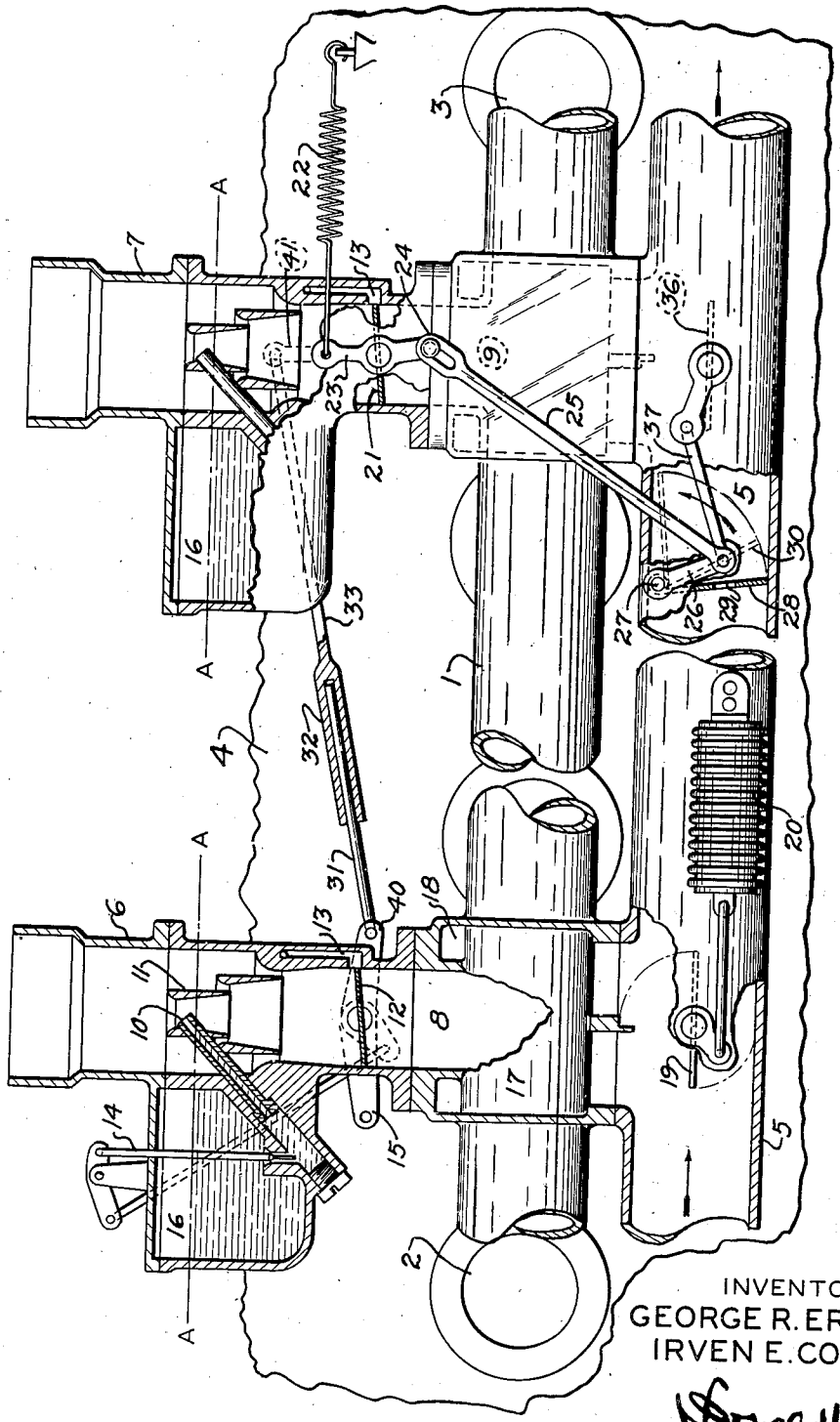
May 12, 1942. G. R. ERICSON ET AL 2,282,311

INTERNAL COMBUSTION ENGINE

Filed Nov. 19, 1940



INVENTORS
GEORGE R. ERICSON
IRVEN E. COFFEY

Donald M. Kirk

ATTORNEY

Patented May 12, 1942

2,282,311

UNITED STATES PATENT OFFICE

2,282,311

INTERNAL COMBUSTION ENGINE

George R. Ericson, Kirkwood, and Irven E. Coffey, Normandy, Mo.

Application November 19, 1940, Serial No. 366,272

7 Claims. (Cl. 123—127)

This invention relates to the control of the fuel mixture supply for internal combustion engines, and is especially applicable to engines of the multi-cylinder type where a plurality of cylinders are to be supplied from a single intake conduit or manifold. The invention may be considered as an improvement in certain respects upon the invention shown in our co-pending application Serial No. 335,590 filed May 16, 1940.

It is a well known fact that considerable difficulty has been experienced in obtaining high power out-put and good fuel economy in the same engine. This difficulty has been to a certain extent overcome by providing two separate carburetors or sources of fuel mixture supply, one of these sources being of comparatively small capacity but providing a sufficient supply for normal and low speed driving and having such small passages as to permit excellent vaporization of fuel, thereby obtaining good fuel economy. The second or auxiliary source of fuel mixture supply is not normally in operation, but is operated only when the maximum amount of power is required.

The chief object of this invention is to provide a new and improved method of control for the auxiliary carburetor in an installation of the general character previously described. Other objects and advantages will appear from the following description and accompanying drawing, which shows a diagrammatic elevation of a double carburetor installation embodying our invention, parts being broken away and others shown in section.

The reference numeral 1 shows an intake manifold constructed and arranged to supply fuel to a plurality of inlet ports 2 and 3 of an internal combustion engine, which is generally indicated as 4. An exhaust pipe 5 conveys the exhaust gases from the engine in the direction shown by the arrows. Main and auxiliary carburetors 6 and 7 respectively are connected to separated inlet ports 8 and 9. The general structure of these carburetors is not shown in detail but it is to be understood that all features found in modern carburetors, such as automatic chokes, independent idles, fuel pick up and step up devices etc., may be embodied. A more complete showing of some of these details may be found in Patents 1,967,708, 2,085,351, 2,147,019 and 2,174,313. For simplicity of construction however we prefer to use the automatic choke and the fuel pick up and step up devices on the main carburetor only, as the auxiliary carburetor comes into operation only at high speeds when the importance of these devices is greatly reduced.

The primary carburetor is provided with the usual main nozzle 10, venturi stack 11 and throttle 12. The idle passage 13 is connected to the wall of the mixing conduit at the edge of the throttle and a step up device or metering rod 14 is connected to the throttle valve, so that when the throttle is opened the fuel supply will be increased. It will be understood that the throttle valve is normally held in closed or idle position by a spring (not shown), and a conventional manual operating level 15 is provided. The fuel is normally maintained at the level AA, in the float chamber 16. The automatic choke and other details are not shown herein but may be found in the above mentioned patents.

At the outlet of the main or primary carburetor 6 a hot spot 17 is formed on the intake manifold by bringing the exhaust gases up and around in a well known manner through the passage 18. The volume of flow through these passages is controlled by the valve 19 which is operated by the thermostatic gas filled bellows 20.

The second carburetor is provided with a float chamber 16 corresponding to the float chamber 16 of the main carburetor. An idle passage 13 also corresponds to the idle passage 13 in the main carburetor. The secondary carburetor is preferably not provided with any choke valve, fuel pick up or fuel step up, and the throttle valve 21 is not manually operable. The secondary throttle 21 is normally held in closed position by spring 22 attached to the throttle lever 23 which is connected by means of the lost motion connection 24 and link 25 to the lever 26 which is mounted on a shaft 27 carrying the flap valve 28. This flap valve is provided with a by pass port 29 and is also mounted rather loosely in the exhaust passage 5 to avoid possibility of the valve sticking in open position. It may be noted however that even if the valve 29 should become stuck in a partially open position such as indicated by the dotted line position 30, the auxiliary throttle 21 may still fully close on account of the lost motion provided by the slot in the upper end of the link 25.

In order to insure the closing of the auxiliary throttle ahead of the closing of the main throttle, the main throttle shaft is provided with a lever 40 which is connected to an auxiliary throttle lever 41 by a one way connection 31—32—33. This connection cannot open the auxiliary throttle but may close it if the spring 22 fails to do so. The lever 40 goes slightly over dead center just

before the main throttle reaches the idle or closed position, so as to insure the closing of the auxiliary throttle actually before the complete closing of the main throttle.

A heat control valve **36** is provided to control the supply of heat to the auxiliary carburetor. This valve is connected to the valve **28** by the link **37**, so that heat is supplied to the outlet of the auxiliary carburetor only when it is in operation.

In operation the normal supply of fuel is delivered to the engine by manual control of the primary carburetor **6**, but when the engine is operated at high speeds the flow of exhaust gas past the valve **28** becomes so great as to force this valve toward open position, and when the lost motion in the slotted link **25** has been taken up, further increase of the flow of exhaust gas causes the secondary throttle **21** to be opened against the tension of the spring **22**. As this valve is moved toward open position, the lever **23** swings downwardly in an arc about the throttle shaft and the pressure required to hold the flap valve **28** in open position is less than that which is required to originally open the valve, thus once the auxiliary throttle has been opened, it is held in that position with comparative ease, and there is no substantial restriction of the flow of exhaust gases by the valve **28**. However there is still sufficient tendency of the spring **22** to close the valve as soon as the volume of the exhaust gases is reduced by the closing of the valve **12**, so that no matter how suddenly the operator closes the valve **12**, the auxiliary valve **21** will also close at least as quickly. This action is made more positive by the lost motion connection **31—32—33** which mechanically prevents the auxiliary valve **21** remaining in open position when the main throttle **12** is closed, the connection being so arranged as to permit the main throttle to open without opening the auxiliary throttle but to prevent the auxiliary throttle being more fully open than the main throttle.

We claim:

1. In an internal combustion engine, an intake manifold, a plurality of mixture supply devices connected to said manifold, a manually operated throttle for one of said mixture supply devices, an auxiliary throttle for the other of said mixture supply devices, an exhaust conduit and means operated by the flow of exhaust gas through said exhaust conduit for controlling said auxiliary throttle.

2. In an internal combustion engine, means forming a main mixing conduit, means forming an auxiliary mixing conduit, manual means for controlling said main mixing conduit, and means operated by the exhaust gas of the engine for controlling said auxiliary mixing conduit.

3. In a power plant installation, a main carburetor, an auxiliary carburetor, main and auxiliary throttle valves for said carburetors, separate means for opening said throttle valves, and means positively operated by the main throttle for preventing the opening of said auxiliary throttle in advance of the opening of said main throttle.

4. In a power plant installation, main and auxiliary fuel supply devices having main and auxiliary throttles respectively, manual control means for said main throttle, means depenedent on the operation of said power plant at a predetermined capacity for opening said auxiliary throttle, and means positively operated by the main throttle for preventing the auxiliary throttle from opening in advance of the main throttle.

5. In an internal combustion engine, a manifold, a pair of mixture heating devices, a heat responsive device for controlling the action of one of said heating devices, and means dependent on the operation of the engine at a predetermined capacity for controlling the other heat control device.

6. In an internal combustion engine, an intake manifold, an exhaust manifold, a pair of inlets for said inlet manifold, manual means for controlling one of said inlets, and means dependent on the flow of exhaust gases for controlling the other inlet.

7. In an internal combustion engine, a manifold, a pair of mixture supply devices, a throttle for each of said mixture supply devices, a pair of mixture heating devices, a heat responsive device for controlling the action of one of said mixture heating devices, and means connected to one of said throttles for controlling the other of said mixture heating devices.

GEORGE R. ERICSON.
IRVEN E. COFFEY.