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BY A. P. C. Filed Aug. 11, 1938

Fig. 1.

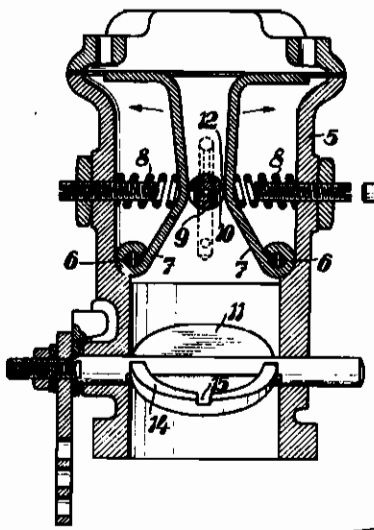


Fig. 2.

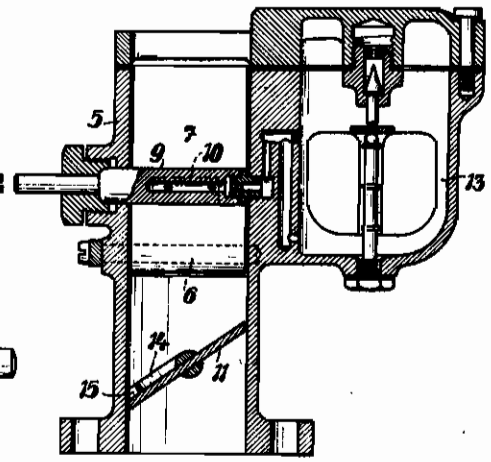


Fig. 3.

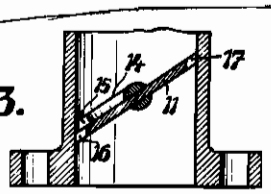
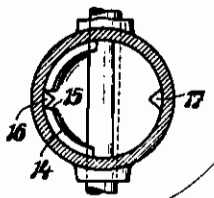


Fig. 4.



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ALIEN PROPERTY CUSTODIAN

CARBURETTORS FOR INTERNAL COMBUSTION ENGINES

Alexander Abramson, Prague, Czechoslovakia; vested in the Alien Property Custodian

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This invention relates to carburettors for internal combustion engines of the kind having a mixing cross-section varying automatically in accordance with the quantity of air sucked in.

It is required of carburettors of the kind referred to that no fuel should issue through the atomising nozzle, arranged in the mixing chamber of the carburettor, during starting or periods of idle running of the engine. For starting and during idle running of the engine, fuel is supplied to the induction pipe from a separate starting or idle running nozzle. This arrangement has the disadvantage that when the throttle valve is suddenly opened the atomising nozzle, arranged in the mixing chamber of the carburettor does not begin immediately to operate since the fuel column must first be set in motion by the difference in pressure between the mixing chamber of the carburettor and the fuel container. Up to this time, however, so much air comes into the induction pipe of the engine that the fuel issuing from the starting nozzle which is still operating cannot form an ignitable mixture with it. Accelerating pumps have, therefore, been used, which cut out this critical phase in the operation of the engine by injecting the necessary quantity of fuel.

A further disadvantage is that on shutting off the engine the throttle valve retains its predetermined position in the induction pipe for starting or for idle running. Pressure equalisation between the spaces above and below the throttle valve can only take place, after some time has elapsed through the very narrow crescent-shaped slit then existing between the edge of the throttle valve and the wall of the induction pipe. During this time the relatively cooler air flows past the atomising nozzle through the mixing chamber into the induction pipe, thus continuously causing fuel to issue from the starting nozzle.

The object of the present invention is to overcome these disadvantages. In carburettors having a mixing cross-section varying automatically according to the quantity of air sucked in, it is known to provide in the mixing chamber of quadrangular cross-section a pivoted blade on each side of the transversely disposed atomising nozzle. These blades are provided for the exclusive purpose of opening out when the engine is loaded by the incoming air so as to be spaced more or less apart from the atomising nozzle in order to obtain in this way pressure conditions in the neighbourhood of the atomizing nozzle and in the mixing chamber which lead the desired predetermined quantity of fuel to the air.

According to the present invention the pivoted blades are used for a further purpose. In a carburettor according to the invention the starting or idle running nozzle is no longer used and in the neighbourhood of the atomising nozzle a flow cross-section for the air is obtained so that in the starting or idle running position of the carburettor throttle valve the drop in pressure prevailing in the mixing space permits the air to flow through the mixing space to such an extent that the fuel emerges from the atomising nozzle in a quantity which corresponds to the formation of a mixture ensuring starting or idle running. In this way on starting or during idle running the fuel will be found flowing in the ducts of the carburettor leading to the atomising nozzle, so that during transition of the engine operation to load and also to sudden maximum load the fuel emerges immediately in a requisite quantity from the atomising nozzle. Constructed devices which are provided according to the invention on the throttle valve of the carburettor serve in this connection for ensuring the formation of a complete starting or idle running mixture of fuel and air.

The invention also provides measures in order on shutting off the engine to effect as quickly as possible pressure equalisation in the spaces above and below the throttle valve and therewith to prevent the continued emergence of fuel under the action of inertia from the atomising nozzle. These measures consist therein that the throttle valve in the position in which it is adjusted obliquely to the axis of the induction pipe for starting and idle running is disposed adjacent to two edge recesses, replacing the previous crescent-shaped slits between the edge of the throttle valve and the wall of the induction pipe, or adjacent to recesses arranged in the wall of the induction pipe. Since these recesses are arranged at the highest and lowest positions of the obliquely disposed throttle valve, they determine at the same time the flow passages for far the greater part of the fluid flowing in a corresponding direction at the times indicated (starting and idle running or shutting off the engine), so that on the one hand the starting and idle running phase of the engine is favourably influenced, and on the other hand the most rapid equalisation in pressure in the spaces above and below the throttle valve is obtained on shutting off the engine.

The accompanying drawing illustrates constructional examples of the invention applied to a down draught carburettor.

Figs. 1 and 2 are vertical sections in two mu-

tually perpendicular planes of one constructional form, and

Figs. 3 and 4 illustrate separately a constructional form of throttle valve and its arrangement in the induction pipe in section and plan.

The down draught carburettor shown in the drawings is constructed on the principle that its mixing cross-section varies automatically according to the quantity of air sucked in. Accordingly, in the mixing chamber 5 of the carburettor, the blades 7 are pivoted around pins 6 which are pressed by springs 8 each one to one side of the transversely disposed atomising nozzle 9. On opening the throttle valve the air flowing against the blades 7 produces a movement of the blades away from the atomising nozzle, so that the flow cross-section through the mixing chamber varies in accordance with the air sucked in.

According to the invention the blades 7 with wide cut-out portions 10 of the atomising nozzle 9 determine in the starting or idle running position of the throttle valve 11 such a flow cross-section 12 for the starting or idle running phase of the engine, to be denoted as invariable, that the air flowing through it causes the proper quantity of fuel to issue from the atomising nozzle to form the starting or idle running mixture. The arrangement of a separate starting or idle running nozzle thus becomes superfluous. The fuel is thus, on starting or during idle running of the engine, in movement in the ducts leading from the float chamber 13 into the atomising nozzle, so that a transition from idle running to loading of the engine is effected without disturbance even in the case of sudden maximum loading.

The following arrangement is adopted for forming the inlet of air and fuel in the space below the throttle valve similarly to a nozzle, in order to obtain favourable conditions for the formation of the starting or idle running mixture.

The throttle valve 11 has on its periphery facing the engine a rib 14 projecting beyond the outer surface of the throttle valve, the rib having a through aperture 15. The device serves to guide the air striking the throttle valve in its starting or idle running position, and the fuel dropping out of the atomising nozzle 9, along the rib 14 against the aperture 15, operating in a nozzle-like manner, from which fuel and air emerges in a well mixed state.

In order to support this operation in the starting or idle running position of the throttle valve, according to the constructional examples illustrated in Figs. 3 and 4, the communication between the spaces above and below the throttle valve is produced merely by the edge recesses 16 and 17. The remaining periphery of the obliquely disposed throttle valve abuts against the wall of the induction pipe. The recess 16 is disposed below the aperture 15 in the rib 14 and the recess 17 is disposed diametrically opposite the recess 16. All fluid (air and fuel) which strikes on the upper surface of the throttle valve is directed along this surface of the throttle valve and along the rib 14 towards the recess 16. Much the greater part of the air which, on shutting off the engine, strives in consequence of the super-pressure prevailing in the induction pipe, to reach the space above the throttle valve, passes through the recess 17. Equalisation of the pressures in the spaces above and below the throttle valve takes place therefore considerably more rapidly than in the presence of the known crescent-like slits between throttle valve and wall of the induction pipe, (frictional resistance opposing the flow), which has for consequence an immediate interruption in the emergence of the fuel from the atomising nozzle on shutting off the engine.

The recesses 16, 17 can also have a variable flow cross-section, which can be obtained, for example, by the arrangement of adjustable slides on the throttle valve. Recesses corresponding to the recesses 16, 17 can also be arranged in the wall of the induction pipe.

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