fuel to the intake conduit adjacent to the mouth of said annular passage.

7. The combination in an internal combustion engine of an intake conduit, a carburetor operated by engine suction throughout the range of engine operation, a throttle, means for supplying supplementary gases to the intake conduit above the throttle, and means controlled at times when fuel lifting through the carburetor is subnormal for delivering a supply of auxiliary fuel to the intake conduit above the carburetor by pressure supplementary to that due to engine induction.

8. In an internal combustion engine, an intake conduit, a carburetor supplying fuel and air throughout the range of operation of the engine, a throttle, means for supplying to the intake above the throttle auxiliary fuel under pressure supplementary to that due to intake depression and automatically replenished from the same fuel source as the fuel supplied to the carburetor, and means operated adjunctively to throttling for opening said fuel supplying means, so long as a predetermined opening of the throttle is exceeded.

9. In an internal combustion engine, an intake conduit, a carburetor, a throttle, means for supplying auxiliary fuel to the intake conduit above the throttle, means for opening said fuel supplying means at predetermined stages of throttle movement and valved air bleed means controlled by variations in intake depression for aerating and breaking up said auxiliary fuel adapted to open at the stage of throttle movement when the intake depression falls below a predetermined amount.

10. In an internal combustion engine having a carburetor, an intake conduit and a throttle, a constant level fuel container provided with a valved bottom outlet to the intake, and cam controlled means interlinked with the throttle for opening up said valve first a little and then additionally as the throttle is opened throughout its range of opening.

11. In an internal combustion engine having an intake conduit, a carburetor, and a throttle, means for supplying gases to the intake conduit supplementary to the stream through the carburetor, means for supplying auxiliary fuel to the intake conduit in addition to that supplied through the carburetor, and common control means for the throttle, the supplemental gas delivery means, and the auxiliary fuel means.

12. Means for feeding fuel to the intake conduit of an internal combustion engine in addition to that supplied through the carburetor, comprising a constant level container with a valved bottom gravity outlet to the intake conduit, and cam means interconnected with the throttle to open the valve and release the fuel upon opening movement of the throttle and inoperative for fuel release upon closing throttle movement.

13. In an internal combustion engine, means for feeding fuel to the intake conduit above the throttle at predetermined stages of throttle movement, means for continuously bleeding a modicum of air into the fuel stream for subdivision thereof, and means for supplying additional air for aeration and breaking up of the fuel when the intake depression is less than a predetermined amount.

14. An internal combustion engine having an intake manifold, a carburetor, and throttle associated with said intake manifold, said carburetor comprising means for lifting fuel by air velocity past a fuel jet, means for delivering heated gases comprising exhaust gas of the engine to the intake above the throttle whereby the fuel is gasified, and means for effecting limited delivery of fuel by gravity into the intake passage above the throttle upon opening movement of the throttle.

15. In a four stroke cycle internal combustion engine for consuming volatile liquid fuel and comprising an abnormally large intake manifold, an abnormally large carburetor, a throttle, and means for supplying supplemental gases to the intake over the throttle whereby the intake depression is characteristically low, of means for supplying auxiliary fuel to the intake, and means for releasing said fuel at intervals for supplying limited quantities of fuel in addition to the fuel supply through the carburetor upon opening up of the throttle for acceleration and for supplying said auxiliary fuel substantially continuously at and near wide open throttle position.

16. In an internal combustion engine, an intake conduit of abnormally large bore, an abnormally large carburetor, a throttle, a conduit for conduction of supplemental gases, an elbow member in said conduit in which the gases are set into rotational movement, an annular delivery nozzle from said elbow member to the intake conduit directed in the direction of flow therein, a riser portion of said intake conduit which is enlarged and then contracted beyond the delivery point of said nozzle to produce agitation and admixture of charge materials therein, means for diverting a portion of the exhaust gas stream and admixing the exhaust gas with hot air during partial throttle openings and with cold air during wider throttle openings and delivering same to the intake passage through said supplemental gas conduit, the intake depression of the engine being char-

acteristically abnormally low, a constant level fuel container associated with the intake conduit and taking fuel from the same supply as the carburetor, a valved bottom outlet for gravity delivery of fuel from said carburetor to the engine intake, a fuel passage provided around the riser part of the intake conduit, a series of fuel outlets provided from said fuel passage to the intake passage immediately over the mouth of the annular nozzle, and means interconnected with the throttle for opening the auxiliary fuel valve and releasing auxiliary fuel to the intake whereby the said valve is opened somewhat upon early opening movement of the throttle and is further opened upon additional throttle opening movement and kept open until at least some reverse throttle movement takes place, whereupon the auxiliary fuel valve is automatically closed.

17. The combination with an internal combustion engine, of a constant level fuel supply means, means for conveying supplemental fuel therefrom to the intake conduit, and for subjecting said fuel to a potentially available pressure supplementary to that due to the engine induction, and means operated manually at will for releasing said supplemental fuel and for rendering said pressure active thereon.

18. The combination with the intake conduit, throttle, and main fuel delivering means of an internal combustion engine, of means for conveying supplemental gases including exhaust gas and air to said intake conduit above the throttle, means for controlling the delivery of said supplemental gases to said intake conduit, and means separate from the main fuel delivering means for delivering a charge of fuel to said supplemental gases at periods of main fuel impoverishment.

19. The combination with the intake conduit throttle, and main fuel delivering means of an internal combustion engine, of means for conveying supplemental gases including exhaust gas and air to said intake conduit above the throttle, means operated adjunctively with the operation of the throttle for controlling the admission of said supplemental gases to said intake conduit, and separate means for delivering a charge of fuel to said supplemental gases; said last named means being rendered effective to deliver fuel to said supplemental gases at periods of main fuel impoverishment.

20. The combination with the intake conduit, throttle and main fuel delivering means of an internal combustion engine, of a tubular portion disposed within said intake conduit above the throttle and forming with said intake conduit an annular passage open at the top thereof, means for supplying supplementary gases including exhaust gas and air to said intake conduit through said annular passage, and means associated with said annular passage for delivering auxiliary fuel to said supplementary gases as the same enter the intake conduit.

21. In charge supplementing apparatus for internal combustion engines, means for delivering a mixture of exhaust gas and air to the engine intake beyond the throttle, and means for supplying auxiliary fuel to the intake upon acceleration in substantially the region of delivery of the gaseous mixture and subject to the heating action thereof.

22. In charge supplementing apparatus for internal combustion engines, means for supply of exhaust gas and air to the engine intake, control means therefor, means for supplying to the intake passage fuel in addition to that supplied through the carburetor, control means therefor, and interconnections between said two control means and the throttle for operating same adjunctively with throttling.

23. In charge supplementing apparatus for internal combustion engines, means for delivering a mixture of exhaust gas and air into direct admixture with the fuel and air stream from the carburetor between the throttle and the engine cylinders whereby the absolute intake pressure is raised, and means for compensating for resulting reduction of draft on the fuel by delivery to the resulting mixture of auxiliary fuel substantially independently of intake suction and stream velocity.

24. The combination with an internal combustion engine comprising an intake conduit, and a throttle therein, of a constant level fuel container communicating with the intake beyond the throttle at a point below the level of the fuel in said container, and means including a valve actuated by the throttle for controlling the passage of fuel from said container, said means supplying an accelerating charge of fuel upon initial opening of the throttle, and fuel continuously at a wider open throttle position.

25. The combination with an internal combustion engine comprising an intake conduit, and a throttle therein, of a constant level fuel container communicating at a point below the level of the fuel in said container with the intake above the throttle, a valve actuated by the throttle for controlling the passage of fuel from said container, and an air bleed communicating with the fuel passage between the valve and the point of discharge into the intake.

26. The combination with an internal combustion engine comprising an intake conduit and a throttle therein, of a constant level fuel container having a gravity flow line of communication with the intake at the engine side of the throttle, and valvular means located in said line of communication below the fuel in said container level, and actuated momentarily by opening movement of the throttle

for supplying enriching fuel upon engine acceleration.

27. The combination with an internal combustion engine comprising an intake conduit and throttle therein, of a constant level fuel container having a gravity flow line of communication with the intake conduit, a valve located in said line of communication below the fuel level in said container, throttle actuated cam means having portions for momentarily opening said valve upon initial opening of the throttle and again at wider open throttle positions, and means for preventing movement of the valve from closed position as the throttle closes.

28. The combination with an internal combustion engine comprising an intake conduit and a throttle therein, of a constant level fuel container having a gravity flow line of communication with the intake conduit at the engine side of the throttle, a valve for controlling the flow of fuel from said container, a cam for actuating said valve adjunctively to throttling, said cam including means for momentarily opening said valve upon initial opening movement of the throttle and again to retain the valve open at greater throttle openings, means for rendering said cam inoperative to open the valve as the throttle closes, and means for aerating the fuel released by said valve.

In testimony whereof, I have signed my name hereto.

ARLINGTON MOORE.