Dec. 29, 1931. C. H. KINDL ET AL 1,839,103

CHARGE FORMING DEVICE

Filed Oct. 2, 1929 2 Sheets-Sheet 1

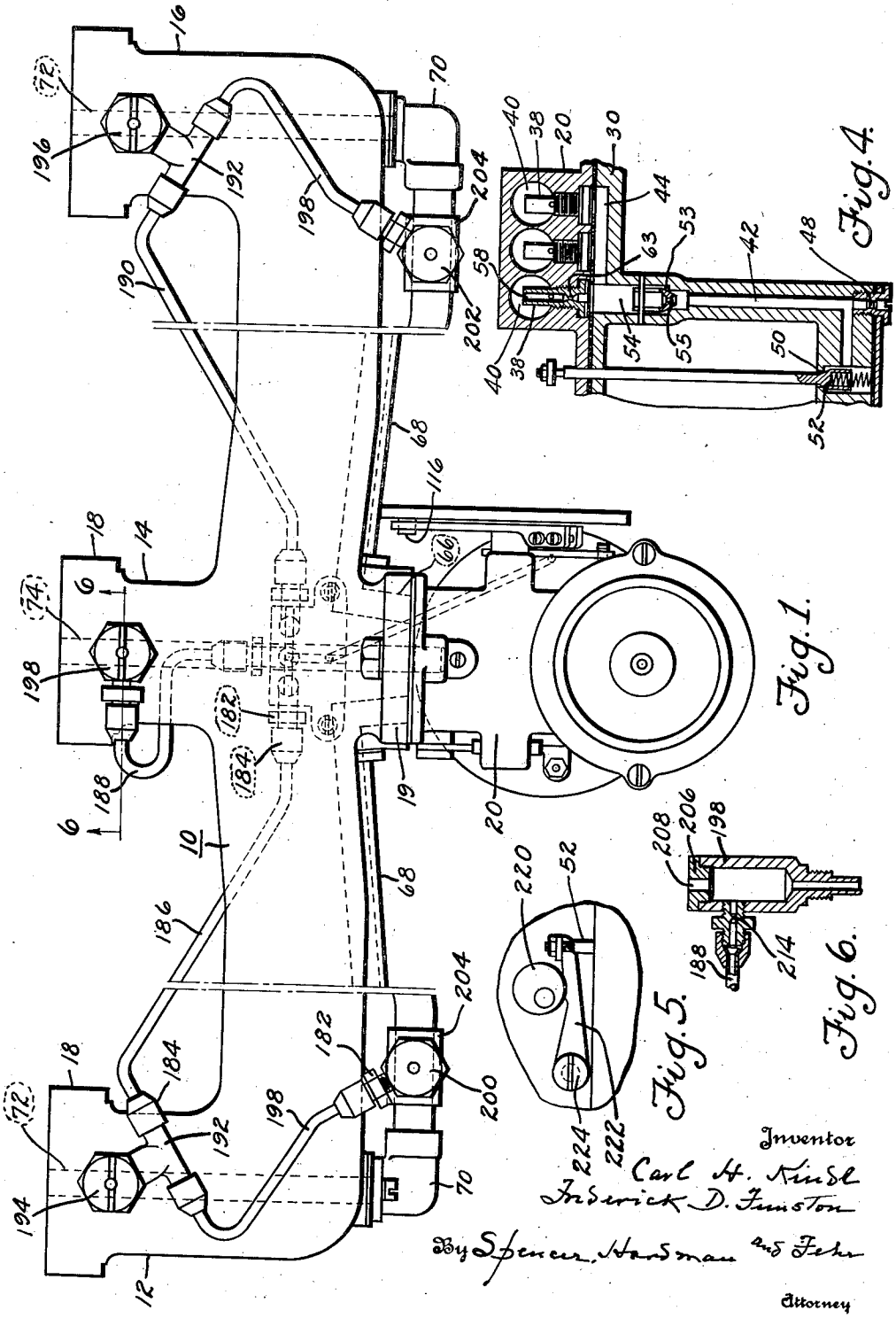

Fig. 1.

Fig. 4.

Fig. 5.

Fig. 6.

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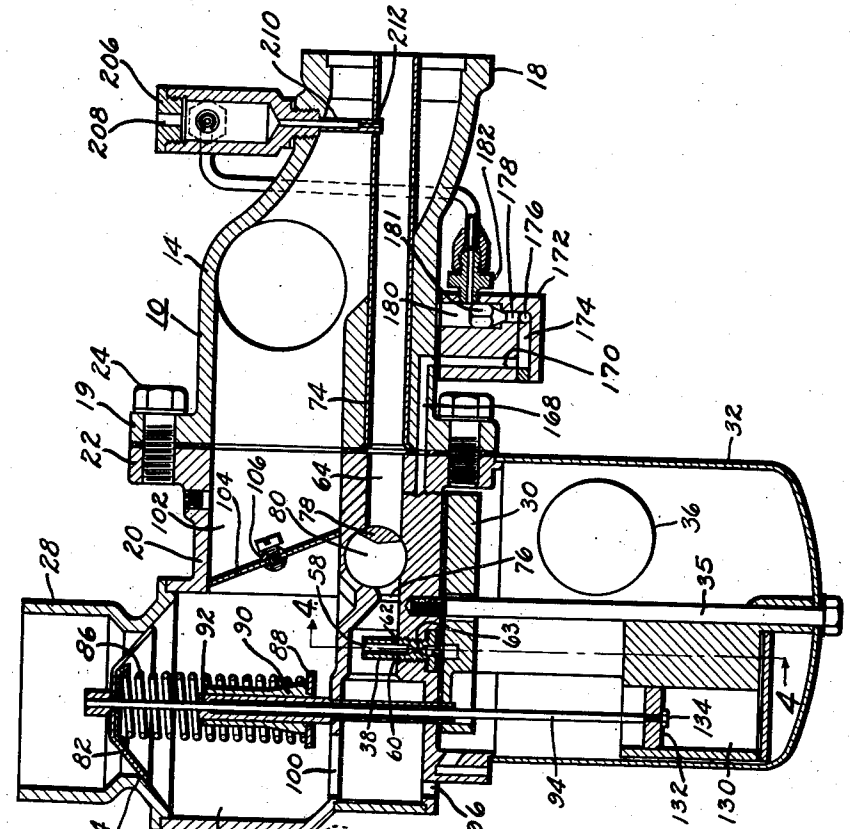

Fig. 2.

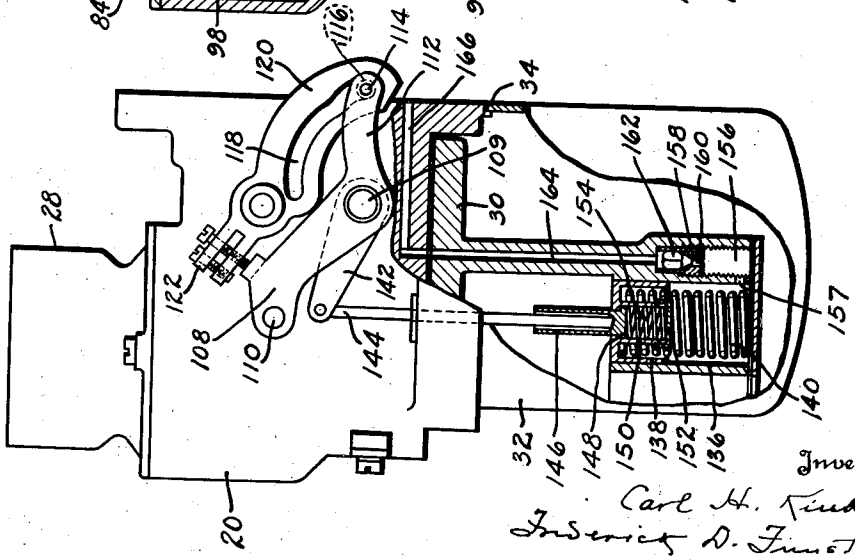

Fig. 3.

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UNITED STATES PATENT OFFICE

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CHARGE FORMING DEVICE

Application filed October 2, 1929. Serial No. 396,709.

This invention relates to charge forming devices for internal combustion engines, and more particularly to devices of this character which comprise a plurality of primary carburetors which deliver a primary mixture of fuel and air to a plurality of secondary mixing chambers located adjacent the engine intake ports, and in which the primary mixture is mixed with additional air under certain operating conditions.

A device of this character is fully disclosed in the copending application of Fred E. Aseltine, Wilford H. Teeter and Carl H. Kindl, Serial No. 288,683, filed June 10, 1928.

It is the principal object of the present invention to provide improved means for enriching the mixture during the acceleration period and more particularly, to provide means which is effective to enrich the mixture substantially simultaneously with the opening of the throttle.

In devices of this character, such as disclosed in the above mentioned application, a pump has been provided to supply additional fuel following any opening movement of the throttle to enrich the mixture under such operating conditions. It has been found, however, that when such opening movement of the throttle is accompanied by an opening of the valve which controls the admission of secondary air, the latter reaches the secondary mixing chambers before the enriched primary mixture of fuel and air and results in the formation of too lean a mixture to properly operate the engine unless some means is provided to retard the flow of secondary air, the provision of which adds to the mechanical complexity of the structure. It is therefore one of the purposes of the present invention to provide means for enriching the mixture which is so designed that the means for retarding the admission of secondary air may be entirely eliminated.

With these objects in view one of the features of this invention resides in the provision of a fuel pump which is effective on opening movements of the throttle to supply additional fuel to the primary mixture conduits at a point adjacent the outlet thereof and close to the engine intake ports, and substantially simultaneously with the opening of the throttle whereby the additional fuel reaches the secondary mixing chamber at substantially the same time as the secondary air, without the provision of any means for retarding the flow thereof.

Another feature of the invention resides in the provision of a plurality of auxiliary reservoirs for supplying fuel to the primary mixture passages near the outlets thereof, means for restricting the flow therefrom into the said primary mixture passages, means for preventing flow from one reservoir to another on change of inclination of the vehicle on which the device is used and a throttle operated pump for supplying fuel to said reservoirs.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a plan view of a charge forming device constructed in accordance with the present invention.

Fig. 2 is a vertical, longitudinal section through the carburetor unit forming part of the charge forming device and one outlet branch of the manifold associated therewith.

Fig. 3 is a side elevation of the carburetor unit being partly broken away to show certain parts in section.

Fig. 4 is a section on the line 4—4 of Fig. 2.

Fig. 5 is a detail view of the means for operating the fuel valve.

Fig. 6 is a detail section on the line 6—6 of Fig. 1.

The device disclosed comprises a main air manifold 10 having three outlet branches 12, 14 and 16, each of which is provided with a flange 18 for securing the manifold to the engine block in the usual manner. The manifold is also provided with a flange 19, to which the carburetor unit hereinafter described is secured.

The carburetor unit comprises a main housing 20, having an attaching flange 22, adapted

to be secured to the flange 18 by screws 24. An air inlet coupling 28 is secured in position to register with an opening in the upper wall of the housing 20, in any suitable way and may be connected with an air cleaner if desired. A casting 30, in which the passages supplying fuel to the nozzles are formed, is secured by screws to the lower wall of housing 20, and a sheet metal fuel bowl 32 is held tight against an annular shoulder 34 on the housing 20 by any suitable means, such as a machine screw 35 passing through the fuel bowl and screwed into the bottom wall of the main housing. Fuel is conducted from a main source of supply to the fuel bowl through a conduit (not shown) and the flow of fuel to the bowl is controlled by a float 36, operating in the usual manner to maintain a substantially constant level of fuel therein.

Fuel flows from the bowl 32 to a plurality of primary fuel nozzles 38, one of which is located in each of the primary mixing chambers 40, the construction of which is briefly described hereinafter. The fuel conduit between the fuel bowl and the nozzles comprises the vertical fuel passage 42 communicating at its upper end with the horizontal fuel canal 44, which connects with each of the nozzles 38. Fuel is admitted from the fuel bowl to the passage 42 at all engine speeds, through a fixed metering orifice 48 and at high speeds additional fuel is admitted through an orifice 50 controlled by a valve 52, operated in the manner set forth more fully hereinafter.

Fuel is lifted from the fuel bowl through the above described fuel passages and nozzles 38 to the primary mixing chambers by the suction therein and the flow is regulated by a two stage metering valve 53 received in chamber 54 and having a passage 55 therethrough to regulate the flow when the valve is seated, but which is adapted to be unseated as the suction increases to permit a flow of fuel around the valve also. Moreover, on any reduction in mixing chamber suction which might permit the fuel column to drop sufficiently to cause a temporary fuel starving of the engine, the said valve partially checks the return flow of fuel to largely prevent such an action as such valve immediately seats and the return flow will be limited by the small orifice in the valve.

Each primary fuel nozzle is provided with a main fuel outlet 58 in the top of the nozzle and a secondary fuel outlet comprising two orifices 60 and 62 in the vertical wall of the nozzle near the bottom of the mixing chamber. At relatively high speeds, the mixing chamber suction is sufficient to lift fuel from the main outlet as well as from orifices 60 and 62. At idling, or low speed operation under load, however, the suction is enough to lift fuel only to some point between the top of the nozzle and the orifices 60 and 62, fuel flowing from these orifices by the action of gravity under such operating conditions. Each nozzle is provided with a restricted fuel metering orifice 63. The primary mixing chambers comprise the enlarged anterior ends of the primary mixture passages 64, which are parallel to each other and close together, as indicated in Fig. 2. When the carburetor is attached to the manifold, these passages register with conduits which convey the primary mixture to the secondary mixing chambers. These conduits comprise angular passages 66 indicated in dotted lines in Fig. 1, which communicate with pipes 68 leading to elbows 70, secured to the manifold and communicating in turn with tubes 72, located in the outlet branches 12 and 16 of said manifold. The middle passage 64 communicates directly with a tube 74 similar to the tube 72 and fully illustrated in Fig. 2. Restrictions 76 separate the primary mixing chambers from the remainder of the mixture passages so as to reduce the velocity of flow past the fuel nozzles for purpose fully set forth in the above mentioned copending application.

A single throttle valve 78, which extends across all of the primary mixture passages, controls the flow therethrough and is provided with grooves 80, which register with said mixture passage. This throttle valve is operated by a mechanism more fully described hereinafter. The major part of the air entering the carburetor flows through the inlet coupling 28 and is controlled by a main air valve 82, normally held against the seat 84, by a spring 86 received between the valve and flange 88, projecting from a sleeve 90, slidably mounted on a stationary guide sleeve 92, fixed in the main housing 20, and serving also as a guide for the vertically reciprocating stem 94, to which the air valve is secured in any desirable manner. When it is desired to choke the carburetor to facilitate starting of the engine, the flange 88 is adapted to be lifted by means not shown herein but fully illustrated and described in the above application, until the upper end of the sleeve 90 engages the air valve to hold it closed. Sufficient air to carry the starting fuel from the nozzles to the intake ports of the engine is admitted through orifice 96 in the wall of the main housing, as shown in Fig. 2.

The air valve controls the admission of air to a main air chamber 98 from which air flows to the primary mixture passages through an opening 100 in the bottom wall of the air chamber and to the secondary mixing chambers through a passage 102, which connects with the inlet of the manifold 10. The flow of air through this passage is controlled by a manually operable throttle 104, secured to a shaft 106, rotatably mounted in the main housing and adapted to be operated by the primary throttle, as hereinafter described.

The operating mechanism for the two throttle valves comprises an arm 108, secured to a spindle 109, projecting from one end of the primary throttle outside the main housing and provided with an orifice 110, for connection with some suitable operating connection extending to a point convenient to the operator of the vehicle. The arm 108 is provided with an extension 112 having a projecting pin 114 supporting a roller 116 which is received within a cam slot 118, formed in an arm 120, secured to the end of the shaft 106 by a split clamp 122, or in any other desirable manner. As the arm 108 is rocked to open the primary throttle, the roller 116 engaging in the cam slot is operative to rock the shaft 106 to open the valve 104. The slot 118 may be of any desired contour to give the desired amount of movement to the valve 104 and is generally so designed that a part of such slot is concentric with the spindle 109, so that a portion of the movement of the arm 112 is ineffective to move the valve 104. This concentric part of the slot 118 may be of any desired length but is usually so formed that the valve 104 begins to open when the primary throttle has reached a position corresponding to a vehicular speed of approximately 20 miles per hour on the level. After the valve 104 begins to open, such valve moves simultaneously with the primary throttle until both are fully open. While the operating mechanism disclosed herein is specifically different from that disclosed in the above copending application, the function of such mechanism is substantially the same as that described therein and the valves are operated in substantially the same manner to produce the same result.

On opening of one or both throttle valves, the suction in the air chamber 98 is increased and the air valve is opened to admit additional air and increase the quantity of mixture supplied to the engine. The opening of the air valve is retarded to prevent fluttering thereof and to restrict the admission of air to prevent leaning of the mixture whenever the valve is opened. For this purpose a dashpot is provided comprising a cylinder 130 formed in the casting 30 and receiving fuel from the reservoir 32. Cooperating with this cylinder is a piston 132 secured to the lower end of the valve stem by a nut 134, as indicated in Fig. 2. The specific construction of this dashpot is immaterial so far as the present invention is concerned and may be of any conventional design which will properly retard the opening of the air valve.

In order to provide a mixture of the proper proportions to most properly operate the engine during the acceleration period, a pump is also provided to supply additional fuel whenever the primary throttle is opened. This pump comprises a cylinder 136 formed in the casting 30 and a piston 138 cooperating therewith, which is normally held in its uppermost position by a spring 140 received between the piston and the bottom of the cylinder, as indicated in Fig. 3. The pump piston is operated by the primary throttle through a resilient operating connection comprising an arm 142 secured to spindle 109 and is pivotally connected at its free end to a piston rod 144, which is adapted to operate the pump piston. The lower end of this rod projects into a tube 146, which is closed at the bottom, as indicated in Fig. 3, and has a flange 148 projecting therefrom which fits slidably in a small cylinder 150, formed within the pump piston and closed at the bottom by a cap 152, a spring 154 being provided between the bottom of the tube 146 and the cap 152. On opening movement of the throttle, the rod 144 is depressed and the spring 154 is compressed until the force of such spring is sufficient to overcome the resistance of the spring 140, which normally holds the pump piston in its upper position, after which the pump piston is moved downwardly with the rod 144, forcing fuel from the cylinder 136 into a fuel delivery conduit which includes a chamber 156 which connects with said cylinder 136 by a passage 157 at the bottom of the cylinder.

Screwed into the chamber 156 is a sleeve 158, which is closed at its lower end except for a restricted passage 160, normally closed by a check valve 162, slidable within the sleeve and adapted to be lifted on downward movement of the pump piston to permit the passage of fuel from the chamber 156 into a vertical passage 164, bored in the casting 30 and connecting at its upper end with a horizontal passage 166 bored in the main housing, which, when the device is assembled, communicates with an angular passage 168, formed in the wall of the manifold. The passage 168 is adapted to connect with a vertical passage 170, bored in a block 172, which is secured to the lower side of the manifold by screws, as indicated in Fig. 1, or in any other desirable manner. A passage 174 transverse with respect to the cylinder block is bored in block 172 and communicates with another horizontal passage 176, which supplies fuel to three short vertical passages 178, each of which leads to an enlarged chamber 180, formed in the block 172, and each of which receives a check valve 181, functioning in a manner hereinafter described.

Nipples 182, of identical construction, communicate with the chambers 180 and are connected by coupling members 184 of identical form with tubes 186, 188 and 190 which are designed to supply fuel to auxiliary reservoirs associated with the outlet branches 12, 14 and 16 respectively, the nipples and coupling members providing fluid tight joints. The tubes 186 and 190 are connected by cou-

pling members of the same form as above referred to, to T-shaped nipples 192, which connect with auxiliary fuel reservoirs 194 and 196 screwed into branches 12 and 16 of the manifold, while tube 188 is connected by a nipple and coupling member of the same construction as the parts 182 and 184 to another auxiliary reservoir 198 screwed into branch 14 of the manifold. The T-shaped nipples 192 are also connected by coupling members to tubes 198 which are connected in the manner above described to auxiliary fuel reservoirs 200 and 202 supported by sleeves 204 surrounding the primary mixture conduits supplying fuel mixture to the manifold branches 12 and 16.

Each of the above described auxiliary reservoirs is closed at the top by a plug 206 having a restricted inlet 208 to admit air to said reservoir and each of such reservoirs, at its lower end, is provided with a downwardly projecting tube 210 of reduced size which projects into the primary mixture conduit, each of these downwardly extending tubes being provided with a restricted outlet 212 to regulate the flow of fuel from said reservoir into the various primary mixture conduits. Restrictions 214 are provided in each of the nipples leading to the various auxiliary fuel reservoirs, and the passages through these restrictions are all of the same size so as to secure equal distribution of the fuel to all of said reservoirs on each movement of the pump piston.

The check valves 181 previously referred to are provided for the purpose of preventing any fuel running from one reservoir to another on any change in the angle of the inclination of the vehicle while fuel remains in the auxiliary reservoirs following an operation of the pump piston. The check valve 162 operates to prevent the return of any of the fuel from the pump delivery conduit and auxiliary reservoirs to the pump cylinder after an operation of the pump.

The operation of the above described pump mechanism should be obvious from the foregoing description. On any downward movement of the pump piston, fuel is forced into the various auxiliary reservoirs described the quantity of such fuel being proportional to the movement of the piston and the flow of fuel therefrom being due to the action of gravity, substantially atmospheric pressure being maintained in the reservoirs. By forcing this fuel into the reservoirs which are open to atmosphere and provided with restricted outlets leading to the primary mixture conduits, the period of time during which such fuel is supplied to said conduits to enrich the mixture flowing therethrough is considerably prolonged by comparison to what it would be if the fuel were forced directly into the conduits by an injection pump. Moreover, by supplying the fuel from said auxiliary reservoirs to said primary mixture conduits at points close to the engine intake ports, it will be apparent that such fuel reaches the engine intake ports substantially immediately on operation of the pump.

In Fig. 5 there is disclosed the means for operating the fuel valve 52, herein before referred to. Secured to the left end of the primary throttle, as seen in Fig. 1, is a cam 220 which is adapted to engage an operating arm 222 pivoted at 224 on the main housing, and connected at the opposite end to the upper end of the valve 52. After a predetermined opening movement of the primary throttle, the cam depresses the arm 222 and moves the fuel valve downwardly to permit a flow of fuel through the inlet 50.

It will be noted that only one auxiliary reservoir is provided to supply fuel to that primary mixture conduit which is associated with the outlet branch 14 of the manifold, while two auxiliary reservoirs are associated with the primary conduits supplying primary mixture to the branches 12 and 16 of said manifold. This construction is made necessary because the primary mixture conduit associated with branch 14 is shorter than those leading to branches 12 and 16, so that the suction in the conduit associated with branch 14 is higher and the velocity of flow therethrough is greater than in the other two primary mixture conduits. Since this is true, it is necessary that a larger quantity of fuel be supplied to the primary mixture flowing through the conduits associated with branches 12 and 16 and for a longer time than is necessary with respect to the conduit associated with the branch 14, in order to secure the same enriching effect.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, and an auxiliary fuel reservoir for supplying fuel to the intake passage adjacent the engine intake ports under certain operating conditions.

2. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying fuel to the intake passage adjacent the engine intake ports dur-

ing the acceleration period, and means operated by the throttle for supplying fuel to said auxiliary reservoir.

3. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying fuel to the intake passage adjacent the engine ports during the acceleration period and means operated during opening movements of the throttle for supplying fuel to said auxiliary reservoir.

4. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying additional fuel to said mixture passage adjacent the engine intake ports, means for supplying fuel to said auxiliary reservoir under certain operating conditions and an air inlet admitting air to said auxiliary reservoir whereby atmospheric pressure is maintained therein.

5. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying additional fuel to said mixture passage adjacent the engine intake ports, means for supplying fuel to said auxiliary reservoir under certain operating conditions, an air inlet admitting air to said auxiliary reservoir and a restricted fuel outlet therefrom, whereby said additional fuel is supplied to the mixture passage relatively slowly.

6. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying additional fuel to said mixture passage adjacent the engine intake ports, means operated by the throttle for supplying fuel to said reservoir, and a fuel outlet from said reservoir of less size than the inlet thereto, whereby flow of fuel from the reservoir continues after operation of the throttle.

7. A charge forming device for internal combustion engines comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying additional fuel to said mixture passage adjacent the engine intake ports, means operated by the throttle for supplying fuel to said reservoir, a fuel outlet from said reservoir of less size than the inlet thereto, whereby flow of fuel from the reservoir continues after operation of the throttle, and an air inlet admitting air to said reservoir to maintain atmospheric pressure therein.

8. A charge forming device for internal combustion engines comprising a primary mixture passage, means for supplying fuel and air thereto, a secondary mixing chamber into which said mixture passage delivers a primary mixture of fuel and air, and means operative under certain operating conditions for supplying additional fuel to the primary mixture passage adjacent the delivery end thereof.

9. A charge forming device for internal combustion engines comprising a primary mixture passage, means for supplying fuel and air thereto, a secondary mixing chamber into which said mixture passage delivers a primary mixture of fuel and air, a throttle, and means operable on opening movements of the throttle for supplying additional fuel to the primary mixture passage adjacent the delivery end thereof.

10. A charge forming device for internal combustion engines comprising a primary mixture passage, means for supplying fuel and air thereto, a secondary mixing chamber into which said mixture passage delivers a primary mixture of fuel and air, a throttle, and a pump operated by the throttle for supplying additional fuel to the primary mixture passage adjacent the delivery end thereof.

11. A charge forming device for internal combustion engines comprising a primary mixture passage, means for supplying fuel and air thereto, a secondary mixing chamber into which said mixture passage delivers a primary mixture of fuel and air, a primary throttle for regulating the flow through the primary mixture passage, a secondary throttle for controlling the admission of air to the secondary mixing chamber, and means operated by said primary throttle for supplying additional fuel to said primary mixture passage adjacent the delivery end thereof during the acceleration period.

12. A charge forming device for internal combustion engines comprising a primary mixture passage, means for supplying fuel and air thereto, a secondary mixing chamber into which said mixture passage delivers a primary mixture of fuel and air, a primary throttle for regulating the flow through the primary mixture passage, a secondary throttle for controlling the admission of air to

the secondary mixing chamber, means connecting the secondary throttle to the primary throttle for operation therewith, and means also operated by the primary throttle for supplying additional fuel to the primary mixture passage adjacent the delivery end thereof during the acceleration period.

13. A charge forming device for internal combustion engines comprising a primary mixture passage, means for supplying fuel and air thereto, a secondary mixing chamber into which said mixture passage delivers a primary mixture of fuel and air, a primary throttle for regulating the flow through the primary mixture passage, a secondary throttle for controlling the admission of air to the secondary mixing chamber, means for operating the secondary throttle by the primary throttle after a predetermined opening movement of the latter, and means operated during all opening movements of the primary throttle for supplying additional fuel to the primary mixture passage adjacent the delivery end thereof.

14. A charge forming device for internal combustion engines comprising a main mixture passage leading to the intake ports of said engine, a secondary mixing chamber therein, a primary mixture passage adapted to deliver a primary mixture thereto, a main fuel reservoir, means for supplying fuel and air to said primary mixture passage, means for supplying additional fuel to said primary mixture passage during the acceleration period comprising an auxiliary fuel reservoir supported on the main mixture passage adjacent the engine intake port and communicating with the primary mixture passage.

15. A charge forming device for internal combustion engines comprising a main mixture passage leading to the intake ports of said engine, a secondary mixing chamber therein, a primary mixture passage adapted to deliver a primary mixture thereto, a main fuel reservoir, means for supplying fuel and air to said primary mixture passage, a throttle controlling the flow therethrough, means for supplying additional fuel to said primary mixture passage during the acceleration period comprising an auxiliary fuel reservoir supported on the main mixture passage and communicating with the primary mixture passage, and means operated on opening movements of said throttle for supplying fuel to said auxiliary reservoir.

16. A charge forming device for internal combustion engines comprising a plurality of primary mixture passages, a main fuel reservoir, means for supplying fuel and air to said mixture passages, secondary mixing chambers into which said primary mixture passages deliver a primary mixture of fuel and air, and means for supplying additional fuel to all of said primary mixture passages adjacent the delivery end thereof during the acceleration period.

17. A charge forming device for internal combustion engines comprising a plurality of primary mixture passages, a main fuel reservoir, means for supplying fuel and air to said mixture passages, secondary mixing chambers into which said primary mixture passages deliver a primary mixture of fuel and air, and means for supplying additional fuel to all of said primary mixture passages adjacent the delivery end thereof during the acceleration period, said means comprising a plurality of auxiliary fuel reservoirs, at least one of which is adapted to communicate with each primary mixture passage.

18. A charge forming device for internal combustion engines comprising a plurality of primary mixture passages, a main fuel reservoir, means for supplying fuel and air to said mixture passages, secondary mixing chambers into which said primary mixture passages deliver a primary mixture of fuel and air, a plurality of auxiliary fuel reservoirs for supplying additional fuel to said primary mixture passages adjacent the delivery ends thereof during the acceleration period, a fuel delivery conduit supplying fuel to said reservoirs and means for preventing a flow of fuel from one auxiliary reservoir to another.

19. A charge forming device for internal combustion engines comprising a plurality of primary mixture passages, a main fuel reservoir, means for supplying fuel and air to said mixture passages, secondary mixing chambers into which said primary mixture passages deliver a primary mixture of fuel and air, a primary throttle for controlling the flow through all of said pimary mixture passages, a plurality of auxiliary fuel reservoirs for supplying additional fuel to the primary mixture passages adjacent their outlet ends and means operated by said primary throttle for supplying fuel to all of said auxiliary reservoirs.

20. A charge forming device for internal combustion engines, comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto at a point relatively remote from the engine intake ports, a throttle controlling the flow therethrough, a main fuel reservoir, and an auxiliary fuel reservoir for supplying fuel to the intake passage adjacent the engine intake ports under certain operating conditions.

21. A charge forming device for internal combustion engines, comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto at a point relatively remote from the engine intake ports, a throttle controlling the flow

therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying fuel to the intake passage adjacent the engine intake ports, and means operated by the throttle for supplying fuel to said auxiliary reservoir.

22. A charge forming device for internal combustion engines, comprising a mixture passage adapted to supply a mixture of fuel and air to the intake ports of said engine, means for supplying fuel and air thereto at a point relatively remote from the engine intake ports, a throttle controlling the flow therethrough, a main fuel reservoir, an auxiliary fuel reservoir for supplying fuel to the intake passage adjacent the engine intake ports, and means operated by the throttle during opening movements thereof for supplying fuel to said auxiliary fuel reservoir.

In testimony whereof we hereto affix our signatures.

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