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M. L. MENNESSON
CARBURATION DEVICES FOR INTERNAL COMBUSTION ENGINES
Filed Jan. 9, 1940

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2 Sheets—Sheet 1

Fig. 1.

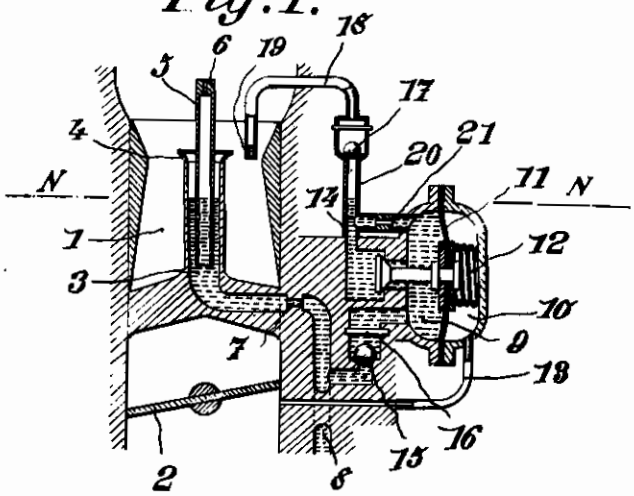

Fig. 2

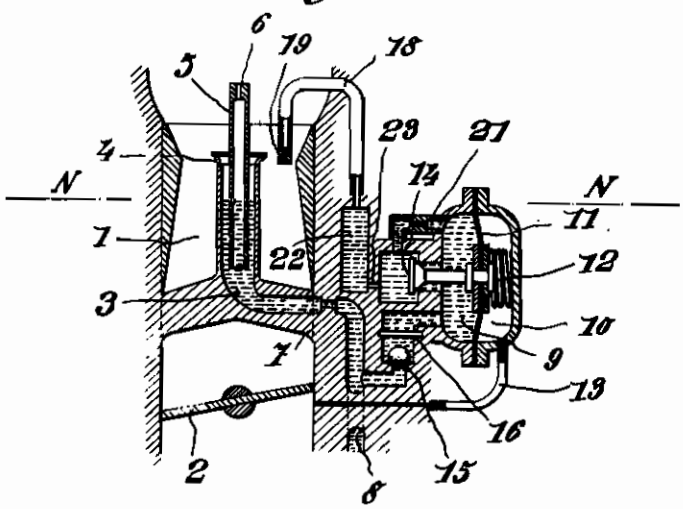

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Fig. 3

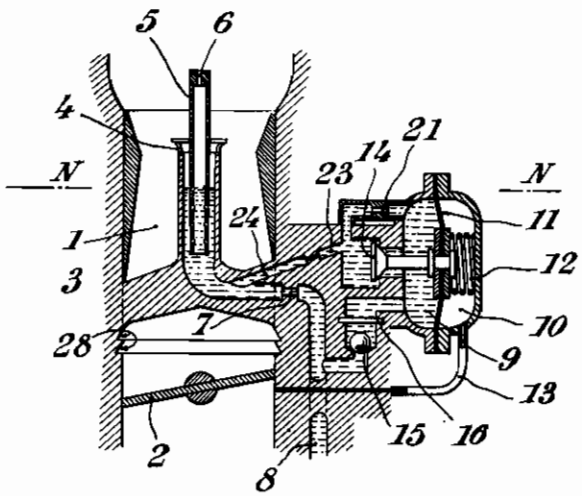
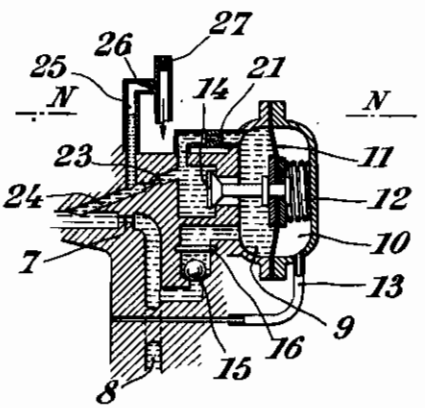


Fig. 4



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ALIEN PROPERTY CUSTODIAN

CARBURATION DEVICES FOR INTERNAL COMBUSTION ENGINES

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Application filed January 9, 1940

This invention relates to carburation devices for internal combustion engines and more particularly to such devices comprising a carburettor and an enrichment and pick-up means, which latter is adapted to come into action automatically as a function of the suction prevailing in the intake pipe, more especially downstream of the throttle valve for the introduction of additional fuel into the said pipe during the pick-up period and the increase of the proportion of fuel when the pressure prevailing in the pipe exceeds a certain value, and has for its principal object so to make such devices that their operation is rendered more rational and, in a general manner, that they respond, better then hitherto, to the various desiderata of practice.

In accordance with the main feature of the invention, a permanent and calibrated communication is established between the source of fuel supply for the enrichment and pick-up means and the conduit by which this fuel is delivered to the intake pipe of the engine.

As a further feature the invention consists in so constituting the enrichment and pick-up means that the delivery valve (which previously has been proposed to be utilised therewith) can be omitted, by providing in the delivery conduit of these means a chamber which is located, by preference, below the constant level of the carburettor and which is made to communicate with the said means by at least one calibrated orifice.

As a still further feature the invention consists in making the delivery conduit of the enrichment and pick-up means open into the principal nozzle system so that the impulse given to the supplementary fuel at the time of the pick-up tends to increase the delivery from the calibrated device of the principal nozzle.

According to another feature, the invention consists in making the delivery conduit of the enrichment and pick-up means communicate with the principal nozzle system so that the additional fuel can also be introduced by the conduit termed "slow-running" into the intake pipe of the engine.

Yet another feature of the invention consists in disposing in the walls of the body of the carburettor, upstream of the throttle, grooves adapted to prevent the flow of the fuel along the walls of the said body towards the intake pipe of the engine.

In order that the invention may be better understood, it will now be described with reference to the accompanying drawings, which are given by way of example and in which:

Fig. 1 shows, in diagrammatic vertical section, a carburettor provided with an enrichment and pick-up device opening by a distinct orifice into the venturi of the carburettor, this device being constructed according to the invention.

Fig. 2 shows, similarly, a similar device but which is so arranged, according to the invention, that its delivery valve can be omitted.

Fig. 3 shows, similarly, a similar device but which opens into the principal nozzle system of the carburettor.

Fig. 4 shows, similarly, a modification of the device shown in Fig. 3.

According to the drawings, the carburettor proper is constituted in any suitable manner and for example as shown diagrammatically in Fig. 1, by a body 1, a regulating or throttle valve 2, a principal spraying well 3 which discharges into the venturi by apertures 4. Into this well there dips axially a perforated tube 5, terminated by a calibrated orifice 6. In this well there is also provided a calibrated orifice 7 which limits the delivery of fuel flowing towards the principal nozzle system. This calibrated orifice 7 communicates by a conduit 8 with the constant level chamber or any other feeding device adapted to replace this constant level (none of these devices, which are well known, has, however, been shown on the drawings). The conduit 8 also feeds a chamber 9 separated from a chamber 10 by a diaphragm 11. This diaphragm is subjected to two contrary influences, that of a spring 12 which tends to displace it towards the left of each of the Figs. 1 to 4 and that of the suction prevailing downstream of the regulating valve 2 and which acts in the chamber 10 through the conduit 13 by having a tendency to displace the diaphragm 11 towards the right.

To this diaphragm 11, which can be simple or multiple, is connected a valve 14 which rests on its seating when the diaphragm is drawn towards the right. This valve interrupts the communication between the chamber 9 and a delivery conduit 20 for fuel, this conduit serving as the housing for a ball valve 17 and communicating by the conduit 18 and the calibrated orifice 19, with the venturi of the carburettor. In the suction conduit is located a ball 15 and a stop 16 for example a pin, adapted to limit the movement of this ball.

The chamber 9 and the delivery conduit 20 communicate directly and permanently by a calibrated orifice 21.

The operation of the device thus constituted is the following. When the suction falls below a certain value for which the feed of the engine requires a desired enrichment, either for the pick-up period or for running at heavy loads, the diaphragm 11 is displaced towards the left, the action of the spring 12 then becoming preponderant over the action of the suction. When the diaphragm is displaced, the quantity of fuel contained in the chamber 9 is entirely delivered to the calibrated orifice 19. When its position is stabilised towards the left of Fig. 1, the valve

14 permits the direct passage, by the raising of the two balls 15 and 17, of the fuel from the conduit 8 up to the venturi of the carburettor. This supplementary feeding is assured by the suction which exists in the venturi of the carburettor opposite the orifice 19. The enrichment and pick-up delivery is then determined by the dimension of the calibrated orifice 19 and it is found that in order to assure a good operation during these enrichment and pick-up periods, the section of this orifice 19 must be relatively large.

In consequence, the volume of fuel, delivered at heavy loads of the engine, is determined by the section of the calibrated orifices 7 and 19. When the load is reduced, which necessitates a partial closing of the regulating valve 2, the action of the suction becomes preponderant over that of the spring 12, the diaphragm 11 moves towards the right and the valve 14 obturates the direct communication between the chamber 9 and the delivery conduit 20.

At this moment, if calibrating device 7 alone delivered fuel, the quantity delivered would be insufficient and the mixture would be too poor.

It therefore is necessary for the orifice 19 to deliver, under the action of the suction which prevails in the venturi, to obtain a suitable richness in the case where the regulating valve 2 is partially closed. For this reason there is provided the calibrated orifice 21 for making the chamber 9 and the delivery conduit 20 communicate directly. Consequently, at the partial openings of the valve 2, the delivery of the fuel is determined by the calibrated orifices 7 and 21, whilst at heavy loads and at pick-up periods the delivery is determined by the calibrated orifices 7 and 19. This arrangement, to give the best results, permits the choice of the best values for the orifices 19 and 21 to adapt them to the pick-up and enrichment periods and to the periods of normal utilisation.

Fig. 2 shows a similar device but which is so arranged that the ball or the valve 17 located in the delivery conduit 20 can be omitted. To this end there is made to intervene a chamber 22 situated, preferably, below the constant level N—N of the carburettor and communicating with the venturi, for example by a conduit 19 and an orifice 19. This chamber 22 communicates with the pick-up device downstream of the valve 14 by a calibrated orifice 23. At the moment when the spring 12 expands, producing the injection of fuel, the ball or the valve 15 located in the suction conduit is applied on its seating and the fuel contained in the chamber 9 is sent through the chamber 22 and the conduit 19 into the venturi of the carburettor.

On the contrary, when under the action of the suction the diaphragm 11 moves towards the right, a double suction takes place; on the one hand, the ball or the valve 15 rises to allow the passage of the fuel contained in the conduit 8 and, on the other hand, the fuel contained in the conduit 18 and the chamber 22 is re-aspired by the movement of the diaphragm.

The calibrated orifice 23 allows the reduction of this suction and the volume of the chamber 22 is such that the diaphragm 11 has completely resumed its position before the fuel contained in this chamber is aspired, so that, in no case air can enter the chamber 9.

Moreover, as in Fig. 1, the chamber 9 constantly communicates directly through the calibrated orifice 21 with the delivery conduit 18 so, that, as soon as the pump has terminated its movement, the constant level N—N is re-established in the chamber 22 which always has a certain volume of fuel which prevents, in all cases, the pump being able to take up air through the delivery conduit 18. The function of this calibrated orifice 21 is exactly the same is in the case of the device shown in Fig. 1.

Fig. 3 shows a device similar to that of Fig. 2, but in which the delivery takes place through a conduit 24 into the principal nozzle system of the carburettor, downstream of the calibrated orifice 7. In this case the calibrated orifice 23 is located in the conduit 24 which connects the diaphragm pump and the nozzle system. The chamber 22, situated below the constant level N—N, is constituted by the well 3 of the principal nozzle system. The operation of the pump and the function of the calibrated orifice 21 obviously remain the same as these indicated above.

In Fig. 3 there have also been shown grooves 28 which are provided in the interior surface of the body 1 of the carburettor, downstream of the regulating or throttle valve. These grooves have the following function. When the ignition circuit of the engine is interrupted for example, whilst the valve 2 is closed, the suction prevailing in the conduit 13 suddenly falls to a very low value, the spring 18 expands and a certain quantity of fuel is delivered towards the intake pipe of the engine, which causes the local level in the well 3 to rise, with the risk that the fuel will overflow through the apertures 4. This fuel is, however, delivered without violence and flows along the walls of the body 1 finally to attain the intake pipe and the engine, which interferes with the re-starting of this latter. By the provision of these grooves 28, the delivered fuel is retained by these latter and does not descend as long as the engine is stopped. If the engine is re-started and if the throttle valve 2 is opened, the current of air produced carries along the fuel which is retained in these grooves towards the engine.

It is also seen in Fig. 3 that the conduit 24 is slightly inclined with respect to the horizontal. This has for its object to produce at the position of the outlet of the conduit 24 into the feed system of the principal nozzle, a rather considerable current of liquid which augments the delivery of the calibrating device 7 and, in consequence, facilitates its priming, which is generally rather difficult from the fact that, at the moment of the fuel injection, only very little suction is available opposite the apertures 4.

Fig. 4 shows the same device as that of Fig. 3 but for which a conduit 25 permits some fuel being taken from the conduit 24, to be sent through the calibrating device 26 from which it is drawn by the current of air aspired through the orifice 27. The emulsion of fuel thus formed serves to feed the "idling" and opens into the intake pipe.

The advantage of this device is that the injection of fuel, produced by the pump, gives rise not only to an increase of delivery of the calibrating device but also allows a certain quantity of this fuel to be discharged by the conduit 25 and the calibrated orifice 28, in order to arrive with rapidity into the intake pipe of the engine.

The invention is not limited to the precise forms or details of construction described, as these may be varied to suit particular cases.

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