March 10, 1925.

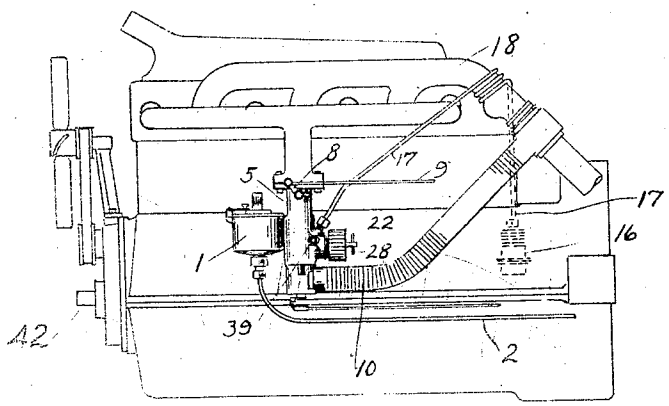
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P. J. COLEMAN

CARBURETOR

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Fig. 1.



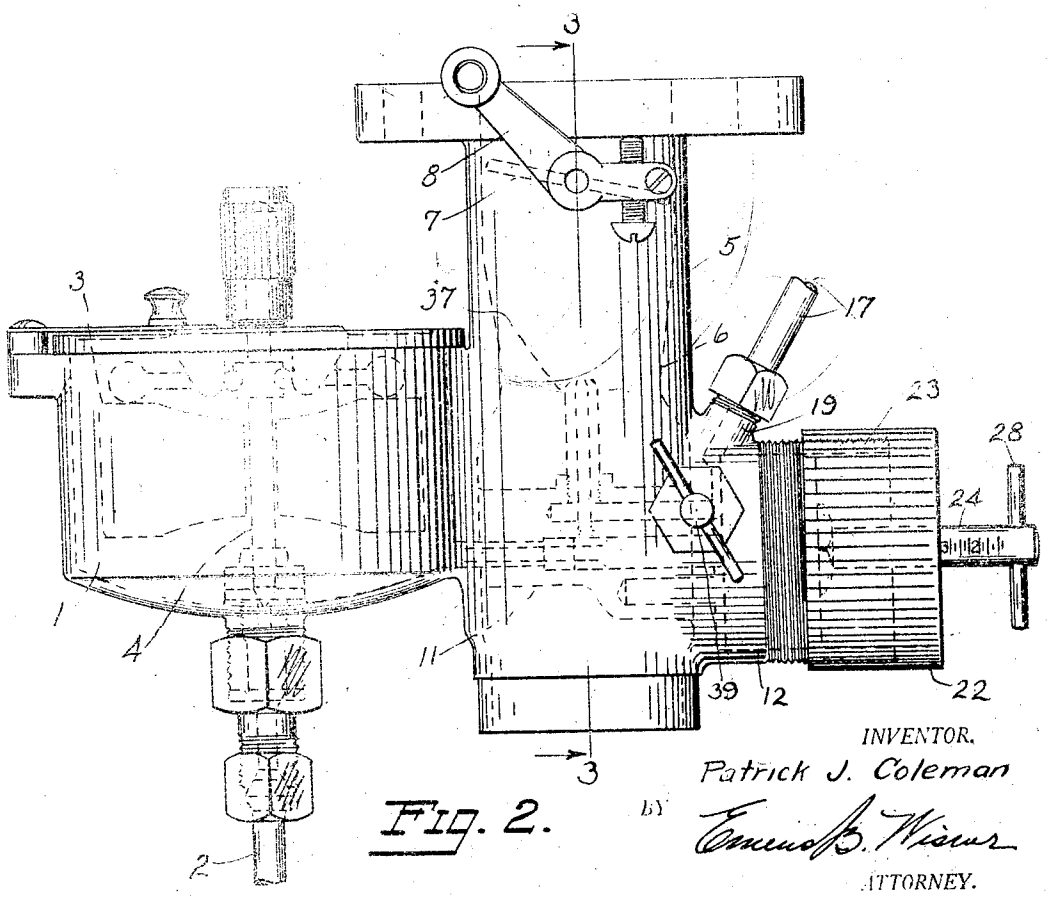


Fig. 2.

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Fig. 5.

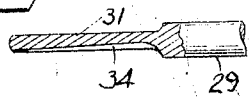
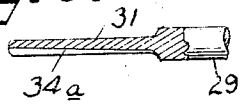


Fig. 6.



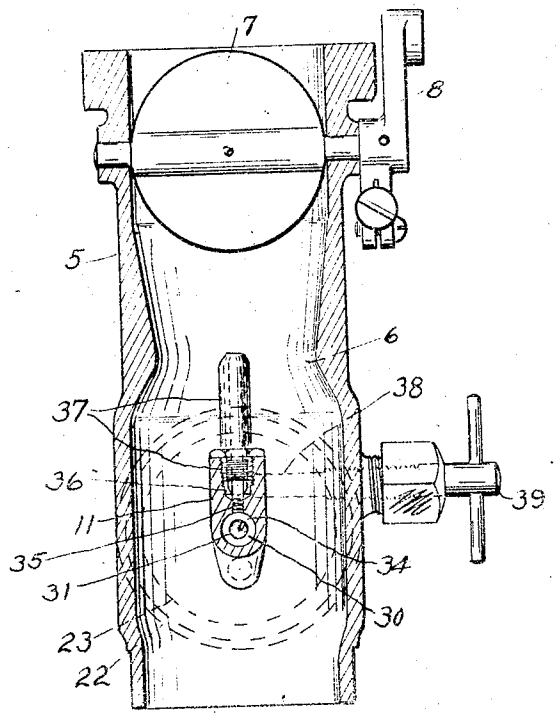


Fig. 3.

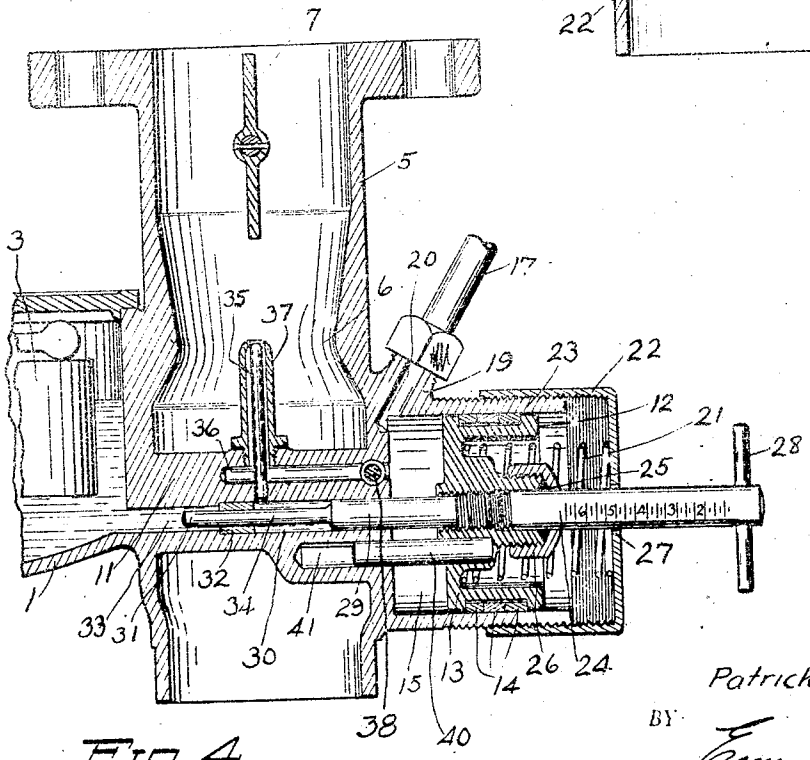


Fig. 4.

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UNITED STATES PATENT OFFICE.

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CARBURETOR.

Application filed June 11, 1923. Serial No. 644,621.

To all whom it may concern:

Be it known that I, PATRICK J. COLEMAN, a citizen of the United States, residing at Highland Park, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Carburetors, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to carburetors and the object of the invention is to provide a carburetor in which the liquid fuel is mixed with air before being passed into the main air conduit. Another object of the invention is to provide a carburetor having the main air conduit in the form of a Venturi tube and into which the mixture of air and liquid fuel is blown at the point of greatest restriction. A further object of the invention is to provide a carburetor utilizing an air pump for blowing the fuel mixture into the main air conduit of the carburetor, the air pump being operated by the engine with which the carburetor is used and the pressure of the air produced by the pump being utilized to control the flow of the liquid fuel into the main air conduit. Another object of the invention is to provide a carburetor in which the liquid fuel is mixed with hot air as it is blown into the main conduit of the carburetor, the hot air assisting in vaporizing the fuel as it passes from the jet. A further object of the invention is to provide a means for controlling the flow of fuel into the carburetor, the fuel regulating means being controlled by the pressure of the air pump which in turn is controlled by the speed of the internal combustion engine. These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is a side elevation of an internal combustion engine showing my carburetor mounted thereon.

Fig. 2 is an enlarged elevation of the carburetor.

Fig. 3 is a section taken on line 3—3 of Fig. 2.

Fig. 4 is a longitudinal section through the carburetor.

Fig. 5 is a section through the fuel control pin.

Fig. 6 is a section through an alternative type of fuel control pin.

As shown in Fig. 2 the carburetor comprises a bowl 1 connected by means of a line 2, shown more particularly in Fig. 1, with a liquid fuel supply tank. The level of fuel in the bowl 1 is controlled by means of a float 3 which is adapted to open or close the fuel feed line to the bowl 1 by means of a needle valve 4 as is the usual construction. Cast integrally with the bowl 1 is the main air conduit 5 which, as shown in Fig. 4, is in the form of a Venturi tube on the interior and provided with an area of greatest restriction at 6. This main air conduit is controlled by means of a butterfly valve 7 which is provided with an operating arm 8 shown in Fig. 2 and which is connected by means of a rod 9 shown in Fig. 1 with the usual foot or hand throttle. The lower end of the main air conduit 5 is connected by means of a flexible conduit 10 shown in Fig. 1 to an air chamber about the exhaust manifold of the internal combustion engine and through which hot air is adapted to be drawn into the main air conduit 5. As shown in Figs. 3 and 4 the conduit 5 is provided with an integral portion 11 extending across the conduit, the conduit being enlarged about this portion to prevent restriction to air flow therethrough. A recess 12 is formed in the conduit 5 on the side opposite the bowl 1 and a piston 13 is positioned in the recess 12 and is provided with packing rings 14 which engage the sides of the recess 12 and with the member 13 form a closed chamber 15. As shown in Fig. 1 an air pump 16 is mounted on the internal combustion engine and is adapted to be driven by the internal combustion engine in any suitable manner and a pressure line 17 extends from the pump 15 and is wound about the exhaust manifold 18 and is connected at the opposite end to a boss 19 provided on the carburetor. This boss 19 is provided with an aperture 20 which opens into the chamber 15 and through which air may flow from the pressure line 17 into the said chamber. A coiled spring 21 engages in the member 13 on the side opposite the chamber 15 and a cap 22 is threaded onto the portion 23 of the carburetor about the recess 12 and by threading the cap onto or off from the portion 23 the tension of the spring 21 may be increased

or decreased as desired. A member 24 is threaded through the member 13 and a packing 25 is provided which is held in place by a packing nut 26 to prevent leakage of air about the member 24 from the chamber 15. The cap 22 is provided with an aperture 27 through which the member 24 extends and the member 24 is provided with an end 28 by which the member 24 may be manually threaded through the member 13. The member 24 is provided with calibrations on the face thereof as shown in Fig. 4. This member 24 is provided with a reduced end 29 which fits closely in an aperture 30 provided therefor in the portion 11 of the carburetor. The member 24 is also provided with a further reduced end or pin 31 which is rotatable in an annular member 32 which is made a press fit in the end of the aperture 30, the aperture 30 being provided with a reduced portion 33 which is open to the bowl 1 of the carburetor. The end 31 of the member 24 is provided with a tapered groove 34 in one side thereof as shown more particularly in Fig. 5, and the liquid fuel may flow from the aperture 33 through this groove 34 into the aperture 30. A jet 35 opens into the aperture 30 and extends longitudinally of the main air conduit 5 as shown. A deep recess or auxiliary air conduit 36 is provided in the member 11 through which the jet 35 extends and a tubular member 37 is positioned about the jet, one end of the tubular member opening into the recess 36 and the opposite end thereof opening about the discharge end of the jet 35. This recess 36 is open to the chamber 15 and is controlled by means of a valve 38 seating therein, the valve 38 being provided with an extending end 39 as shown in Fig. 3 which may be regulated to control the flow through the recess 36 as will be readily understood. The piston 13 is provided with a pin 40 extending therefrom at one side of the member 24 and engages in a recess 41 provided in the portion 11 to prevent the piston 13 from turning on its longitudinal axis, the recess 41 being of sufficient depth to allow longitudinal movement of the piston.

To start the engine the crank shaft 42 thereof is rotated which operates the pump 16 and forces air through the line 17, chamber 15, auxiliary air conduit 36 and through the tubular member 37 past the discharge end of the jet 35 which draws the liquid fuel through the jet into the main air conduit of the carburetor where it is further mixed with the air passing therethrough and passes about the butterfly valve 7 into the engine where it is ignited and the engine is thus started. The position of the member 13 is determined by the pressure of air in the chamber 15 produced by the pump 16. When the engine is first started and at idling speeds the pressure is not so great and the member 13 is forced to the left of the position shown in Fig. 4 by the spring 21 thus positioning the deeper part of the groove 34 in the member 32 and allowing a greater flow of liquid fuel from the bowl into the aperture 30 for idling speeds. As the butterfly valve 7 is opened the speed of the engine is increased which in turn increases the speed of the pump and the pressure in the chamber 15 and also increases the flow of air from the end of the tubular member 37 which tends to pull the liquid fuel through the jet 35 with more force. As the pressure is increased in the chamber 15 the member 13 is moved to the right against the tension of the spring 21 until a position is found where it equalizes between the tension of the spring 21 and the pressure in the chamber 15. By this arrangement the member 24 is moved to the right which draws the end 31 thereof to the right to position the shallower part of the groove 34 in the member 32 so that less liquid fuel is used at the higher speeds for each explosion of the engine, but the fuel, due to greater suction is drawn through the groove 34 at a greater velocity. By means of the handle 28 the member 24 may be threaded through the member 13 to a greater or less extent to regulate the position of the groove 34 extending through the member 32 in relation to the position of the member 13, the member 24 being calibrated for this purpose as shown in Fig. 4. By means of this adjustment the liquid fuel supply may be adjusted so that the carburetor may be used on engines of different horse power and by means of the extending end 39 the valve 38 may be regulated to vary the flow of air about the jet which in turn regulates the quantity of liquid fuel drawn through the jet and by experiment the setting of the valve 38 and member 24 will be found to be about the same for engines of the same number of cylinders having the same bore and stroke. While I have shown in Fig. 5 a groove 34 of a certain shape it is to be understood that this invention is not limited to this specific shape of groove. For instance as shown in Fig. 6 a groove 34ª may be provided which is deepest at the extreme end and this type of groove will give a greater supply of liquid fuel at higher engine speeds while the type shown in Fig. 5 will cut down the supply of liquid fuel in proportion to the air as the engine speed is increased. It will be noted by the construction herein described that when the position of the member 24 is set in relation to the member 13 and the position of the valve 38 is set in the recess 36 the entire control of the carburetor is accomplished by means of the butterfly valve 7 which is operated by the throttle adjacent the driver's seat, movement of the valve 7 causing the other parts to operate in relation thereto and when the engine is shut off the

deepest part of the groove 34 is positioned in the member 32 so that the liquid fuel will quickly fill the aperture 30 and will rise in the jet 35 to a position level with the liquid fuel in the bowl 1. By this arrangement when the engine is started a rich mixture is provided allowing the engine to start without difficulty. By winding the pressure line 17 about the exhaust manifold 18 as shown in Fig. 1 the air passing therethrough is heated as the engine warms up thus aiding in vaporizing the liquid fuel as the air passes from the tubular member 37. Satisfactory results may be attained however by running the line 17 straight to the chamber 15 and not preheating the auxiliary air though somewhat better results may be had by heating the pressure line.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, will automatically adjust itself for different engine speeds and may be manually adjusted for engines of different horse power.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. A carburetor for an internal combustion engine, comprising a main air conduit, a chamber provided at the side thereof, an air pump driven by the internal combustion engine, a pressure line for the air pump discharging into the chamber, a piston reciprocable in the chamber, a spring yieldably resisting movement of the piston by the air pressure, means for regulating the tension of the spring, a liquid fuel supply, a conduit for the liquid fuel supply, an annular member fitting the conduit, a cylindrical member adjustable in the piston and having a cylindrical end fitting in the annular member, the said end being provided with a longitudinal slot tapered in relation to the longitudinal axis of the said cylindrical member, a jet in communication with the fuel supply through the slot of the cylindrical member and discharging into the main air conduit, a tubular member about the jet discharging into the main air conduit at the discharge end of the jet, an auxiliary air conduit allowing discharge of air from the chamber through the tubular member, a valve regulating flow of air through the auxiliary air conduit, and a butterfly valve regulating flow of air and fuel through the main air conduit.

2. In a carburetor for an internal combustion engine, a main air conduit in the form of a Venturi tube, a chamber provided at the side of the main air conduit, an air pump driven by the internal combustion engine, a pressure line for the air pump discharging into the chamber, a piston reciprocable in the chamber, a spring yieldably resisting movement of the piston by the air pressure, means for regulating the tension of the spring, a liquid fuel supply, a jet in communication with the liquid fuel supply discharging into the main air conduit at the point of greatest restriction, a tubular member about the jet through which air is discharged from the chamber into the main air conduit, adjustable means controlling discharge of air from the chamber and a member adjustable in the piston and regulating flow of liquid fuel to the jet by movement of the piston.

3. In a carburetor for an internal combustion engine, a main air conduit, a chamber provided at the side thereof, an air pump driven by the internal combustion engine, a pressure line for the air pump discharging into the chamber, a piston reciprocable in the chamber, an adjustable spring yieldably resisting movement of the piston by the air pressure, a liquid fuel supply, a jet in communication with the liquid fuel supply discharging into the main air conduit, a tubular member about the jet through which air is discharged from the chamber into the main air conduit, and a member adjustable in the piston and regulating flow of liquid fuel to the jet by movement of the piston.

4. In a carburetor for an internal combustion engine, a main air conduit, a chamber provided at the side thereof, an air pump driven by the internal combustion engine, a pressure line for the air pump discharging into the chamber, a piston reciprocable in the chamber, a spring yieldably resisting movement of the piston by the air pressure, a liquid fuel supply, a jet in communication with the liquid fuel supply and discharging into the main air conduit, a tubular member about the jet through which the air is adapted to discharge from the chamber, means controlling the discharge of air through the tubular member, and a member carried by the piston controlling flow of liquid fuel to the jet.

5. In a carburetor for an internal combustion engine, a main air conduit, a chamber provided at the side thereof, an air pump driven by the internal combustion engine, a pressure line for the air pump discharging heated air into the chamber, a piston reciprocable in the chamber, a spring yieldably resisting movement of the piston by the air pressure, a liquid fuel supply, a jet in communication with the liquid fuel supply and discharging into the main air conduit, a tubular member about the jet, an air conduit adapted to direct air from the chamber through the tubular member about the jet, and a member carried by the piston controlling flow of liquid fuel to the jet.

6. In a carburetor for an internal com-

bustion engine, a main air conduit, a member provided in the side thereof, an air pump driven by the internal combustion engine, a pressure line for the air pump discharging into the chamber, a piston reciprocable in the chamber, a spring yieldably resisting movement of the piston by the air pressure, means for adjusting the tension of the spring, a liquid fuel supply, a jet in communication with the liquid fuel supply and discharging into the main air conduit, and a member adjustable longitudinally in the piston and regulating flow of liquid fuel to the jet by movement of the piston.

In testimony whereof, I sign this specification.

PATRICK J. COLEMAN.