Jan. 12, 1932. R. M. DILWORTH 1,840,570

HYDROCARBON MOTOR

Filed June 6, 1928

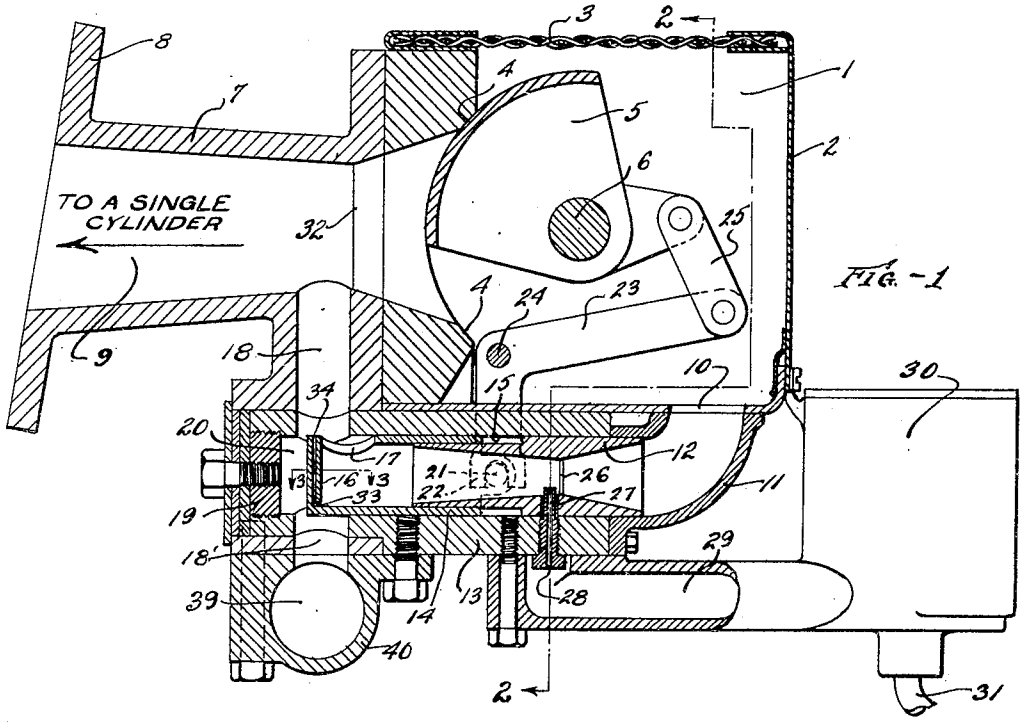

FIG. -1

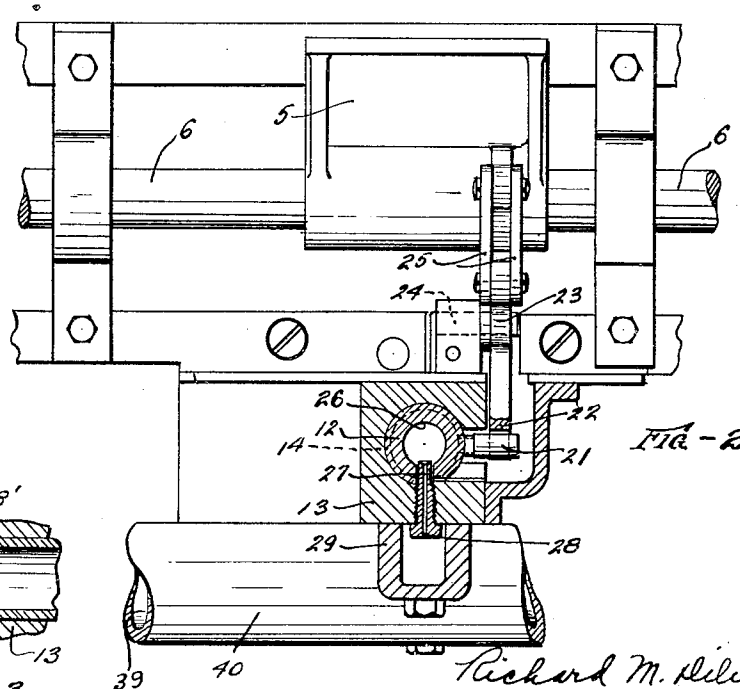

FIG. -2

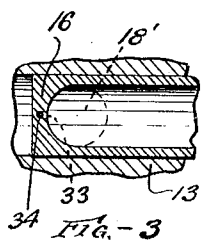

FIG. -3

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UNITED STATES PATENT OFFICE

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HYDROCARBON MOTOR

Application filed June 6, 1928. Serial No. 283,173.

This invention relates to hydrocarbon motors and more particularly to carburetion devices therefor adapted for use one in connection with each engine cylinder to supply fuel mixture thereto.

Where low grade hydrocarbons are employed as fuel, as is contemplated in this invention, a high inlet velocity is imperative to prevent fuel precipitation, and to this end it is customary to employ the shortest possible passage between the carburetion device and the engine cylinder, and to provide a separate carburetion device for each cylinder so that a maximum carburetion velocity will be attained during the suction stroke of each cylinder piston.

Where such an arrangement is provided the air stream is accelerated very rapidly indeed during the piston suction stroke although, of course, the air velocity will always lag somewhat behind that of the piston. The principle of the carburetion device being to pick up by this air stream the liquid fuel as from a nozzle laterally extending into an air passage therein, it will be apparent that the higher specific gravity of the liquid will result in a very considerable lag of the liquid with respect to the air.

What is more important is that the sudden closing of the engine cylinder inlet valve, bringing the air in the passage to a substantial standstill, results in a spewing over of the liquid from the nozzle into the air passage due to the inertia of the liquid set up during the immediately preceding suction stroke. The consequence is that ordinarily this liquid will be carried over into the cylinder during the next succeeding suction stroke, work down the cylinder walls past the piston and into the engine crank case, diluting the lubricating oil therein with the well-known disastrous consequences.

It is the ultimate object of my invention to eliminate this possibility of such so-called crank case dilution. To this end I have devised means of collecting in the fuel mixture passage liquid fuel leaving the fuel nozzle during portions of the cycle in which this liquid can not be entrained by the air flow; and further I have devised means for returning fuel thus collected, into the air stream during the next succeeding period of air flow; the net result being that not only is liquid fuel collected when it is super abundant, and thus prevented from entering the engine cylinder as such, but during the initial portion of each suction stroke, where the tendency of the liquid to lag behind the air is greatest, my device has in substance a double means of introducing liquid into the air stream, one the nozzle above referred to and the other the means provided for introducing the excess liquid collected as described.

The exact nature of the invention together with further objects and advantages thereof will be apparent from the following description taken in connection with the accompanying drawings in which Fig. 1 is an elevation view, largely in section, showing a construction of carburetion device in which my invention is incorporated; Fig. 2 is a transverse section of the same but with the air chest wall removed, as in the planes indicated by line 2—2, Fig. 1; and Fig. 3 is a detail plan view of the valve pick-up device employed, as in the plane of line 3—3, Fig. 1.

With reference now to the drawings the carburetion device shown is provided with an air chest or compartment 1 having a removable side wall 2 but open at its upper end to the atmosphere through a screen 3 carried by the wall, the chest having a seat 4 for a valve 5 mounted upon a shaft 6 which may extend beyond the chest 1 in either direction and carry similar valves of corresponding devices and have connection with a governor or control handle; it being understood that one such carburetion device is provided for each engine cylinder. Secured with the chest is a casting 7 adapted as by flange 8 for connection directly with the engine and having a passage 9 adapted for communication with the engine inlet valve port when such connection is made. The chest has also a downward opening 10 communicating with an elbow 11 through which air may pass from the chest to a sleeve member 12 fitted in a casting 13 properly secured as a unit with the casting 7 and other parts

shown. The member 12 is turned down upon its forward portion to clear a generally cylindrical valve 14 slidable in the bore 15 of the member 13 in which the member 12 is fitted.

The valve 14 is closed at its end by a wall 16 but has an opening 17 leading upwardly and adapted to register with the lower end of a passage 18 leading in the casting 7 into the passage 9. The end of the bore 15 is closed as by a plug 19 but a clearance pocket 20 is allowed sufficient to receive the end wall 16 of the valve in its wide open position, that is, when the opening 17 is aligned with the passage 18.

The passage 18 extends downwardly beyond the bore 15 as at 18' and communicates with the transverse passage 39 in the manifold 40. This manifold has similar connection with the carburetion devices of the several remaining engine cylinders and also has communication with a starting carbureting device arranged to supply to the engine a starting mixture of higher grade fuel than that employed under ordinary running conditions. Otherwise this manifold has no connection with this invention.

The valve 14 carries a laterally extending stud 21 engaged by the forked end 22 of a bell crank lever 23 mounted upon a fixed pin 24. The opposite end of the bell crank lever has connection as by a pair of links 25, with the valve 5, the arrangement being such that the valves 5 and 14 open and close together.

The through opening in the sleeve 12 is tapered down as indicated to a restricted throat portion 26 into which projects a nozzle 27 having a bore 28 communicating by way of the tube 29 with the float chamber 30 having the usual float, not shown, associated with a needle valve and having a fuel supply connection as at 31, whereby liquid fuel is maintained in the nozzle 27 to the proper predetermined level to be picked up from the nozzle by the air stream through the throat 26.

The passage 9 also converges to a throat portion 32 into which throat portion the passage 18 opens. By the arrangement described it will be apparent that when the valve 14 is at its extreme right position, Fig. 1, the valve 5 will be closed and admission to the engine cylinder will be solely from the manifold 40. This then is the starting or idling position of the parts.

The drawings show the parts in mid-running position and it will be apparent therefrom that air will be induced during the suction stroke of the piston by way of the opening 10, elbow 11, throat 26 of the sleeve 12, valve 14, passage 18 to the passage 9 at the throat 32 thereof. As the air passes the throat 26 fuel is picked up from the nozzle 27, and the parts are so proportioned that an overly rich mixture will thus be produced. At the same time, however, air is flowing from the chest 1 past the valve 5 and through the passage 9. Thus the overly rich mixture delivered by the passage 18 is thinned out by the additional air and a proper running mixture is delivered to the cylinder of the engine.

According to my invention I provide in the end wall 16 of the valve 14 a short lead 33 from the valve corner formed by the end and bottom portions thereof, the lead 33 communicating with a vertical lead 34 opening upwardly as shown. When the valve is in open position with the wall 16 thereof seating in the pocket 20, a passage with continuously smooth walls is formed between the sleeve 12 and the throat 32, this passage having a sharp right angle bend upwards in such position of the valve 14, and the valve 5 is wide open; and the engine is consequently working to full capacity on fuel supplied through the connection 31. Under such conditions the velocity through the passage described is so great that the corner in the valve at the bend thereof will be effectively scoured and free from liquid fuel.

When the parts are in the position illustrated, however, the velocity through this passage is much reduced, and after each period of maximum velocity, that is, following each piston suction stroke, a certain amount of liquid fuel will, due to its inertia set up during the suction stroke, overflow the nozzle 27 and gradually work down into the corner in the valve adjacent the opening of the lead 33. Such liquid will, however, when the valve is in the position shown, owing to the pressure drop between the interior of the valve 14 and the passage 18, be caused to rise in the lead 34 and be picked up and entrained in air flowing through the passage 18 upon the next succeeding piston suction stroke. Thus effectively under partially throttle conditions fuel is introduced into the air stream at two points, by way of the nozzle 27 and by way of the end wall 16 of the valve 14.

I claim:

1. In a carburetion device adapted to supply fuel mixture subject to periodic suction and having a passage arranged for air flow dependent upon said suction, a nozzle arranged to introduce fuel into said air stream, said passage having a bend, a valve means movable in said passage between said bend and said nozzle and having a portion adapted to collect fuel flowing from said nozzle following suction periods, said valve means having a lead from said portion thereof and directed into said passage beyond said bend thereof whereby said collected fuel will be introduced into said air stream during succeeding suction periods.

2. In a carburetion device adapted to supply fuel mixture subject to periodic suction and having a passage arranged for air flow

dependent upon said suction, a nozzle arranged to introduce fuel into said air stream, said passage having a bend and a pocket, a valve slidable in said passage between said bend and said nozzle and having a corner adapted to collect fuel flowing from said nozzle following suction periods, said valve having a lead from said corner thereof and directed into said passage beyond said bend thereof whereby said collected fuel will be introduced into said air stream during suction periods, said pocket being adapted to receive that portion of said valve containing said lead in wide-open valve position, and said valve being adapted in said position to complete the conformation of said passage walls whereby a bent passage with continuous walls is formed.

In testimony whereof I hereby affix my signature.

RICHARD M. DILWORTH.