May 15, 1956 M. J. KITTLER ET AL 2,745,645

DUAL CARBURETOR

Filed Sept. 22, 1953 2 Sheets-Sheet 1

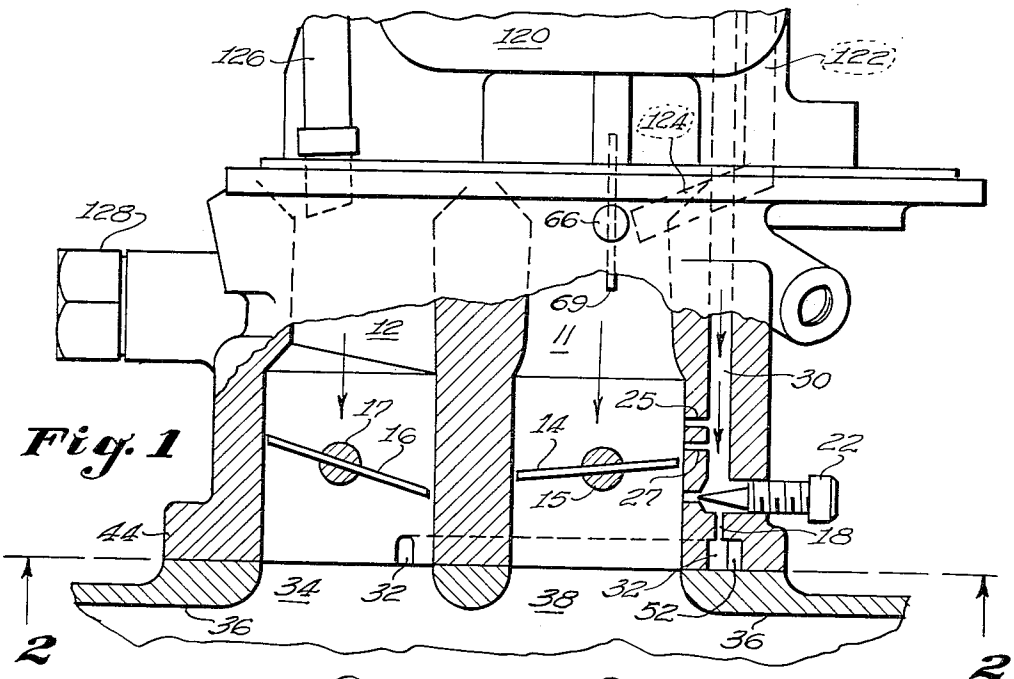


Fig. 1

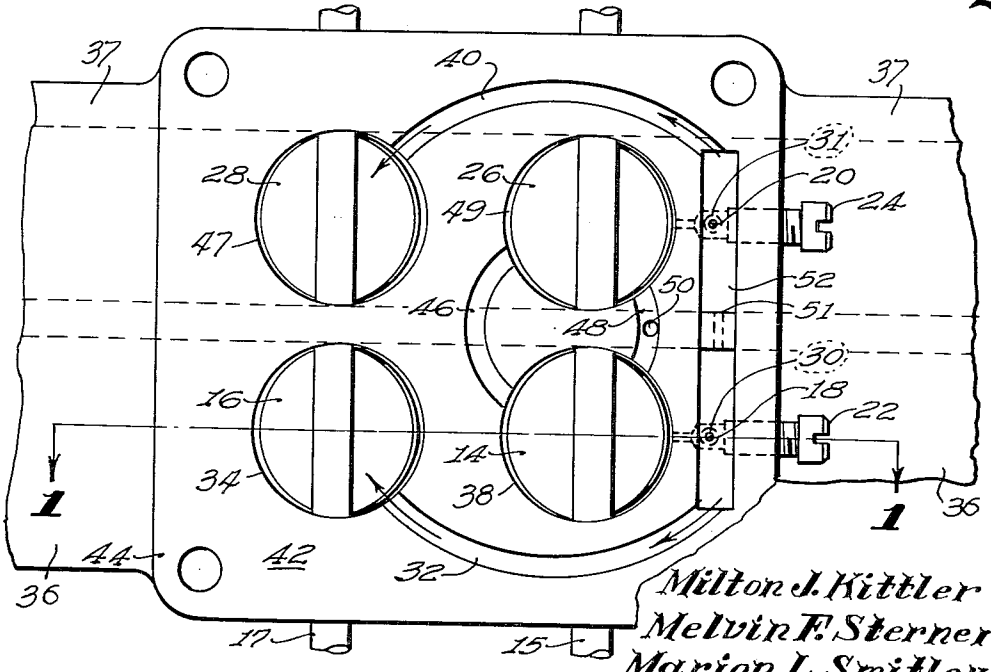


Fig. 2

Milton J. Kittler
Melvin F. Sterner
Marion L. Smitley
INVENTORS

BY J. Farley M. Udale

May 15, 1956 M. J. KITTLER ET AL 2,745,645

DUAL CARBURETOR

Filed Sept. 22, 1953 2 Sheets-Sheet 2

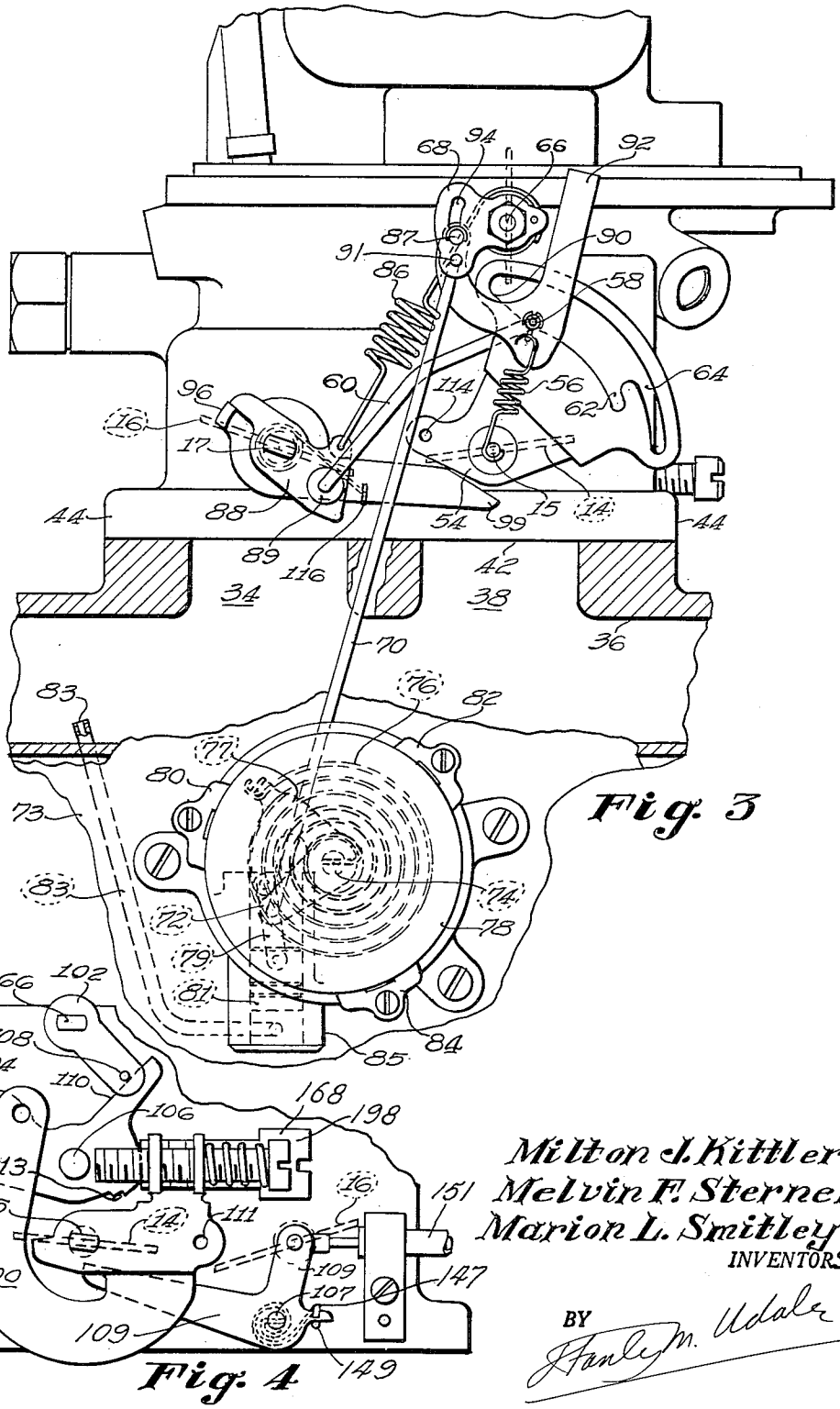


Fig. 3

Fig. 4

Milton J. Kittler
Melvin F. Sterner
Marion L. Smitley
INVENTORS

BY Stanley M. Udale.

United States Patent Office 2,745,645 Patented May 15, 1956

2,745,645

DUAL CARBURETOR

Milton J. Kittler, Detroit, Melvin F. Sterner, Bloomfield Hills, and Marion L. Smitley, Huntington Woods, Mich., assignors to Holley Carburetor Company, Detroit, Mich., a corporation of Michigan

Application September 22, 1953, Serial No. 381,552

1 Claim. (Cl. 261—23)

The object of this invention is to apply automatic choke and throttle control mechanism to a two-stage carburetor. Carburetors have now come into use in which normal driving is accomplished on the primary carburetor and the secondary carburetor is not called upon until after the primary carburetor is almost wide open. Even this is undesirable in cold weather until the engine has run long enough to warm up. So that the problem is to prevent the operation of the two throttles interfering with the operation of the automatic choke.

Figure 1 shows a cross-section on plane 1—1 of Figure 2.

Figure 2 shows a plan view looking up the plane 2—2 of Figure 1.

Figure 3 is an outside elevation corresponding to Figure 1 with portions of the inlet and exhaust manifolds and the thermostat.

Figure 4 is a detailed view taken from the opposite direction to that taken for Figure 3.

In the figures:

Fuel entrance is shown at 128 (Fig. 1) from which it flows to a float chamber 120 (only the lower portion is shown). A primary fuel nozzle is indicated in broken lines at 124 fed from a primary fuel passage 122 in which a certain amount of air is mingled in with the fuel derived from float chamber 120. 126 is a similar main fuel nozzle also supplied with fuel from the float chamber 120 for the second stage carburetor; both nozzles discharge into the throats of the venturi mixing chambers.

As in all modern carburetors air is progressively added to the fuel in the air and fuel passages 122—126 until eventually, an explosive mixture is delivered to the inlet manifold.

11 is the outlet from the primary venturi of the primary carburetor into which the primary fuel nozzle 124 discharges.

12 is the outlet from the secondary venturi of the secondary carburetor into which the secondary fuel nozzle 126 discharges.

14 is the throttle of the primary venturi. Throttle 14 is mounted on shaft 15 as is the throttle 26 of the other primary carburetor.

16 is the throttle of the secondary venturi. Throttle 16 is mounted on shaft 17 as is the throttle 28 of the other secondary carburetor.

36 is one inlet manifold; 37 is the other.

38 is the inlet manifold port for the first stage of the inlet manifold 36.

34 is the inlet manifold port for the second stage of the inlet manifold 36.

47 is the secondary port to the second inlet manifold 37 located exactly behind 36.

49 is the primary port to this manifold 37 controlled by throttle 26.

Associated with the primary fuel nozzle passage 122 are:

30 which is the low speed fuel and air passage for manifold 36.

31 is the other low speed fuel and air passage for manifold 37. 22 is the regulating valve for the low speed fuel and air passage 30 to adjust the low speed mixture ratio for inlet manifold 36. 24 is the other regulating valve for the other low speed fuel passage 31 (see Figure 2) for the other inlet manifold 37.

25 and 27 are the low speed outlets from passage 30 controlled by throttle 14. Similar passages (not shown) are provided for the mixture outlet port 49 of manifold 37.

18 is a restriction at bottom of the low speed fuel and air passage 30.

20 is a restriction at the bottom of the other low speed fuel passage 31.

52 is a low speed groove which delivers low speed fuel from both of the restrictions 18 and 20 around first port 38 into the second port 34 leading to the inlet manifold 36. It also delivers through groove 40 to the port 47 of the other inlet manifold 37.

51 is a restriction in the groove 52 between 18 and 20.

46 is another groove connecting two outlets 38 and 49.

Groove 48 is a second crossover passage which helps balance the two inlet ports 38 and 49 at idle.

50 is the passage out of groove 48 from which it is convenient to obtain the vacuum for the pipe to the fuel economizer which controls the main fuel nozzle fuel economizer of a well known type (not shown).

Figures 3 and 4 show the somewhat complicated throttle controls which explain the need for these novel low speed fuel nozzles and the air passages associated with them.

Throttle controls

The primary throttle lever 54 is mounted on primary throttle shaft 15 (Figure 3).

A spring 56 hooks over shaft 15 and over the pin 58 so that the upper right end of rod 60 which is bent at right angles to the rod 60 engages the floating lever 92. The upper end of rod 60 goes through a hole in the floating lever 92.

As shown in its hot weather position, pin 58 rides in the shorter circular groove 62 or slot in the lever 54 so that the full travel anticlockwise of lever 54 to open the throttle 14 opens throttle 16 wide.

The longer circular groove 64 and the shorter 62 are both formed in the lever 54. The longer slot extends so far to the right that 58 is not engaged by lever 54 until lever 54 is almost in its wide open position. (Fig. 3.) Lever 54 is rigidly connected to shaft 15. Shaft 15 is rigidly connected to the manually operated lever 100 (Fig. 4.)

66 is the choke shaft for choke valve 69. (Fig. 1.)

68 is the slotted choke lever shown in its normal (warm) position in which pin 58 is engaged by the shorter slot 62.

70 is the operating link connected to the temperature responsive lever 72 mounted on the shaft 74 and rotated by the clock spring thermostat 76 mounted on the outside of the exhaust manifold 73 which is adjacent to the inlet manifold 36.

This thermostat 76 is enclosed in a cover 78. This cover 78 is locked by the three clamps 80, 82 and 84. These three clamps 80, 82 and 84 when released permit the thermostat 76 to be adjusted in a well-known manner.

When cold, rod 70 rises and link 60 is rotated slightly anti-clockwise from position shown stretching the tension spring 56. This tension spring 56 is connected at its upper right end with the pin 58, its lower left end with the shaft 15. Link 92 at the same time moves slightly clockwise up and to the left. 91 is the upper end of the link 70 and engages with the link 68.

The pin 87 projects from the floating lever 92 and is retained by a washer so that it slides in the slot 94 in the lever 68 mounted on choke valve shaft 66. A tension spring 86 is provided to hold lever 88 in position so as to be engaged by link 60 when its upper righthand end is engaged by shorter slot 62 so that secondary throttle 16 is opened as the first throttle 14 is opened to its wide open position.

The lower left hand end of inclined link 60 is connected with the secondary throttle lever 88. The pin 58 on the upper right hand end of 60 is forced up the inclined surface 90 connecting the two slots 62 and 64 and so transfers to the upper groove 64 when the engine is cold. The "hot" position is the one illustrated. The J-shaped floating lever 92 carries the two pins 58 and 87. The pin 87, however, rides in a groove 94 in the choke lever 68. This is so that as you operate normally (hot weather) (no choke) the pin 87 rides up slot 94 at wide open throttle.

A vacuum cylinder 85 is controlled by a vacuum passage 83 leading from the inlet manifold 36 to the bottom of cylinder 85.

A lever 77 on shaft 74 is shown in broken lines in Fig. 3 and is connected by link 79 to a piston 81 inside cylinder 85. Thermometer 76 engages the upper left hand end of lever 77.

This is a well known means for closing the choke and increasing the idle speed of a cold engine. Manually controlled lever 100 is shown mounted on the shaft 15 of the primary throttles 14 and 26 and opens them clockwise in this view (Fig. 4).

A lever 102 is mounted on shaft 66 of the choke valves 69 and the one behind it (not shown). A low speed adjusting lever 104 is mounted on a pin 106 and provides the variable fast idle adjustment by means of the adjustable cap screw 168. The adjustable cap screw 198 provides the minimum throttle opening when the graduated stops 113 on lever 104 no longer engage with the low speed stop screw 168.

The weighted left hand end 117 of lever 104 causes lever 104, when free, to rotate anti-clockwise. As choke shaft 66 is rotated clockwise (Fig. 4) pin 108 on lever 102 engages with flat surfaces 110 of lever 104 in the position shown when the lever 102 is in the choke closed position, as distinguished from the choke open position illustrated in Fig. 3. Hence, lever 104 is shown moved into its fast idle position (choke 69 closed).

107 is a pivot pin on the body of the carburetor on which is mounted a lever 109. Lever 109 when engaged by "Bowden" wire 151 engages the pin 111 on lever 100 and acts as a throttle stop to limit throttle opening when starting a cold engine.

A coil spring 147 around the pivot pin 107 causes the lever 109 to rotate clockwise and to engage the stop 149. This throttle stop 96 for the throttle 17 is mounted on the lever 99. This lever 99 is mounted so as to be rotated. The secondary throttle shaft 17 and its lever 88 are rotated thereby counter-clockwise by a coil spring 116 in a clockwise direction. Pin 114 on lever 54 engages lever 99 which carries stop 96, which ensures that secondary throttle 16 is always at least partly open when primary throttle 14 is wide open.

Operation

The pin 114 when lever 54 is rotated counter-clockwise to open the primary throttle 14, engages the right hand end of lever 99 and rotates it slightly clockwise. This gives the secondary throttle 16 a slow initial opening as the stop 96 pushes the lever 88 to open the secondary throttle 16. Continued motion of the lever 54 causes the secondary throttle 16 to open all the way as follows:

With the linkage as shown in Fig. 3 (when the engine is warm) the first throttle lever 54 rotates anti-clockwise. The pin 58 then rides on the shorter circular groove 62 of 54 and engages with the upper right hand end of the groove 62. The lever 88 of the secondary throttle 16 is then rotated rapidly as the distance from shaft 15 and groove 62 is much greater than the distance from shaft 17 to end pin 89, which is the lower left hand end of link 60.

The J-shaped lever 92 then moves to the right clockwise. The pin 87 then moves up in slot 94 of choke lever 68. During the idling operation and the moment the engine fires a strong suction exists in inlet manifold 36 and through passage 83. This acts on the under side of piston 81. Link 79 transmits the pull of this piston 81 to lever 77 mounted on shaft 74. The effect of this strong suction is to change the slot in which pin 58 slides down the inclined plane 90 into the lower slot 62 where it is in position to open the secondary throttle following the opening of the primary throttle. Meanwhile, the low speed fuel discharging into both primary and secondary mixture outlets downstream of the throttle 14 and 16 at ports 34 and 38 (Fig. 1) is diluted with air leaking past the throttle.

Port 34 derives its fuel from groove 32. Port 38 derives its fuel from the port controlled by the needle valve 22. Air leaks past both throttles 14 and 16; a little air flows down the low speed fuel passages 30 and 31. Ultimately, after progressive additions of air have been made, the mixture is explosive. The liquid fuel enters at 128, flows to float chamber 120 down the primary main nozzles 124 and the secondary fuel nozzle 126, diluted with a certain amount of air; low speed fuel flows down the low speed fuel passage 18, also diluted with a certain amount of air.

After the choke valve 69 has opened up there is a period during which if no fuel flowed down restriction 18 and all the low speed fuel flowed past the needle valve 22 and/or through the restrictions 25 and 27, refrigeration at the upstream lip of throttle 14 would be serious. It is the richness of the mixture in the grooves 32, 40 and 52 that prevent ice in the said grooves.

Starting cold

The choke valve 69 is then closed by the coil thermostat 76 and link 70. The same coil thermostat 76 lifts the pin 58 to engage slot 64 stretching the spring 56. Until throttle 14 is almost wide open valve 16 remains closed. As an additional precaution the "Bowden" wire control 151 is moved manually to the right to assume the position shown. In this position it is the pin 111 on secondary lever 100 which engages the upper lefthand surface of lever 109 and limits the opening of throttle 14.

As the engine warms up the pin 58 drops back under the influence of spring 56 into the position in which it is shown (Fig. 3).

What we claim is:

An automatic choke mechanism for a two stage carburetor having individual air entrances, mixing chambers and outlets, primary and secondary throttles in said mixture outlets and a choke valve in the air entrance to the primary carburetor, a choke lever therefor, an inlet manifold and an exhaust heated wall associated therewith, a thermostat mounted on the outside of said exhaust heated wall, an element moved thereby, a movable link connecting said thermostatically operated element to said choke valve lever, a slotted lever having two slots of unequal length mounted on said primary throttle, a second throttle lever, said lever controlling said secondary throttle, a link pivotally connected to said second throttle lever at one end, the other end riding in said slots, a second slotted lever linkage comprising a slot in said choke lever, a pin in said slot, a floating lever pivotally mounted on the end of said second throttle link, the pivot of which rides in and engages with the ends of the slots in the first slotted lever, said pin being mounted on said floating lever so that when the primary throttle is opened the end of the shorter slot engages the end of the link in the event that the choke valve is open so as to open

the secondary throttle wide when the primary throttle is opened wide, and in the event that the choke valve is closed the end of the link operating the second throttle will then engage the end of the longer slot so that when the primary throttle is wide open then the secondary throttle will be hardly opened at all and the choke valve is free to move because of the slot in the choke valve lever.

References Cited in the file of this patent

UNITED STATES PATENTS

2,328,763 Winkler ---------- Sept. 7, 1943