

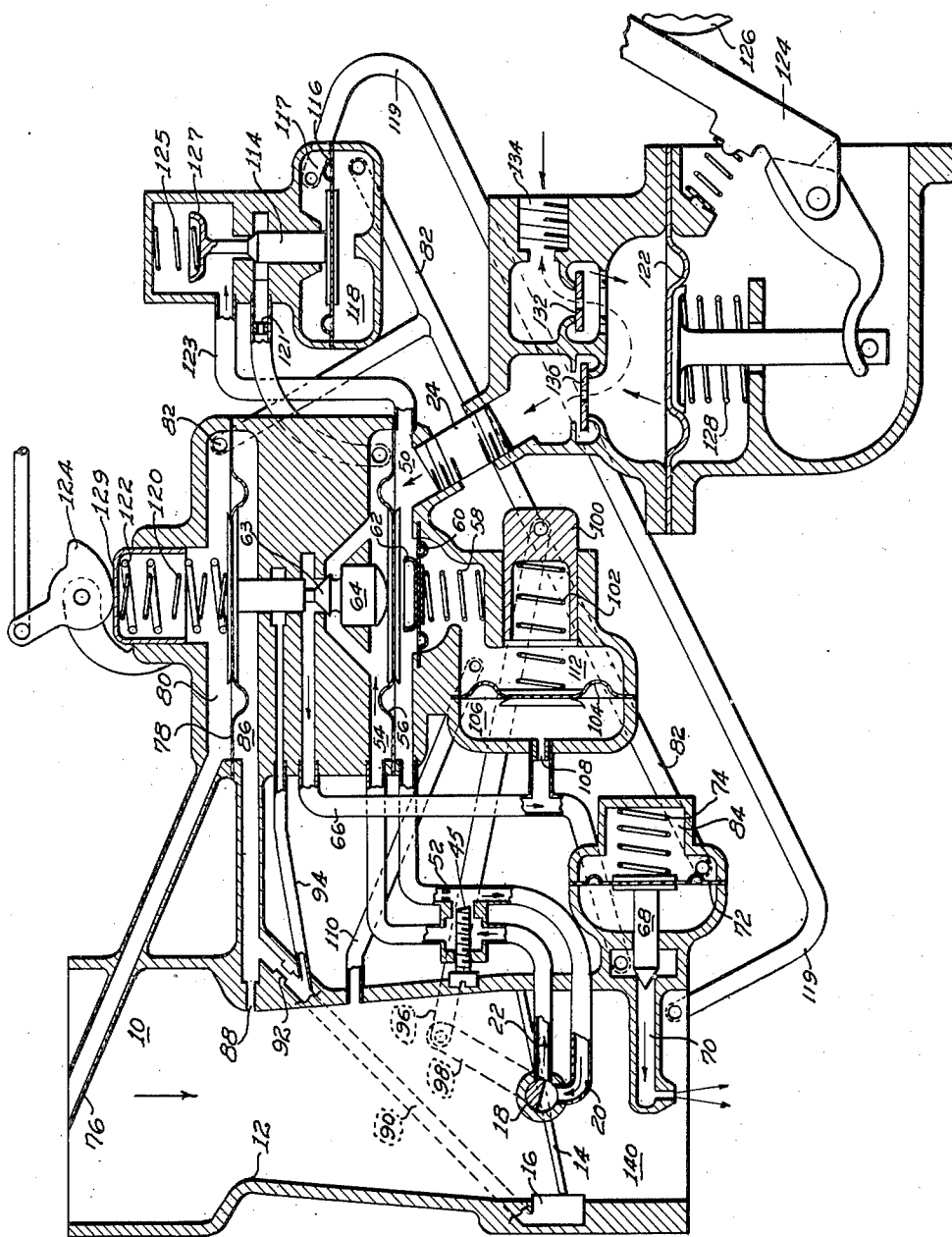
Dec. 20, 1949

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2,491,760

PRESSURE CARBURETOR

Filed April 20, 1948



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UNITED STATES PATENT OFFICE

2,491,760

PRESSURE CARBURETOR

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Application April 20, 1948, Serial No. 22,167

1 Claim. (Cl. 261—37)

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The objects of this invention are:

(1) To simplify and make more positive the operation of a pressure type carburetor when the throttle is almost closed.

(2) To prevent the discharge of a "slug" of gasoline which otherwise would be discharged into the inlet manifold every time the engine is started.

(3) To facilitate the prompt restarting of the carburetor after a shutdown.

This case is a continuation in part of my copending applications Serial No. 689,260 filed August 8, 1946 and Serial No. 717,673 filed December 21, 1946.

The drawing shows the preferred form of my invention.

The air enters at 10, flows through the venturi 12, past the throttle 14 and past a long narrow slot 16 in the walls of the outlet passage 140 adjacent to the downstream lip of throttle 14. A valve 18 on the throttle shaft controls the communication between the fuel passages 20 and 22.

Fuel enters at 24 from the fuel pump 26 having a flexible diaphragm 122 flexed by the broken link 124. This link is flexed by the cam 126.

When the pressure above the diaphragm 122 is excessive a spring 128 is compressed. Check valves 130 and 132 complete this well known pump. This pump is of a well known type.

The check valves 130 and 132 are each pierced with a tiny hole so that if the compressed spring 128 moves the diaphragm 122 after the engine has stopped, liquid trapped above the diaphragm 122 or above the check valve 130 can escape through 134 which is the fuel entrance to the pump.

Fuel flows from the entrance 24, through the chamber 50, past the throttle controlled valve 18, along the passage 22 to the chamber 54 above the diaphragm 56. (The diaphragm 56 separates the chamber 50 from the chamber 54.) This diaphragm 56 is pushed up by the spring 58 which pushes a diaphragm 60 up and thus raises the cup 62 which engages with the underside of the diaphragm 56.

A release valve 64 engages with the upper side of the diaphragm 56 and the lower side of a diaphragm 78 and controls the flow of fuel from the chamber 54 past the valve 63 to the passage 66, down past the valve 68 and so out through nozzle 70 to mixture outlet passage 140. A diaphragm 72, loaded by the spring 74, and the air entrance pressure derived from the air impact tube 76 presses the valve 68 onto its seat.

A diaphragm 78 is subjected on its upper face

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to the pressure in the air entrance 10 through the impact tube 76. The chamber 80, above the diaphragm 78, is connected by the passage 82 to the chamber 84 on the right of the diaphragm 72. The chamber 86, beneath the diaphragm 78, is connected through the restriction 88 with the throat of the venturi 12. An inclined air passage 90 connects the narrow vertical slot 16 with the chamber 86 through the restriction 92. A drain passage 94 is provided for obvious reasons.

An acceleration pump is provided and is operated by a link 96 driven by the throttle lever 98, mounted on the shaft of the throttle valve 14. This pump comprises a piston 100 which is operated by the link 96.

This piston 100 compresses a spring 102. Spring 102 engages with the right hand face of a diaphragm 104. A passage 110 connects the chamber 112 located to the right of the diaphragm 104.

The left hand face of diaphragm 104 displaces fuel from a chamber 106 whenever the throttle is opened. Fuel enters and leaves the chamber 106 through the restricted passage 108. This restricted passage 108 is connected to the descending fuel outlet passage 66.

Fuel economy is secured by means of the valve 114. This valve 114 is mounted on the small horizontal diaphragm 116. Chamber 118, located below this diaphragm 116, is connected to the passage 82 which is connected through the inclined passage 76 and with the air entrance 10. The passage 119 connects the chamber 117, located above the diaphragm 116, with the main air passage 140 downstream of the throttle 14.

A restricted fuel passage 121 permits fuel to flow into the chamber 54 past the valve 114, from the passage 123 when the valve 114 is opened. This passage 121 forms a bypass around the passage 52—20—18—22.

A spring 125 engages with a cup 127 connected to the valve 114 and tends to open the valve 114.

Two springs 120 and 122 are arranged under the cup 129 so as to engage with the upper side of diaphragm 78. The inner spring 120 is the wide open throttle bias spring and is quite light but exerts this light pressure at all times. The outer spring 122 exerts zero pressure until the choke lever cam 124 has been moved an appreciable degree from its "off" position.

When cam 124 is rotated clockwise then the loose spring 122 is compressed and an additional compression is added to the pressure imposed by the smaller inner spring 120 at all times.

The spring load on the valve 68 is such that a

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pressure of 2 to 3 pounds per square inch across the diaphragm 72 will open the valve 68 and compress the spring 74 and allow fuel to discharge from nozzle 70.

A pressure difference of 1 to 2 pounds per square inch will lower the diaphragm 60 and compress the spring 58 and permit the valve 63 to open.

A low speed adjustment is provided and is shown at 45. This adjustment permits fuel to flow from passages 20 to 22 in addition to that which flows past the fuel throttle valve 18.

Operation

When the engine is stopped, the spring 128 in the fuel pump raises diaphragm 122 and tends to maintain fuel flow to the engine until the diaphragm 122 reaches its maximum stroke. Fuel would continue to flow through this carburetor because the light biasing spring 120 tends to hold valve 63 open and valve 68 will remain open and discharge this fuel until the fuel pressure drops below 2 or 3 pounds per square inch. However the bleed holes in check valves 130 and 132 permit the fuel delivered by diaphragm 122 to be returned to the fuel tank through fitting 134 after the engine has stopped so that the fuel is not discharged to the engine manifold. Also when the pressure in chamber 50 falls below 1 or 2 pounds per square inch spring 58 moves cup 62 against diaphragm 56 and closes valve 63 against the opposition of the lighter spring 120. If spring 58 and diaphragm 56 were not provided, the valve 63 would normally be opened and diaphragm 56 extended to the limit of its travel by biasing spring 120 after the engine was stopped. Then when the engine was again started diaphragm 56 would, in moving valve 63 to near its closed position, push a slug of fuel into the engine through valve 68. Spring 58 thus through diaphragm 60 and cup 62 holds diaphragm 56 in the up position and valve 63 at its closed position when there is no fuel pressure in the chamber 50. This makes closed throttle starting of the engine possible with a pressure carburetor.

When the throttle is slightly opened for starting the valve 18 is opened slightly. This would not provide sufficient fuel in cold weather so the cam 124 is rotated clockwise. The springs 120 and 122 are compressed so that the valve 63 opens to admit sufficient fuel.

After the engine has started and is running the throttle 14 is opened. As the throttle 14 opens the lip of the throttle sweeps over the long narrow slot 16 and the suction in the outlet 140, which is transmitted through the restriction 92, no longer influences the pressure in the chamber 86. Thereafter the pressure in the chamber 86

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is the pressure in the throat of the venturi 12. The pressure in the throat of the venturi 12 thereafter opposes the pressure drop through the restriction 52 in the fuel passage in the well known manner. The fuel/air ratio is thus maintained constant until the throttle 14 is almost wide open when the valve 114 is opened by the pressure transmitted through the passage 119. The opening of the valve 114 adds fuel sufficient to develop maximum horsepower.

What I claim is:

The combination of a variable stroke fuel pump and a pressure type carburetor in which there is a moving wall in said pump acting as a piston, positive means for moving said moving wall on its suction stroke, spring means for moving said moving wall on its pressure stroke, inlet and outlet check valves, small openings acting as a by-pass passages around said check valves, an air entrance to said carburetor, a venturi therein, a second moving wall responsive to the pressure drop in said venturi, a fuel passage leading from said fuel pump, a restriction in said passage, a third moving wall responsive to the pressure drop due to fuel flow through said fuel restriction, said second and third moving walls being arranged so as to oppose each other, a fuel valve in series with said fuel restriction and connected to said second and third moving walls, a throttle valve downstream from said venturi, a second fuel valve connected to the air throttle and located in the fuel passage in series with said fuel restriction, said second valve being normally wide open but adapted to restrict the fuel flow when the throttle is moved towards its idling position, yieldable means maintaining at all times a pressure on said second moving wall tending to open the first mentioned fuel valve, a fourth moving wall, yieldable means tending to move said fourth movable wall in one direction, the pressure from the first moving wall tending to move said fourth moving wall in the opposite direction, said fourth moving wall being adapted to engage with and to close said first mentioned fuel valve when the fuel pump registers zero pressure, that is, when the variable stroke pump is not operating.

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