Feb. 27, 1940. O. C. BETRY 2,192,067

DUAL CARBURETOR ADAPTER

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Fig. 1

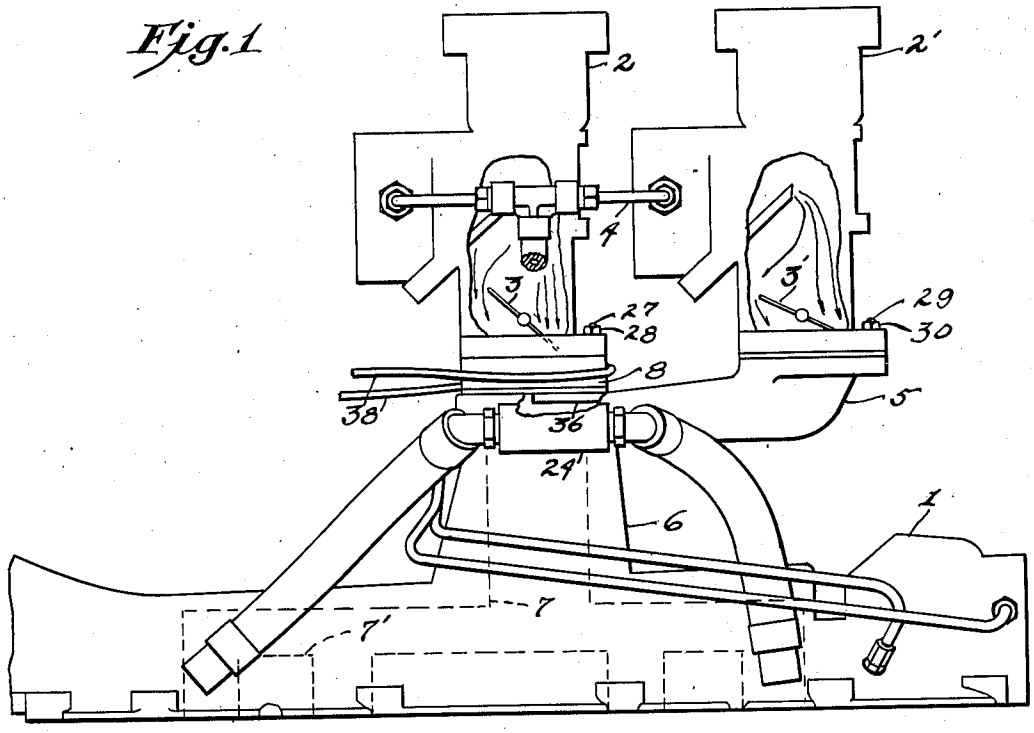
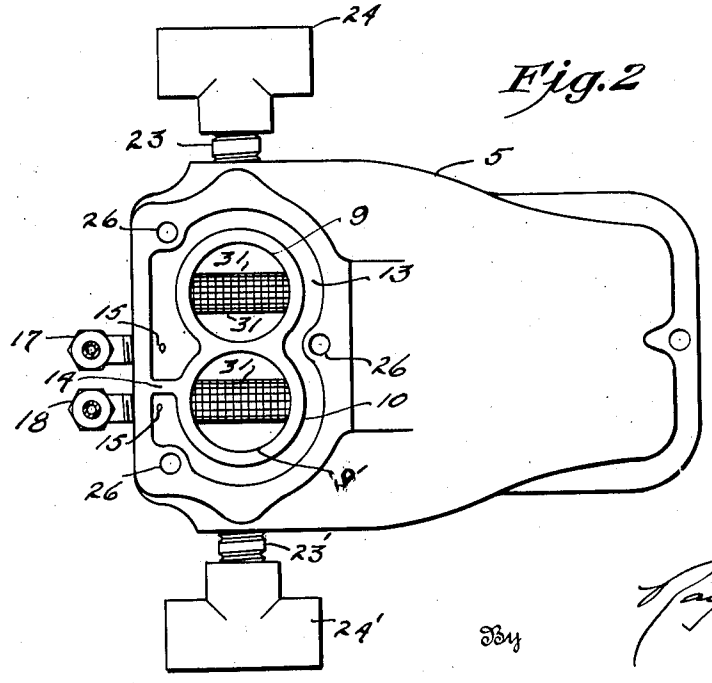


Fig. 2



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Fig. 4

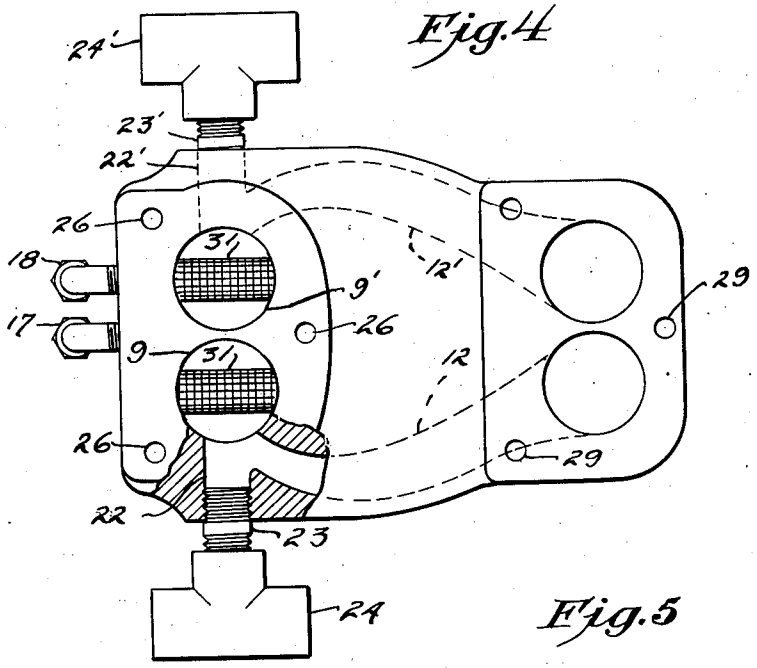


Fig. 5

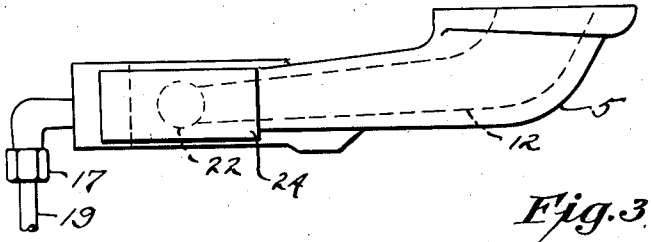


Fig. 3

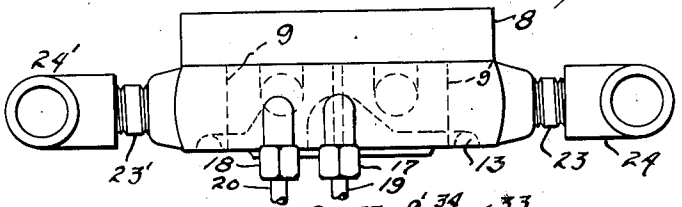


Fig. 6

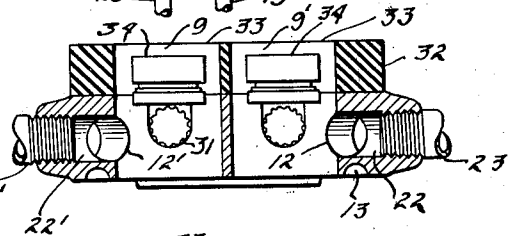
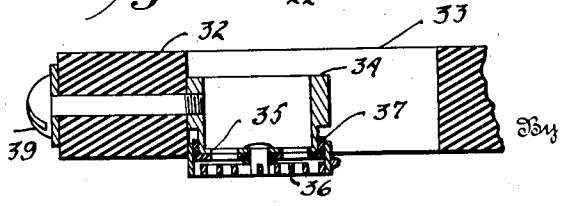


Fig. 7



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UNITED STATES PATENT OFFICE

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DUAL CARBURETOR ADAPTER

Owen Charles Betry, Glendale, Calif.

Application May 16, 1939, Serial No. 273,986

8 Claims. (Cl. 123—127)

My invention relates to a novel fuel temperature regulator and distributor adapted for use on gas engines and has particular reference to a device that may be installed on existing types of engines in which a dual carburetor system is employed. The temperature regulator and distributor has the double function of controlling the temperature of the supply of fuel mixture from each carburetor and, at the same time, provides a means for by-passing a portion of vaporized gasoline from the carburetors directly to the end cylinders.

In the modern types of multiple cylinder high speed gas engines, certain notable difficulties in operation have been encountered. In the first instance, it has been found necessary to supply additional fuel to the engine during overload operating periods by means of an auxiliary carburetor associated in a parallel fluid circuit with the customary gas engine carburetor. Again, it has been found that in gas engines using ordinary intake manifolds the end cylinders particularly are starved in that they do not receive the same proportion of vaporized fuel as do the other cylinders. There is the further objection that the temperature of the vaporized fuel within the manifold varies in a wide range in accordance with the ambient air temperatures and is, at times, too hot and, at other times, too cool for efficient operation of the engine. According to my invention, an apparatus is provided that functions both to more properly distribute the fuel supplied by a dual carburetor system to the various cylinders and to control the temperature of this fuel at all times.

The main object of my invention is to provide a means which is readily adapted for installation on existing engines provided with dual carburetor systems in a manner to permit an auxiliary or shunt supply of fuel mixture from the carburetors to each end cylinder.

Another object is to provide auxiliary means for heating the fuel mixture during the starting cycle of the operation of the engine.

Another object is to provide means for heating or cooling the fuel mixture according to the temperature of the crank case oil and for heating cool crank case oil.

For a full disclosure of the invention, reference is made to the accompanying drawings, wherein—

Fig. 1 shows the device, with parts removed, as associated with the dual carburetor system and intake manifold;

Fig. 2 is a bottom plan view of the device;

Fig. 3 is an end view of the device;

Fig. 4 is a top plan view of the device with parts removed;

Fig. 5 is a side view of the device;

Fig. 6 is a view in section on line 6—6 of Fig. 2; and

Fig. 7 is a view in detail of an electric fuelizer associated with one carburetor.

Referring to the drawings in detail, the invention is shown as applied to a duplex manifold 1 of a V-8 motor which is provided with dual carburetors 2 and 2'. The carburetors 2—2' are conventional in type, being provided with the usual butterfly valves 3 and 3' to control the supply of fuel mixture to the intake manifold. A fuel line 4 supplies both carburetors. The essential feature of my invention comprises an adapter unit 5, preferably a casting, which is adapted to be inserted between the intake neck 6 of the manifold and the bases of the carburetors 2 and 2'. The manifold shown is adapted to supply opposed banks of cylinders and the intake neck 6 is provided with two vertical conduits 7, one for each bank of cylinders leading to the horizontal manifold passage 7'. An electric heater 8 shown in detail in Fig. 7 is inserted between the adapter unit 5 and the carburetor 2 which is mounted directly over the intake neck 6.

Referring to Fig. 2, the adapter unit casting 5 is provided with a pair of gas intake conduits 9 and 9' which are surrounded by a thin wall 10. The casting 5 is further provided with intake openings 11 and 11' which are connected by snail-shaped channels 12 and 12' to conduits 9—9' at right angles thereto. An oil reservoir 13 is formed around the wall 10 within the casting 5. The reservoir is arcuate, conforming with wall 10 and is divided by a partition 14. The casting 5 is tapped at 15 and 16 to receive fittings 17 and 18, respectively. The average depth of the reservoir is approximately an eighth of an inch. The depth of the reservoir is greatest adjacent the taps 15 and 16 where the reservoir is deepened to provide wells. The well at outlet tap 16 is preferably about a quarter of an inch deep, while the well at inlet tap 15 is relatively much deeper.

Oil is pumped from the crank case through a feed pipe 19 into one end of the reservoir 13 and around the wall 10 of the conduits 9—9'. The oil leaves the reservoir by tap 16 and return pipe 20 which leads to the crank case. A gasket 21 seals the lower face of the casting 5 and closes the reservoir 13 from below.

Referring to Fig. 4, the adapter unit casting 5 is tapped at 22 and 22' in a manner to communicate with gas conduits 9—9' and channels

12—12' at right angles therewith. The taps receive nipples 23 and 23' which are connected to T-shaped fittings 24 and 24'. The fittings are connected to four conduits 25 which are tapped, respectively, into the manifold at points opposite each of the four end cylinders. The adapter unit casting 5 is provided with three bolt openings 26 which receive three stud bolts 27 which extend from the manifold intake neck 6 and nuts 28 serve to hold the carburetor 2 and the casting 5 in position on the manifold. The casting 5 is further provided with stud bolts 29 which extend through the base of carburetor 2' and nuts 30 which serve to secure the carburetor 2' to the adapter unit.

Referring to Fig. 6, the view in cross section of the adapted unit 5 shows the walls of the intake conduits 9—9' tapered to provide a constriction at the lower ends thereof. The taper of the intake conduits causes an increase in the static pressure of the fuel mixture flowing therethrough. The increased static pressure assists in diverting a portion of the fuel mixture from the conduits 9—9' into the passages 22 and 22'. The intake conduits 9—9' are further provided with cylindrical screens 31 which serve as baffles or mixers. It will be noted in this figure as well as in Fig. 2 and Fig. 4, that the snail-shaped channels 12—12' vary in diameter throughout their length becoming increasingly smaller at the outlet end. The constriction of the channels adjacent their outlet causes a high turbulence of the fuel mixture which is extremely desirable for reasons hereinafter stated.

The electric heater and mixer shown in detail in Fig. 7 comprises a non-conducting member 32 provided with openings 33 which are co-extensive with the fuel supply throat openings of the carburetor and the intake conduits 9—9' in adapter unit 5. The openings 33 contain cup-shaped member 34 having perforated bottoms 35. Heating coils 36 are secured to the outside of the bottoms of cups 34 and are insulated therefrom by plates 37. A source of current is supplied to the coils 36 through wires 38 and anchor bolts 39. The cups are mounted in the intake passage on the side thereof adjacent the lower or depending edge of the butterfly valve 3.

In operation, a mixture of fuel and air is drawn downwardly from the carburetor 2 around the butterfly valves 3 in the intake passages. The fuel mixture flows in part through the perforated bottoms 35 of the electric heater and mixer 8 and over coils 36 where the fuel mixture is further vaporized and agitated. The fuel mixture then flows through the intake conduits 9—9' in the adapted unit 5. Portions of the fuel mixture are by-passed from the conduits 9—9' through a respective conduit 25 into each end cylinder. The static pressure increase resulting from the constriction of conduits 12—12', as well as the intake suction of the end cylinders through pipes 25, assists in the mixing of the fuel. At the same time, oil is pumped in from pipe 19 through reservoir 13 to substantially surround conduits 9—9', thence out through return pipe 20 and back to the crank case in a manner to heat or cool the incoming stream of fuel mixture, depending upon the temperature of such mixture with respect to that of the crank case oil.

When the engine is operated with an overload such as a high speed operating period, additional fuel mixture is supplied by carbuetor 2' to openings 11—11' in the adapter unit 5. The fuel mixture flows through the snail-shaped channels 12—12' to the passages 22—22' and conduits 9—9'. The shape of the channels 12—12' cause high turbulence of the fuel mixture adjacent the coils 36 as a result of the constriction of the channels as above described, whereby a portion of the gas from channels 12—12' is drawn up against the hot coils 36. The gas leaves the reduced ends of these channels at an increased pressure and expansion of this gas into the enlarged chamber adjacent coils 36 occurs at a reduced pressure according to the law of a Venturi tube. The relative differences of pressures of gas at this point from the two carburetors causes high turbulence and formation of eddy currents and efficient mixing of the two streams of gas at different temperatures. It will be noted that, in Fig. 6, the coils 36 are positioned but slightly above the ends of the channels 12—12' and are positioned on that side of conduits 9—9' adjacent said channel ends. Also as viewed in Fig. 1, the coils 36 are positioned just below the lower ends of the butterfly valves and are secured to the right hand side of the passages 9—9' whereby, as shown by the arrows, the major portion of the gas which is shown as flowing around the right hand side of these valves is diverted through the coils 36 and, immediately thereafter, meets the gas streams from channels 12—12'. During engine starting and at slow speed operation thereof, the cylinders are supplied by gas from carburetor 2, which gas stream is highly heated by coils 36. It will be noted from Fig. 4 that the gas streams from channels 12—12' are directed at a sharp angle to the passages 22—22'.

The oil groove 13 is located at the lower end of the unit 5 to ensure a more practical distribution of heat from the oil since the heat therefrom has a greater tendency to flow upwardly.

I claim:

1. In a gas engine, an adapter casing adapted to be secured in operative position between a pair of carburetors and a manifold, said casing being provided at one end with a main gas conduit extending therethrough from an upper face to a lower face thereof, said casing being provided with an auxiliary gas conduit formed in the body of the casing, one end of the auxiliary conduit terminating in said upper face adjacent the other end of the casing and extending through the body of the casing and being connected at its other end to the main conduit, and means for securing a carburetor to each end of the casing in position to feed gas to said conduits.

2. In a device as set forth in claim 1 wherein the auxiliary conduit is tapered to provide a reduced cross section adjacent the point of connection thereof to the other conduit.

3. In a device as set forth in claim 1, a heating means positioned within the main conduit adjacent the connection of the gas outlet whereby a heated portion of gas may be drawn from the main conduct into the outlet and another portion drawn from the auxiliary conduit.

4. In a gas engine having cylinders, a pair of carburetors and an intake manifold, an adapter casing secured to and between the carburetors and the manifold, a main gas conduit formed in said casing and extending between the upper and the lower face thereof at one end of the casing, a gas outlet formed in the casing and extending from said main conduit to one side of the casing, a pair of feeder conduits extending from said outlet and being connected respectively to opposite ends of the manifold adjacent the end cylinders, an auxiliary conduit having its inlet end

positioned at the other end of the casing and extending therethrough and being connected to said first-named conduit adjacent the point of connection of the gas outlet whereby to feed gas therethrough to said first-named conduit and said outlet, said carburetors being mounted on said casing to feed gas to said conduits respectively.

5. In a gas engine having cylinders, a pair of carburetors and an intake manifold, an adapter unit secured to and between the carburetors and the manifold, a main gas conduit formed in one end of said unit, a gas outlet formed in the unit and extending from said main conduit intermediate its ends to a side of the unit, an auxiliary conduit having its inlet end positioned at the other end of the unit and extending therethrough and being connected to said main conduit adjacent the point of connection of the gas outlet, a pair of feeder conduits extending from said gas outlet and being connected respectively to opposite ends of the manifold adjacent the end cylinders, a pair of carburetors secured to said adapter unit and positioned over the main gas conduit and the inlet end of said auxiliary conduit, a gas heater interposed between said main gas conduit and the adjacent carburetor, whereby a supply of gaseous fuel is delivered from a point above said heater and an auxiliary supply of gaseous fuel is delivered from the other carburetor to a point below and adjacent said heater, a portion of said gaseous fuel being withdrawn and delivered through said feeder conduits to the end cylinders.

6. In a device as set forth in claim 5 wherein the auxiliary conduit is tapered to provide a reduced cross section adjacent the point of connection thereof to the main conduit, whereby a turbulence is formed in the gas stream discharged from the auxiliary conduit, thereby facilitating mixture of said stream with the heated gas stream from the adjacent carburetor.

7. In a device as set forth in claim 5 wherein the heater is positioned adjacent the side wall of said main gas conduit to avoid material obstruction of said conduit and a butterfly valve associated with the carburetor positioned above said main gas conduit adapted to deflect a major portion of the gaseous fuel to said heater.

8. In a gas engine, an adapter casing adapted to be secured between a pair of carburetors and a manifold, said casing being provided at one end with a main gas conduit extending vertically therethrough, an end cylinder gas outlet extending from the main conduit to one side of the casing, conduits for connecting said outlet to respective ends of the manifold adjacent end cylinders, an auxiliary gas conduit extending from the other end of said casing and opening into said outlet and main conduit adjacent the point of connection therebetween, and means for securing a carburetor to each end of the casing in position to feed gas to the main and auxiliary conduits.

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