

March 6, 1956

M. J. KITTLER

2,737,375

DUAL CARBURETOR

Filed Sept. 29, 1953

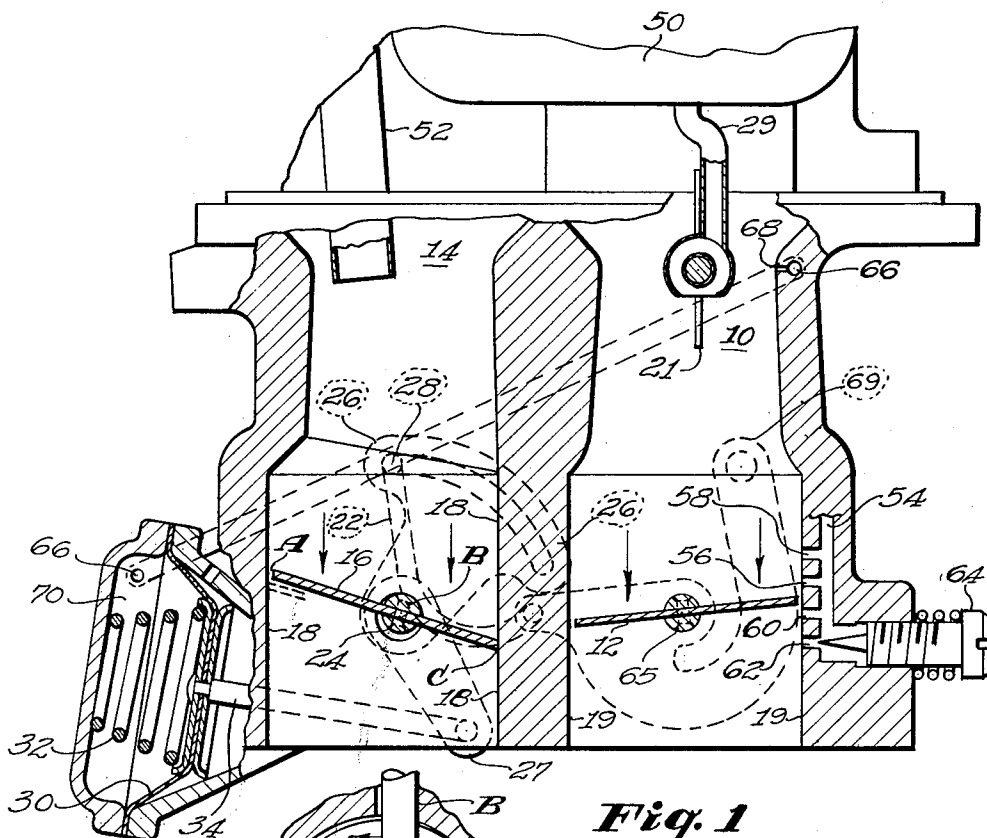


Fig. 1

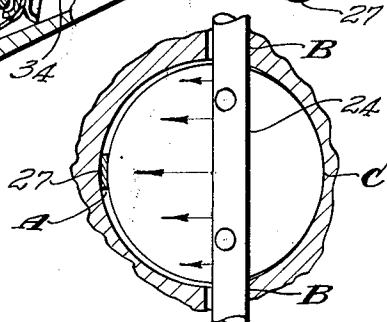


Fig. 2

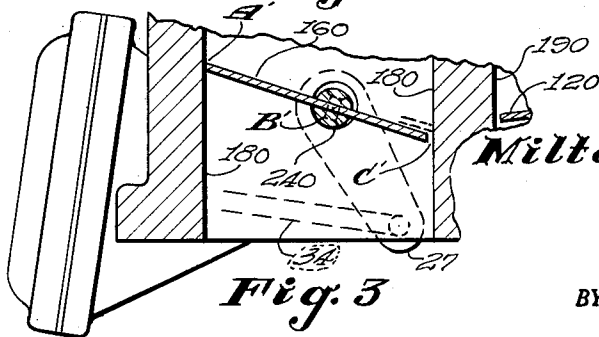


Fig. 3

Milton J. Kittler

INVENTOR.

BY

Stanley M. Udall

1

2,737,375

DUAL CARBURETOR

Milton J. Kittler, Detroit, Mich., assignor to Holley Carburetor Company, Detroit, Mich., a corporation of Michigan

Application September 29, 1953, Serial No. 383,108

2 Claims. (Cl. 261—23)

The object of this invention is to positively close the secondary throttle in a two stage carburetor during idling. The secondary throttle is opened by the suction in the primary venturi as shown in Fogolin Patent No. 1,180,483; Bollee Patent No. 871,320; etc. The modern commercial versions of this old invention have butterfly throttles which present difficulties.

At present the problem of positively closing the secondary butterfly throttle involves the problem of the slight movement of the throttle shaft in its bearing when the atmospheric pressure exceeds the inlet manifold pressure by as much as 7.7 pounds per square inch at sea level. This movement, or shift, permits the secondary throttle to leak air sufficient to raise the idling speed 100 R. P. M. or more, even though the secondary throttle is fitted to seal when the engine is not running. This 100 R. P. M. increased idling speed causes the engine to allow the car to creep.

I have found a way to utilize the atmospheric pressure by reversing the clearance so as to positively seal off the secondary air passage during idling.

Figure 1 shows the preferred form of my invention.

Figure 2 shows one of the methods of assembly.

Figure 3 illustrates the defect overcome by this invention.

Considering the defect first, in Figure 3, the second throttle 160 engages inlet passage 180 at A', second throttle shaft 240 is pushed to the left by atmospheric (14.7 pounds per square inch) pressure when idling due to manifold air pressure (7 pounds per square inch) or a difference of 7.7 pounds per square inch, approximately.

The horizontal component to the left of the inclined downward atmospheric pressure on the inclined throttle 160 pushes the throttle 160 down and to the left around point at the upper end of link 22 (see Fig. 1) and unseals the inlet mixture passage from wall of inlet passage 180 around downstream lip at C' of throttle 160 as shown in broken lines. This gap I have found to be $\frac{3}{1000}$ " or $\frac{4}{1000}$ ".

The whole throttle 160 is thus pushed to the left about pin (Fig. 1) at left hand upper end of rod 22 when the first throttle 120 in passage 190 is put into the idle position when the engine is not operating.

Although this secondary thin throttle 160 engages the walls of inlet passage 180 at A' and C' when the engine is not running, when the engine is idling a differential pressure of 7.7 pounds per square inch approximately is enough to move the second throttle slightly to the left to cause a $\frac{4}{1000}$ " leak at C' as shown in Figure 3. This leak raises the idle speed 100 R. P. M., more or less, and with automatic transmission this increase in engine speed causes the car to creep. The correction of this creep difficulty is shown in Figs. 1 and 2, where 10 is the primary air venturi and 12 is the first throttle.

14 is the secondary air venturi.

16 is the second throttle below 14 eccentrically mounted.

18 is the second mixture passage below 16.

2

19 is the first mixture passage below the first throttle 12. 21 is the choke valve in the primary air venturi above the first throttle 12.

A is the $\frac{4}{1000}$ " gap with which the second throttle 16 is locked in place when the engine is not running—see Fig. 2 for method of adjustment. B is the position of the second throttle shaft 24 in its bearing when the engine is not running and the secondary throttle 16 is closed and the primary throttle is in its idling position. C is the position of the downstream lip of throttle 16 as it touches the wall 18 of the secondary mixture outlet (Figs. 1 and 2). Bent link 22 then pushes the slotted lever 26. Pin 28 on end of link 22 engages in slot in lever 26. The manually operated throttle lever 69 engages link 22. The whole secondary throttle 16 is shifted to the left and engages a feeler 27 $\frac{4}{1000}$ " thick (Fig. 2) which is inserted between the wall and second throttle 16 when assembling the combination. A tight seal by the second throttle 16 is thus insured when the pressure of approximately 7.7 pounds per square inch is applied during idling which gives a slight counter-clockwise rotation to the throttle 16. The clearance around the throttle shaft 24 may be less than the $\frac{4}{1000}$ " gap at A. In fact, it may well be $\frac{2}{1000}$ " or one-half the clearance at A. The plate 16 then touches the bore 18 at A and C simultaneously.

Diaphragm 30, spring 32, link 34 engage slotted link 26 through lever 27. Spring 32 tends to keep the second throttle 16 closed until vacuum in 66 overcomes spring 32 in a well-known manner which was invented by Fogolin and Bollee.

The choke 21 is rotated around the nozzle 29 leading a rich mixture into the venturi 10 out of float chamber 50 as described in my patent No. 2,547,873, issued April 3, 1951, filed March 31, 1950.

52 is a corresponding rich fuel and air mixture nozzle (corresponding to rich mixture nozzle 29) which discharges into venturi 14. A low speed fuel passage 54 discharges fuel also derived from the float chamber 50 out of outlets 56, 58, 60 and 62 into the primary passage 19. The lowest outlet 62 is controlled by a needle valve 64 in a well-known manner. The upstream lip of primary throttle 12 sweeps past the outlets 56 and 58 as they are opened and thus, controls the flow of fuel during the transition period between idling and part-throttle operation; this also, is a well-known feature of modern carburetors.

A passage 66 connects diaphragm chamber 70 with a restriction 68 in the throat of the primary venturi 10. This also, is a well-known feature of two-stage carburetors.

Operation

Assume the engine is in operation and the throttle 12 is almost closed, as shown. The suction in the venturi 10 is almost zero. The suction in chamber 70 is almost zero. The spring 32 pushes the secondary throttle lever 27 over to the right and the downstream lip of 16 engages at C. The atmospheric pressure rotates the throttle 16 until its upstream lip engages, as shown in broken lines at A. The clearance around the secondary throttle shaft 24 permits the point B, when the shaft 24 engages its bearing, to shift and permit the throttle 16 to seal the secondary mixture passage 18 both "fore and aft." That is, at both A and C, which gives the required result: a complete closure of secondary inlet passage 18.

Note.—the eccentricity of secondary throttle 16 is $\frac{5}{1000}$ " to the right in a diameter of 1.312"; so that the distance AB is greater than the distance BC by 0.110". The reason for the longer upstream lip of throttle 16 is to keep the secondary carburetor out of action when not needed. The shaft 65 is eccentric on the left by 0.015" so

that upstream lip of throttle 12 is 0.030" longer than the downstream lip. The shaft 65 is eccentric of the left by 0.015" so that upstream lip of throttle 12 is 0.030" longer than the downstream lip. The reason for the slightly longer upstream lip of throttle 12 is to give it an unbalance in the closing direction at idle to obtain more positive—that is, consistent—idle speeds.

The secondary throttle plate 16 is made of ordinary brass or of chrome stainless steel and is $\frac{6}{1000}$ ", plus or minus $\frac{2}{1000}$ " thick.

The primary throttle plate 12 is made of cold rolled open hearth steel and is $\frac{63}{1000}$ " thick, plus or minus $\frac{1}{1000}$ ".

Both throttle shafts 65 and 24 are made of ordinary brass rod 0.276" to 0.277" diameter. In order to bring out the point of the invention the necessary clearance has been grossly exaggerated and it is recognized that actual clearance will be measured in $\frac{1}{1000}$ of an inch, which it is impossible to illustrate as the width of the lines is too great.

What I claim is:

1. In a two stage carburetor for an internal combustion engine a pair of parallel inlet passages, a primary stage passage, a first butterfly throttle therein, a secondary stage passage, a second butterfly throttle therein, a one-way link from primary to secondary throttle whereby said secondary throttle is positively closed by the closing movement of primary throttle, but can remain closed during the opening movement of the primary throttle, independent means for opening said secondary throttle, a secondary throttle shaft, a bearing therefor, a throttle shaft therein for said secondary throttle located off-center in the passage so that the upstream half of the

secondary throttle is made longer than the downstream half, clearance for said shaft in said bearing, said secondary throttle shaft being so located that the shorter lip first engages the walls of said secondary passage while the longer lip has a clearance less than double that of said bearing clearance whereby the differential between the atmospheric pressure and the engine suction closes the secondary passage completely by shifting the shaft in said bearing.

2. In a two stage carburetor for an internal combustion engine a pair of parallel inlet passages, a primary stage passage, a first butterfly throttle therein, a secondary stage passage, a second butterfly throttle therein, a one-way link from primary to secondary throttle whereby said secondary throttle is positively closed by the closing movement of primary throttle, but can remain closed during the opening movement of the primary throttle, independent means for opening said secondary throttle, a secondary throttle bearing, a shaft for said secondary throttle located therein and off center in said secondary passage so that the upstream lip of the throttle is the longer, clearance for said shaft in said bearing, said secondary throttle being so located on said secondary shaft that the downstream lip engages the throttle bore while the upstream lip is open about twice the shaft clearance whereby the differential between the atmospheric pressure and the engine suction closes the secondary passage completely by shifting the shaft in said bearing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,420,925 Wirth ----- May 20, 1947