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J. C. COULOMBE

CARBURETOR

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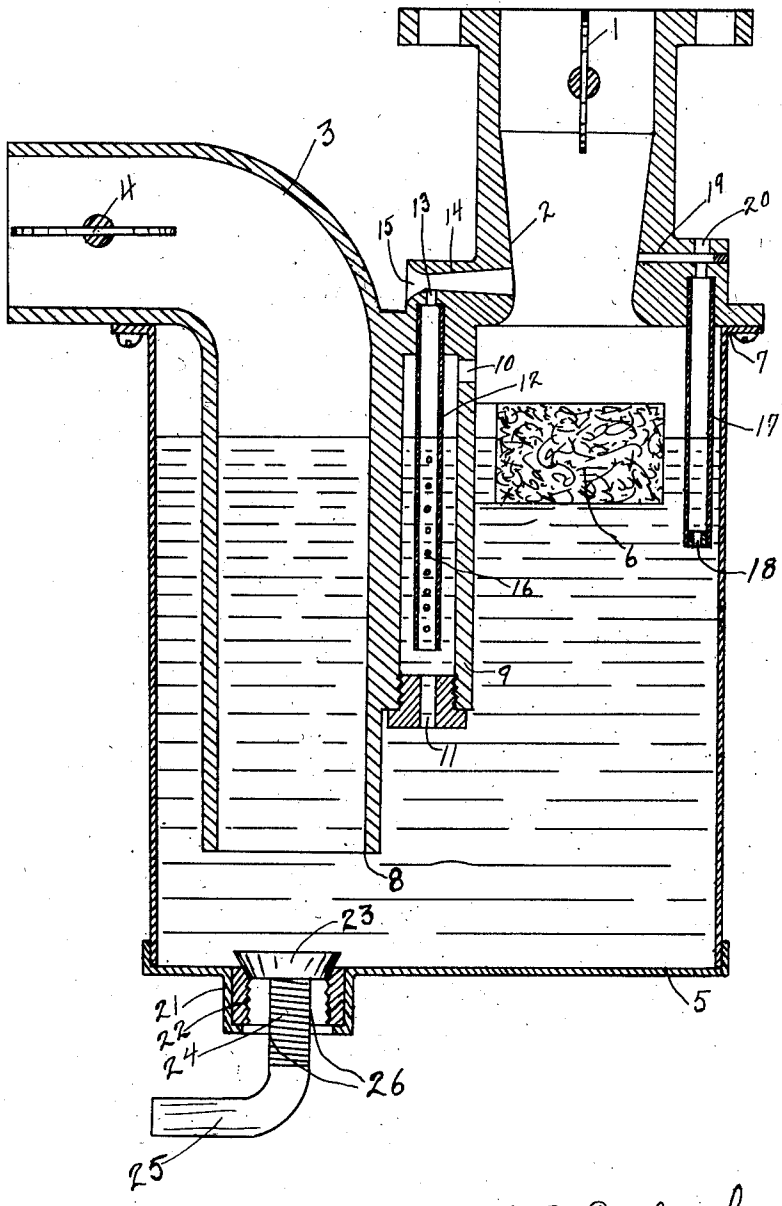

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UNITED STATES PATENT OFFICE.

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CARBURETOR.

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My invention relates particularly to a carburetor for internal combustion motors of the variable speed type.

One of the objects of my invention is to provide a carburetor which will clean the air entering it.

Another object of the invention is to provide idling means without using the usual fuel by-pass at the throttle.

A further object of my invention is to provide a carburetor that will give the required mixture proportions throughout the range of the motor.

A still further object of my invention is to provide a drain valve that is simple, efficient and self-cleaning.

Referring to the drawing which is a sectional elevation 1 represents the conventional throttle, 2 a main venturi, 3 the air intake containing the conventional choke valve 4, 5 a float chamber containing a float 6 which maintains a constant level of fuel in the float chamber by means of the conventional form of valve mechanism (not shown). The float chamber is fastened to the carburetor by means of a flange 7, which should be air-tight or practically so. The air intake passage 3 has its outlet 8 below the fuel level to such a depth that the air must be drawn through the fuel and the hydrostatic head of the fuel will cause sufficient vacuum to exist in the mixing chamber and venturi to take care of closed throttle or idling motor speeds. A well 9 has a connection 10 at its upper end above the fuel level, open to float chamber pressure. At its lower end is a calibrated fuel intake 11. Suspended in well 9 is a tube 12, open at its bottom end which is immersed in the fuel, its upper end having a calibrated communication 13 with the throat of a small venturi 14, said venturi having one end 15 open to atmosphere and the other end opening into main Venturi throat 2. The tube 12 has a number of air holes immersed in the fuel of well 9. The small venturi 14, in connection with tube 12 and well 9, control the mixture ratios on idling and intermediate speeds, the high speeds being controlled by the tube 17 suspended in the float chamber with its lower end immersed in the fuel and having a calibrated fuel inlet 18. The upper end of tube 17 connects with passage 19 which in turn communicates with main venturi 2. The passage 19 has calibrated air hole 20. In the bottom of the float chamber 5 is an indented boss 21 into which is pressed a threaded nut 22, the upper part of said nut forming a valve seat for valve 23. The valve 23 has a threaded stem 24 engaging the threaded nut 22 and terminating in a handle 25. The threaded stem 24 has two milled faces 26 which allow passage of fuel when the valve is screwed away from its seat.

The series of holes 16, in tube 12, are close together, equivalent to forming one long slot, so that the varying level will be gradual and continuous. The opening 10, at top of well 9, is much larger than the hole 13 so that there will be practically no pressure difference between the well 9 and float chamber 5. The flow of fuel from chamber 5 to well 9 is through hole 11 and, inasmuch as there is no pressure difference between well 9 and chamber 5, is not directly influenced by the suction at hole 13. The fuel flow through hole 11 is directly affected by the varying level in well 9, causing a varying gravity flow. The varying suction at 13 directly controls the varying fuel level in well 9, thereby indirectly controlling the fuel flow through hole 11. The level of fuel in well 9 gradually lowers with a gradual opening of the throttle; with a practically closed throttle the suction at 13 is sufficient to lower the level to the first hole and maintain the level at that point, with a wider opening of the throttle the suction at 13 is increased sufficiently to lower the level to the second hole, and so on until all the holes in tube 12 have been gradually uncovered or brought above the fuel level. In other words, the flow of fuel through 11 will vary with the fuel level in well 9, which in turn varies with the suction at 13, which varies with the throttle opening. The extra amount of fuel taken into the motor, whenever the fuel level in well 9 is lowered by additional throttle opening, serves to aid acceleration and, inasmuch as there is a varying level with different throttle openings, furnishes fuel for acceleration for the different throttle openings from low speeds to high speeds within the range of tube 12.

The operation is as follows: When the motor starts the fuel level in air intake 3 drops to the lower end or outlet 8 and remains there during the operation of the motor. The incoming air then percolates through the head of fuel in the float chamber through the main venturi 2 and out by the throttle. The vacuum in the float chamber will always be

equivalent to the head of fuel or submersion of the air intake passage, as long as the motor is running and regardless of the speed or load on the motor, provided the air pasasge 3 is sufficiently large so as not to cause any restriction. The vacuum at the throat of the main venturi 2 will always be greater than that existing in the float chamber and will increase with the increased air volumes going through it. The small venturi being open to atmosphere, the suction at the restricted portion will always be three times greater than that existing at the throat of the main venturi, if it is properly proportioned, but it will not continue in that ratio if it is made sufficiently small because then its efficiency is greatly cut down by the incoming fuel from tube 12. While the suction at the restricted portion of the small venturi 14 is sufficiently greater than that existing in the float chamber, so that enough fuel will be properly handled at idling speeds, and, while it is true that suction will increase with increased engine speeds, the restricted portion of the small venturi 14 is so proportioned that it will not be sufficient to maintain the proper mixture proportions. The series of holes 16 are therefor arranged and proportioned to control the mixture proportions at intermediate speeds. As the suction increases in the tube 12 more air is drawn through the holes 16 and the level in well 9 must drop to allow air to enter the additionally exposed holes, resulting in a greater flow of fuel into well 9 through the calibrated hole 11, as the greater the difference in levels between the well 9 and the float chamber, the greater will be the head governing the flow through the calibrated hole 11. When all the holes 16 in tube 12 have been exposed and the fuel level in well 9 is just below the bottom of tube 12, the fuel flow through hole 11 will thereafter remain practically constant, inasmuch as the gravity head will remain constant and inasmuch as the size of hole 10 is sufficiently larger than hole 13 to not cause appreciable effect upon the fuel flow through hole 11 by suction. After the point has been reached, where the fuel flow through 11 does not appreciably increase with increased engine speed, the fuel begins to flow from hole 19 to supply enough additional fuel to maintain the required mixture proportion through the rest of the range. The air hole 20 is so proportioned in relation to the size of passage 19 that there must be enough vacuum in the main venturi to overcome the air bleed through hole 20 and lift the fuel in tube 17 high enough to pull it into the air stream of the main venturi. In other words, no fuel is fed from passage 19 until a certain predetermined engine speed is reached, and this time at which this tube is brought into action is controlled by the size of hole 20. The quantity of fuel fed from the passage 19 however is controlled by the metered hole 18.

What I claim as new and desire to secure by Letters Patent is:

1. In a carburetor for internal combustion motors having a constant level float chamber, an air outlet for same, a main air intake for said carburetor extending below the fuel level in said float chamber, said air intake being proportioned and located so as to permit a sub-atmospheric pressure in said float chamber during the operation of said motor, means for injecting fuel from said float chamber into said air outlet, said means comprising a small venturi connecting said air outlet with the atmosphere, and a tube leading from the throat of said small venturi to the fuel in said float chamber.

2. In a carburetor for internal combustion engines of the suction type having a constant level float chamber, an air outlet and an air inlet for said carburetor, a throttle for said outlet, a well having a fuel communication with said float chamber, an air inlet for said well from said float chamber, communicating means between said well and said air outlet, means for creating a depression in said communicating means greater than the depression in the top of said float chamber, an air port in said communicating means extending below the normal fuel level in said well and proportioned to cause a varying fuel level in said well, said varying fuel level gradually lowering as the suction increases in said air outlet below the throttle, said well air inlet being sufficiently large so that the fuel flow through said well fuel communication will be effected solely by the hydrostatic head represented by the difference in fuel level between the well and the float chamber, the top of said float chamber being in open communication with the air outlet independently of said well.

3. In a carburetor for internal combustion engines of the suction type having a constant level float chamber, an air inlet and an air outlet for said carburetor, a throttle for said air outlet, a well having a fuel communication with said float chamber, an air inlet for said well from said float chamber, communicating means between said well and said air outlet, means for creating a depression in said communicating means greater than the depression in the top of said float chamber, an air port in said communicating means extending below the normal fuel level in said well and proportioned to cause a varying fuel level in said well, the top of said float chamber being in open communication with the air outlet independently of said well.

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