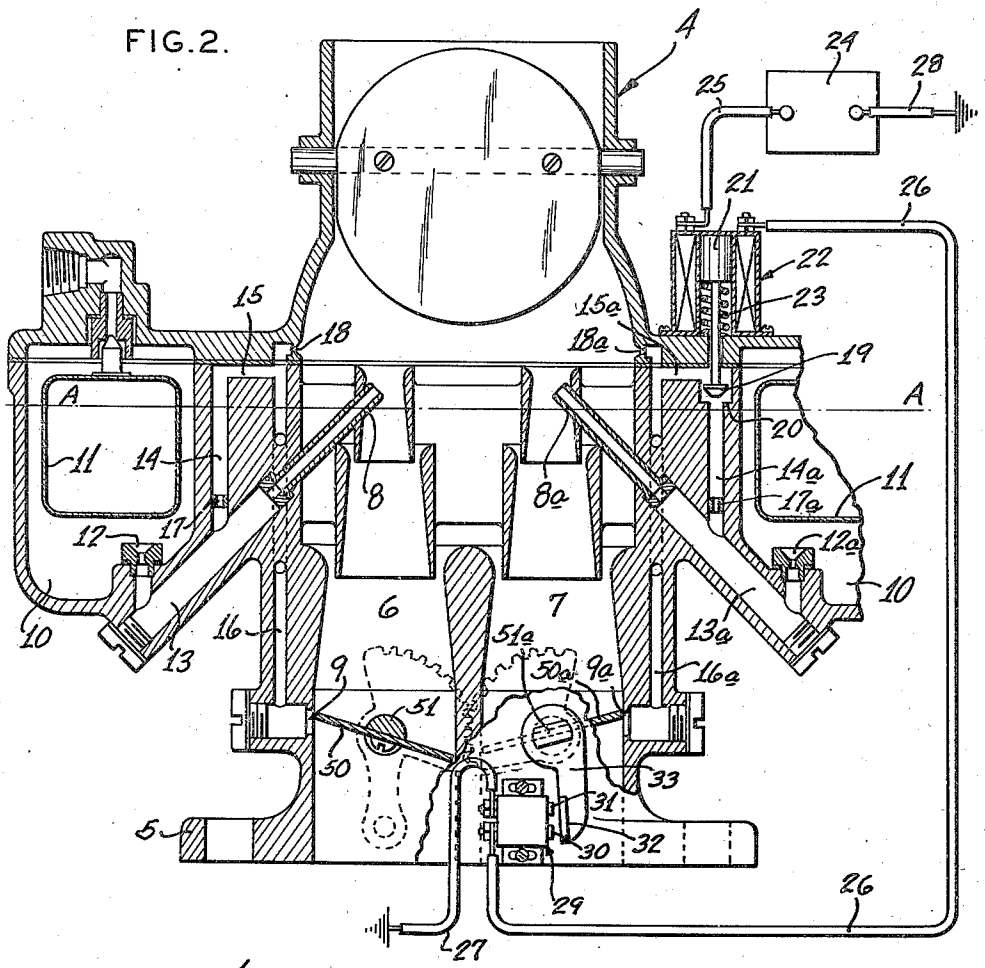
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CARBURETOR

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FIG. 2.



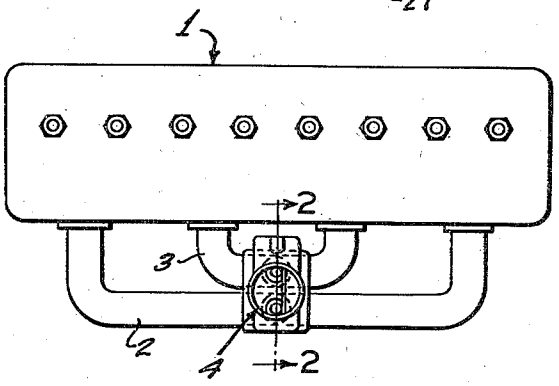


FIG. 1.

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FIG. 5.

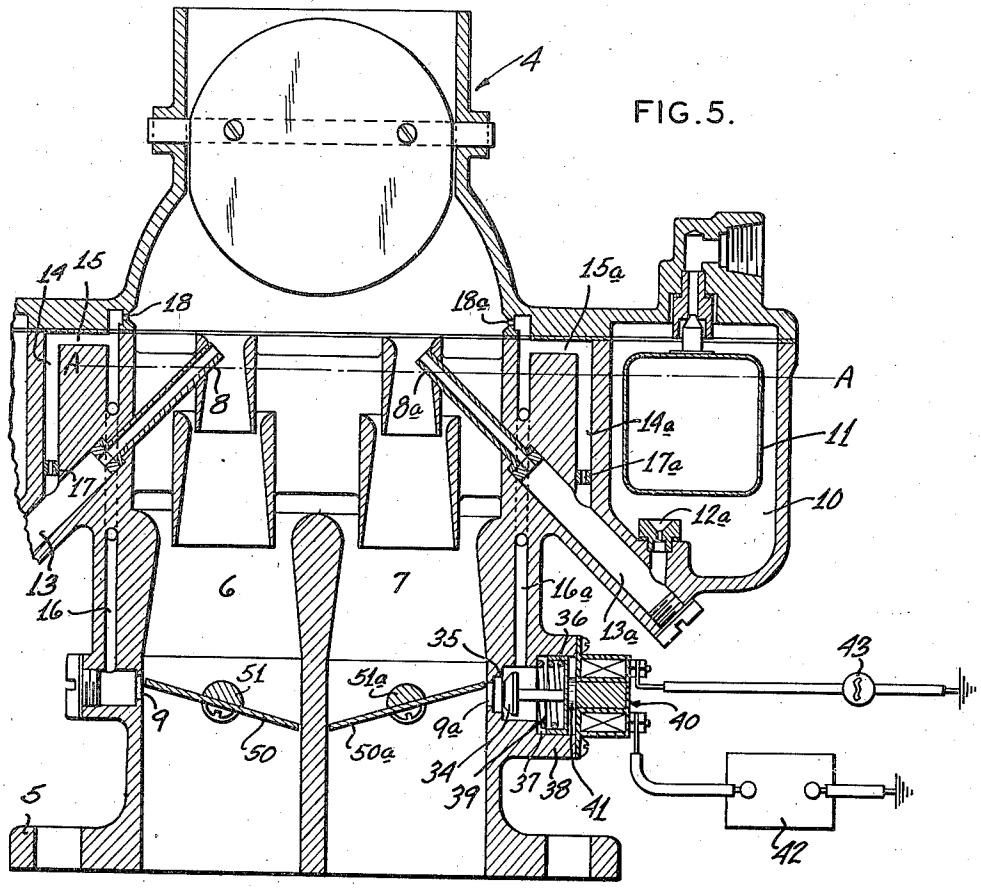


FIG. 3.

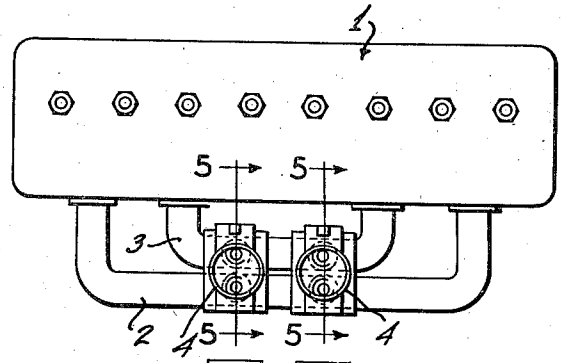
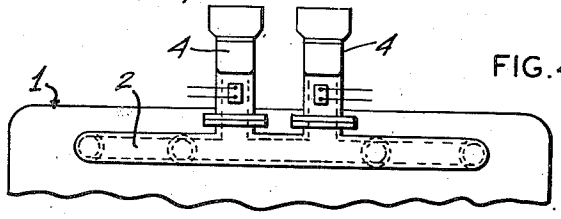


FIG. 4.



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CARBURETOR

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Application December 10, 1940, Serial No. 369,423

7 Claims. (Cl. 123—119)

This invention relates to carburetors for internal combustion engines and more particularly concerns multiple barrelled carburetors or multiple installations.

In installations comprising a plurality of carbureting conduits each capable of supplying idling and high speed mixtures and each controlled by a separate throttle valve, it becomes a difficult matter to adjust this multiplicity of throttle valves to obtain a satisfactory idle. This is particularly true of the commonly used plate type or butterfly throttle valve. The reason for this difficulty will become apparent upon considering that the total of the annular areas around a plurality of plate type valves when cracked open a given amount will be much greater than the annular area around a single valve, controlling a single conduit having the capacity of the total of the smaller conduits, when cracked open the same degree.

It is also customary in induction systems for multicylinder engines to provide separate intake manifolds for separate groups of cylinders and to provide separate carbureting or mixture conduits to supply these separate manifolds.

It is an object of the present invention to provide in combination with an induction system for a multicylinder engine having a plurality of separate intake manifolds supplied by a plurality of separate mixture conduits, means for cutting off the idling fuel supply to some of said mixture conduits.

It is a further object of the present invention to provide an idling fuel cut-off device for use in an arrangement as above which is responsive to intake manifold vacuum.

It is a further object of the present invention to provide an idling fuel cut off device for use in an arrangement as above which is controlled by throttle position.

It is a further object of the present invention to provide an idling fuel cut off devic for use in an arrangement as above which is responsive to intake manifold vacuum and which is arranged to have a snap action between the "on" and "off" positions.

Other objects and advantages will appear upon referring to the following description and accompanying drawings, referring to which—

Fig. 1 is a plan view of a multicylinder engine showing the intake manifolds and carburetor incorporating one form of my invention.

Fig. 2 is a sectional view of the carburetor taken on line 2—2 of Fig. 1.

Fig. 3 is a plan view of a multicylinder engine having an induction system comprising two intake manifolds and an installation of two separate carburetors and incorporating a second form of the present invention.

Fig. 4 is an elevation of the engine shown in Fig. 3.

Fig. 5 is a sectional elevation of one of the carburetors shown in Figs. 3 and 4.

Numeral 1 generally indicates a multicylinder internal combustion engine; in this instance an eight cylinder engine having a pair of intake manifolds 2 and 3. Manifold 2 supplies the two cylinders at each end and manifold 3 supplies the central four cylinders with combustible mixture. At the center of manifolds 2 and 3 is mounted one double barrelled carburetor generally indicated at 4. The carburetor 4 is provided with a suitable flange 5 at its lower end for attachment to the manifolds 2 and 3. The carburetor is provided with two mixture conduits 6 and 7 controlled by separate throttling valves 50 and 50*a*, respectively. Conduit 6 supplies manifold 2 and conduit 7 supplies conduit 3. Mixture conduits 6 and 7 are supplied with fuel for normal and full power and speed operation through the main nozzles 8 and 8*a* and are supplied with fuel for idling operation through the idling ports 9 and 9*a*.

A constant level of fuel for aspiration through these jets is maintained in the constant level chamber 10 as indicated by the dot-dash line A—A by the usual float 11 which acts to control the fuel inlets to these chambers in a manner well known. Fuel is conducted from the fuel chamber 10 to the main nozzles 8 and 8*a* through metering jets 12 and 12*a* and passages 13 and 13*a*, respectively. Fuel is supplied to the idling ports 9 and 9*a* from the passages 13 and 13*a* through the passages 14 and 14*a*, 15 and 15*a*, and 16 and 16*a*, respectively. The idling system posterior to passages 13 and 13*a* further comprise the idling restrictions 17 and 17*a* and the air bleeds 18 and 18*a*, respectively. It will be noted that the main nozzle and idling port for each mixture conduit are commonly fed through jets 12 and 12*a* and passages 13 and 13*a*, respectively. This arrangement, commonly referred to as "interconnected main nozzle and idling jets" has the well known advantage of providing a smooth transfer from the idling fuel supply to the main nozzle supply as the throttle is moved open. It will be seen with the arrangement of ports 9 and 9*a* that the idling system does not cease to discharge immediately as the throttle is moved from the idling position, but continues to discharge to some degree in the throttle range

after the main nozzle has started to discharge and in the usual calibration forms a substantial part of the total fuel at the lower throttle speeds immediately above idling.

In order to reduce the engine idling speed and render the adjustments of the multiple throttling valves less sensitive, I have provided a means for cutting off the idling fuel supply to one of said mixture conduits when the throttling valve is in the so-called "dead idle" position. In the present arrangement I have chosen to cut off the idling supply to mixture conduit 7 which feeds the manifold 2. It will be understood, however, that the idling cut off may be applied to either conduit; the purpose being to starve one group of cylinders to effect a lower idling speed. Further, in the arrangement shown in Figs. 3 and 4 in which two double barrelled carburetors are shown, the idle fuel cut off may be applied to the mixture conduit in more than one carburetor, as to one of the conduits 7 in each carburetor supplying the same manifold.

The method of cutting off the fuel to barrel 7 in the carburetor shown in Fig. 2 comprises a valve 19 adapted to be seated at the upper end of idling passage 14*a*. The valve 19 is attached to the armature 21 of an electromagnet generally indicated at 22. The armature is arranged to be moved downward as the electromagnet is energized thus closing the passage 14*a*. A spring 23 moves the valve to the "open" position as illustrated when the electromagnet circuit is broken. Electrical energy is supplied by a storage battery 24 through a circuit 25, 26, 27, and 28. Included in the circuit is a switch 29 comprising contacts 30 and 31 and the switch blade 32. The switch blade 32 is carried on a lever 33 which is rigidly attached to one end of the rotatable throttle shaft 51*a*. As the throttle is moved to a dead idle position, the blade 32 closes the electromagnetic circuit.

Fig. 5 shows a modification of the idling cut-off device which comprises a valve 34 adapted to be seated on a valve seat 35 in the idling passage immediately anterior to the idling discharge port 9*a*. The valve 34 is attached to a piston 36 which reciprocates in a cylinder 37 formed in a boss 38. The piston 36 is exposed to atmospheric pressure on the right side and to mixture conduit pressure on the left side. A spring 39 within cylinder 37 urges the piston to the right and consequently the valve 34 toward an open position. Mounted on the boss 38 is an electromagnet 40 which forms a stop for the outward movement of piston 36. Piston 36 may either be made of iron or have an iron cap 41, as indicated, so as to be held in the magnetic field. A source of electrical energy for energizing the electromagnet 40 is supplied by a storage battery 42 and a circuit comprising electromagnet 40, battery 42 and a manual switch 43 is provided. The manual switch 43 may be arranged to be operated simultaneously with the engine ignition switch. It is the intention to have the electromagnet 40 energized during all engine operation.

In operation of the device shown in Fig. 2, the lever 33 is moved into position to close the circuit for energizing electromagnet 22 and the valve 19 is, consequently, moved to a closed position thereby cutting off fuel to the idling port of mixture conduit 7. As the velocity passing the nozzle 8*a* is almost nil when the throttle is in idling position it will be seen that the cylinders normally receiving a combustible mixture from conduit 7 will be starved. This will result in a slowing down of the idling speed and the adjustment of the valve 50 and 50*a* will therefore be less sensitive. Also there will obviously be a saving of fuel.

The operation of the device shown in Fig. 5 is as follows:

When the engine is operating and the throttling valves of the carburetor are moved to an idling position, the vacuum in the intake manifold will be comparatively high. This vacuum acting on piston 36 will tend to close the valve 34. Under resistance of the spring 39 only the valve would move gradually toward a closed position as the vacuum increased. This action is undesirable as a lean mixture to some of the cylinders may result in slow firing and popping in the exhaust pipe. With the provision of the electromagnet, however, more or less of a snap action of the valve will result. That is the field of the electromagnet will be overcome suddenly, the field strength decreasing rapidly as the piston is moved away by suction. The electromagnet and associated parts being so calibrated that the piston will be moved therefrom to a valve closing position as the suction in the mixture conduit approaches normal idling suction.

The foregoing description and accompanying drawings are intended to be illustrative and not limiting and the exclusive use of all modifications within the scope of the appended claims is contemplated.

I claim:

1. In a multicylinder internal combustion engine, an induction system comprising a plurality of induction conduits each independently supplying a part of all the engine cylinders, throttle valves for each of said conduits, main and idling fuel passages leading to each of said conduits, and means co-acting with the throttle valve for closing the idling fuel passage to part of said conduits when the throttle valves are moved to a pre-selected idling position.

2. In a carburetor for internal combustion engines, a plurality of mixture conduits, a throttle valve in each of said conduits, an idling port in each of said conduits disposed adjacent the edges of said throttle valves, a fuel supply passage leading to each of said idling ports, and means co-acting with some of said throttle valves for closing the fuel supply passages to their respective conduits when these throttle valves are moved to a predetermined idling position.

3. In a carburetor for internal combustion engines, a plurality of mixture conduits, a throttle valve in each of said conduits, an idling port in each of said conduits disposed adjacent the edge of said throttle valve, a fuel supply passage leading to each of said idling ports, and means responsive to suction in said conduits posterior to said throttle valves for closing part of said fuel passages as the suction approaches that required to hold the engine at a normal idling speeds.

4. In a carburetor for internal combustion engines, a plurality of mixture conduits, a plate-type throttle valve for each of said conduits, a main fuel nozzle for each of said conduits discharging anterior to said throttle valve, an idling port opening into each of said conduits and discharging fuel into said conduits at a point posterior to said throttle valve, fuel passages leading to said idling ports, a valve for controlling one of said fuel passages, means responsive to a predetermined suction for clos-

ing said valve, spring means for moving said valve toward an open position, and an electro-magnet for holding said valve in a wide open position under conditions of less than the predetermined suction.

5. In a multicylinder internal combustion engine, an induction system comprising a plurality of induction conduits each independently supplying a part of all the engine cylinders, throttle valves for each of said conduits, main and idling fuel passages leading to each of said conduits, and means responsive to a predetermined vacuum in said conduits for closing the idling passages to some of said conduits.

6. In a carburetor for internal combustion engines, a plurality of mixture conduits each having a throttle valve, and each having idling and main fuel supply passages leading thereto, a valve for controlling the idling fuel supply passage to one of said conduits, an electro-magnet for holding said valve in an open position, a suction responsive device calibrated to overcome the magnetic field of said magnet at a predetermined vacuum and to move said valve to a closed position, and spring means for moving said valve toward an open position at a lower vacuum.

7. In a carburetor for internal combustion engines, a plurality of mixture conduits, a throttle valve in each of said conduits, a branched fuel passage leading to each of said conduits, one branch of each of said fuel passages discharging anterior to said throttle, the other branch of each of said fuel passages discharging posterior to said throttle, a valve for controlling one of said last-mentioned branches, means responsive to suction posterior to said throttles for moving said valve to a closed position, and an electro-magnet resisting the valve closing action of said suction responsive means up to the vacuum existing at a predetermined idling speed.

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