Sept. 2, 1952 H. T. SCOTT 2,609,187

CARBURETOR

Filed Oct. 24, 1947 2 SHEETS—SHEET 1

Fig. 1.

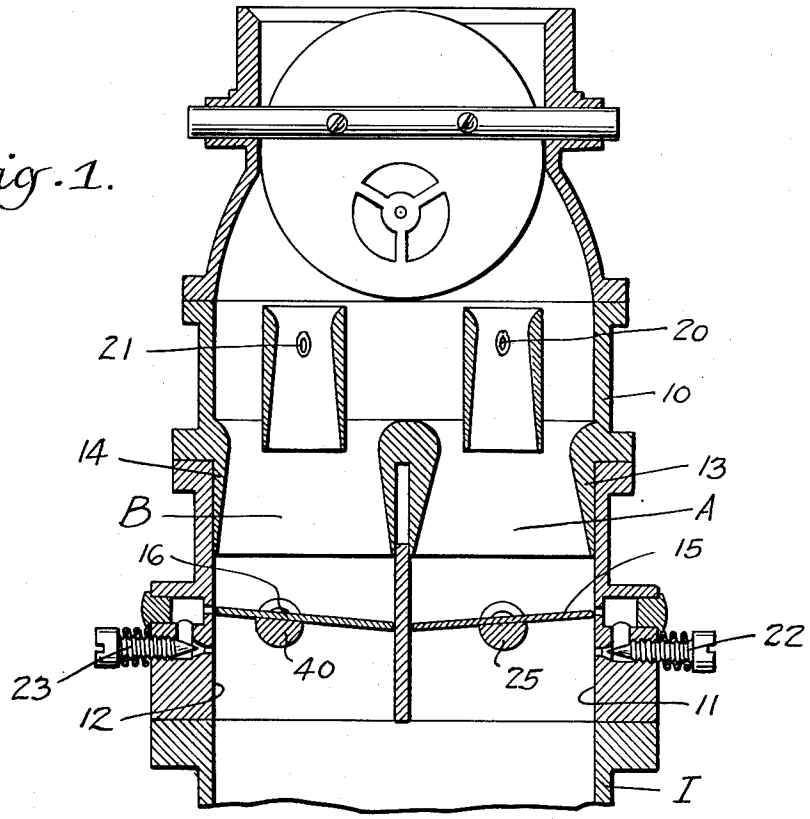


Fig. 2.

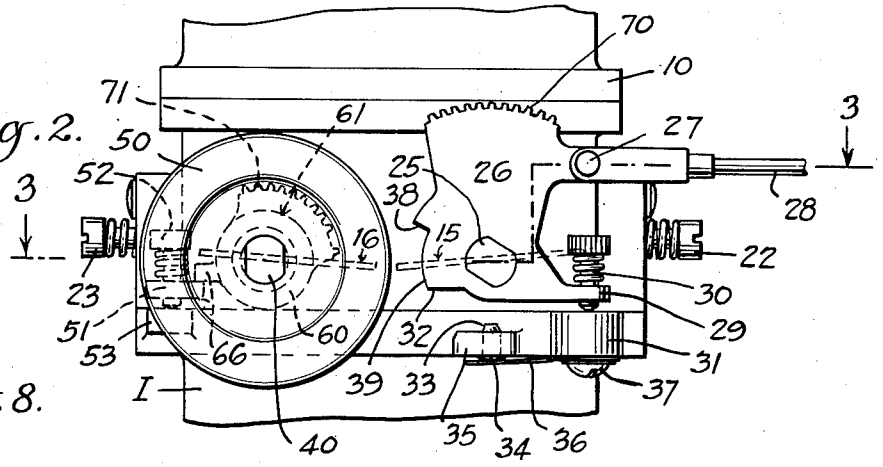
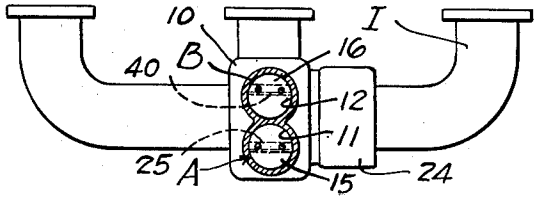


Fig. 8.



INVENTOR.
HARRY T. SCOTT
BY
Frederick Diehl
ATTORNEY

Sept. 2, 1952 H. T. SCOTT 2,609,187

CARBURETOR

Filed Oct. 24, 1947 2 SHEETS—SHEET 2

Fig. 3.

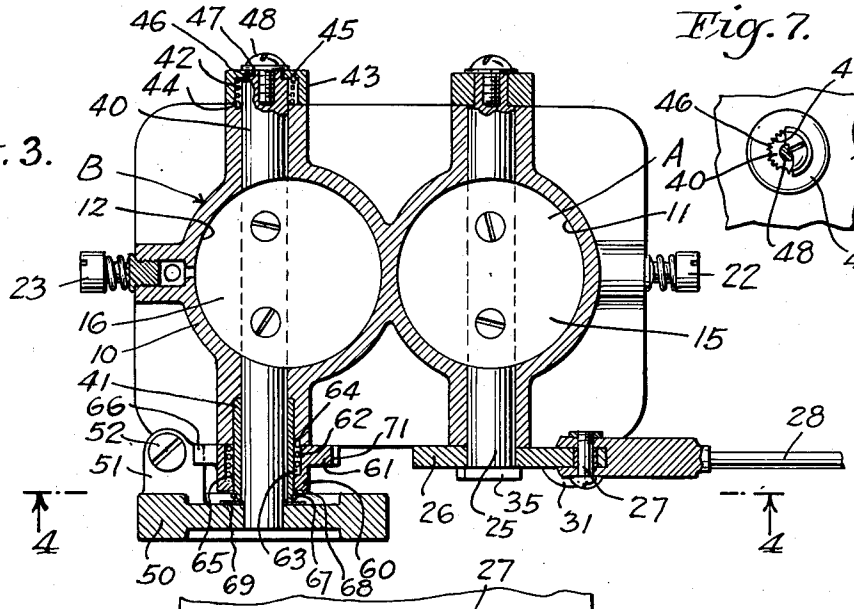


Fig. 7.

Fig. 4.

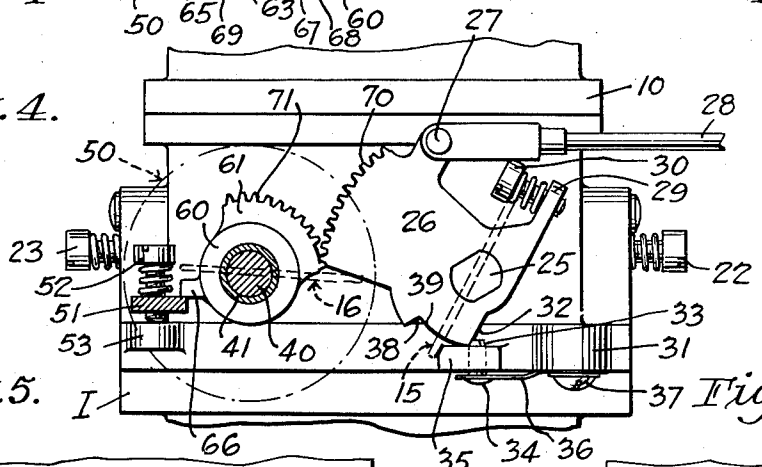


Fig. 5.

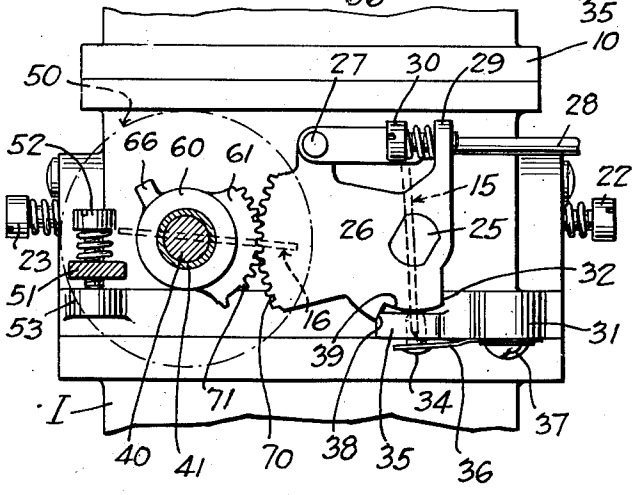
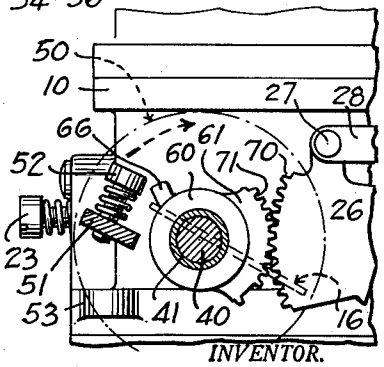


Fig. 6.



INVENTOR.
HARRY T. SCOTT
BY
Frederick Diehl
ATTORNEY

Patented Sept. 2, 1952

2,609,187

UNITED STATES PATENT OFFICE

2,609,187

CARBURETOR

Harry T. Scott, Los Angeles, Calif.

Application October 24, 1947, Serial No. 781,784

4 Claims. (Cl. 261—23)

1

My invention relates generally to internal combustion engines, and more particularly to carburetors for the fuel supply systems thereof.

It is a fact well known to those skilled in the art, that it is impossible to design a single or dual carbureor which will deliver to the engine an economical, homogeneous combustible mixture without sacrificing power, or to design such carburetors to obtain maximum engine power and yet maintain economical, smooth operation of the engine at the lower speeds. In designing a carburetor for economy, the Venturi area must be sufficiently reduced to insure high velocity air for atomization of the fuel at the nozzle into the finest possible mist for mixing with air in the mixing chamber into a homogeneous mixture. However, with a wide open throttle to obtain the maximum power and speed of which the engine is capable, the restricted venturi will limit the air entering the engine and will thus cause a back pressure or vacuum to be built up in the intake manifold. The volumetric efficiency of the engine is thus reduced, to the end that the engine cannot produce all the power that it is capable of delivering.

On the other hand, if the Venturi area is increased sufficiently to obtain increased volumetric efficiency at the higher speeds, then the velocity of air passing through the venturi at the lower engine speeds will be insufficient to atomize the fuel.

The primary object of my invention is to provide a carburetor structurally characterized by simple, positively acting means which overcomes the objections and defects of single and dual type carburetors as above set forth, and insures that an economical, homogeneous, combustible mixture will be delivered to the engine at all speeds without sacrificing any power that the engine is capable of delivering.

Another object of my invention is to provide a carburetor of the above described character embodying one carbureting unit with a manually actuated throttle for the lower speeds, and a second carbureting unit whose throttle for the higher speeds is operatively associated with the low speed throttle in such manner that the high speed throttle will be maintained closed until the low speed throttle reaches a predetermined open position, preferably that at which maximum volumetric efficiency is derived from the mixing chamber of the one carbureting unit, and irrespective of the vacuum present in the induction system of the engine at the downstream side of the throttles, the high speed throttle being then free to open in accordance with the demand of the engine for fuel, whereby to economically obtain maximum volumetric efficiency from the carburetor at all engine speeds.

2

With these and other objects in view, my invention resides in the combinations, arrangements and functional relationships of elements as set forth in the following specification and particularly pointed out in the appended claims.

In the accompanying drawings,

Figure 1 is a view showing in vertical, longitudinal axial section, one form of carburetor embodying my invention;

Figure 2 is a fragmentary view of the carburetor in side elevation, and showing both low and high speed throttle valves closed;

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 3, with the low speed throttle valve partly open and the high speed throttle valve closed;

Figure 5 is a view similar to Figure 4, but showing the low speed throttle valve fully open, and the high speed throttle valve free to open;

Figure 6 is a view similar to Figure 4, but showing the low speed throttle valve fully open and the high speed throttle valve partly open;

Figure 7 is a fragmentary detail view partly in elevation and partly in section, of a spring adjusting means embodied in my invention; and

Figure 8 is a diagrammatic plan view showing the relation between the carburetor and intake manifold of the engine to deliver fuel to the common induction system thereof from a concentrated area at the downstream side of the low and high speed throttle valves.

Referring specifically to the drawings, the carburetor embodying my invention is shown for the purpose of illustration as being of the downdraft type, and is composed of two carbureting units A and B supplying fuel to a common induction system of which the intake manifold I is shown in Figure 8.

The single body 10 which contains the carbureting units A and B is made up of several sections bolted together as is the common practice to facilitate manufacture, and is provided in its lower portion with two parallel bores 11 and 12, the upper portions of which are provided with Venturi members 13 and 14, respectively. In the present instance the bores 11 and 12 are of the same diameter, but the member 13 has a throat of smaller area than the throat of the member 14. It is to be noted that the effective

area of the venturi 13 is considerably smaller than the effective area of the venturi embodied in the usual single Venturi type carburetor for an engine of corresponding size.

In the bores 11 and 12 are throttle valves 15 and 16, the valve 15 being hereinafter referred to as the main or low speed throttle valve for use in attaining road speeds of up to fifty or sixty miles per hour, whereas the valve 16 will be hereinafter referred to as the auxiliary or high speed throttle valve for use in addition to the throttle valve 15 in attaining road speeds above those possible with the throttle valve 15 alone. As shown in Figure 1, the carbureting units A and B are provided with main fuel nozzles 20 and 21 associated with the respective venturis 13 and 14, and idling fuel nozzles 22 and 23 associated with the respective throttle valves 15 and 16, all being supplied with fuel from a common float chamber indicated diagrammatically by 24 in Figure 8.

The throttle valve 15 is fixed to a shaft 25 journaled in the body 10 about an axis diametrically related to the bore 11. Fixed to one projecting end of the shaft 25 is an actuating member in the form of an arm 26 to which pivotally connected at 27 a throttle rod 28 which is controlled by the usual foot throttle (not shown) spring loaded to urge the throttle valve 15 closed in the usual manner. A lateral extension 29 on the arm 26 has threaded therethrough an adjustable stop screw 30 which co-acts with a stop lug 31 on the body 10 to provide for idling adjustment of the throttle valve 15.

The arm 26 is further provided with a cam shoulder 32, which, in the partially open position of the throttle valve shown in Figure 4, engages the beveled end 33 of a yieldable detent pin 34 passing freely through an opening in a lug 35 on the body 10 and mounted on the free end portion of a flat spring 36 whose other end is fixed to the underside of the stop lug 31 by a screw 37. The pin 34 offers slightly noticeable resistance to the opening movement of the throttle valve 15 beyond the position of Figure 4, but yields to continued pressure on the foot throttle to enable the valve 15 to be moved to the fully open position shown in Figure 5, to which position the valve is definitely limited by a stop shoulder 38 on the arm 26 engaging the lug 35 as shown in this figure. The arm 26 is provided with a peripherally arcuate surface 39 which freely wipes across the end of the axially displaced pin 34 between these two positions of the throttle valve 15.

The throttle valve 16 is fixed in an off-center position to a shaft 40 journaled at one end in the body 10 and at the other end is a bushing or sleeve 41 mounted in the body and projecting therefrom as shown in Figure 3. A relatively lightly loaded coil spring 42 surrounds said one end of the shaft 40 within a cup-shaped cap 43. One end of this spring is fixed at 44 to the body 10, and its other end is fixed at 45 to the cap, which latter is rotatably adjustable on the shaft 40 to vary the loading of the spring. The cap 43 and shaft 40 are provided with circular series of teeth 46 and 47, respectively (Figure 7) which lock the cap in any selected position of adjustment.

A headed screw 48 threaded into the end of the shaft 40 and bearing against the cap, confines the latter against axial displacement, with the teeth 46 and 47 in mesh. When the screw 48 is loosened, the cap 41 can be shifted axially to disengage the teeth 46 and 47, so as to enable rotatable adjustment of the cap to be effected.

Fixed to the other end of the shaft 40 which projects beyond the bushing 41, is an anti-flutter or inertia member in the form of a weighted wheel 50, from the inner side of which laterally projects an ear 51. Threaded through the ear 51 is an adjustable stop screw 52 which co-acts with a stop lug 53 on the body 10, to provide for idling adjustment of the throttle valve 16, it being clear that the spring 42 urges the stop screw 52 against the stop lug 53.

Freely mounted on the bushing 41 is the hub 60 of a control member 61. A relatively heavily loaded spring 62 is mounted on the bushing 41 within an enlarged portion 63 of the bore of the hub 60, with one end of the spring fixed to the body at 64, and the other end of the spring fixed to member 61 at 65, all to the end that the spring will urge the control member to rotate in the same direction (counterclockwise in Figures 3 to 6, inclusive) as the throttle valve 16 is urged by the spring 42, to the position shown in Figures 2 and 4 wherein a lug 66 on the control member engages the ear 51 of the inertia wheel 50.

A split, spring ring 67 co-acts with a washer 68 to confine the control member 61 against axial displacement, and a second washer 69 is mounted on the shaft 40 between the inertia member 50 and the end of the bushing 41, to reduce the friction against the inertia member to a negligible amount.

The actuating member 26 is provided with a number of teeth providing a segmental gear 70 which is adapted to mesh with a segmental gear 71 formed by a number of teeth on the control member 61, it being noted that the second tooth at one end of the gear 71 is omitted to enable the gear 71 to move into and out of mesh with the gear 70, all in a manner to be described in the operation of the invention which is as follows:

When driving in the lower speed range, which, in modern automobiles may be considered as a maximum of from fifty to sixty miles per hour, only the carbureting unit A functions, the throttle valve 15 being manually opened from its idling position of Figure 2 to supply the necessary fuel, by depressing the foot throttle in the usual manner. However, upon reaching the partially opened position shown in Figure 4, the throttle valve 15 has been moved through an angular distance of approximately sixty degrees, which represents the maximum throttle opening at which volumetric efficiency can be obtained. Any further opening of the throttle valve 15 will not appreciably increase the power, due to the restricting effect of the Venturi member 13, which, it will be remembered, has designed for economy within the lower speed range.

The operator will be aware that the maximum open position of the throttle valve 15 for maximum volumetric efficiency has been reached, by contact of the cam shoulder 32 with the beveled end 33 of the pin 34 as shown in Figure 4, as the pin offers a slight resistance to further opening of the throttle valve, which is felt at the foot throttle. Concurrently, the leading tooth of the gear 70 on the actuating member 26 engages the leading tooth of the gear 71 on the control member 61. Thus, should increased speed be desired, depressing movement of the foot throttle is continued so as to cam the pin 34 clear of the path of movement of the actuating

member whose arcuate surface 39 wipes freely across the end of the pin.

As this movement of the control member 61 moves its lug 66 away from the ear 51 of the inertia wheel 50, the high speed throttle valve 16 is now free to open against the slight loading of the spring 42 tending to keep the valve closed. As a slight back pressure or vacuum is being built up in the common induction system at the downstream side of the carbureting units, the valve 16 will be opened accordingly by suction thereon due to the off center mounting of the valve on the shaft 40.

The additional mixture admitted to the engine, with the attending increase in engine speed, will naturally increase the vacuum at the downstream side of the throttle valve 16, so as to further open same until the ear 51 of the inertia wheel 50 arrests the opening movement of the valve 16 by striking the lug 66 of the control member 61. Should opening movement of the low speed throttle valve 15 be continued through its maximum angular distance of approximately ninety degrees as shown in Figure 5, then the high speed throttle valve 16 may be opened until the speed of the engine will not produce any additional slight vacuum in the induction system. Under these conditions, the engine will be delivering the maximum power of which it is capable. It will be clear from the foregoing description, that an economical, homogeneous, combustible mixture will be delivered to the engine throughout both low and high speed ranges without sacrificing any power that the engine is capable of delivering.

I claim:

1. In an internal combustion engine, a carburetor comprising: a plurality of carbureting units having main and auxiliary throttle valves, respectively; a rotatably mounted shaft to which said main valve is fixed; a second shaft to which said auxiliary valve is fixed off center, mounted for rotation about an axis laterally offset from and parallel to the axis of the first said shaft; means urging the second said shaft to rotate in a direction to close the auxiliary valve; a manually operable actuating member fixed to the first said shaft; a bushing through which the second said shaft projects; a control member freely mounted on said bushing; means urging the control member to rotate in a direction corresponding to that in which the second said shaft is urged and with sufficient force to prevent manifold vacuum from opening the auxiliary valve when the main valve is closed; an inertia member fixed to the second said shaft; said control and inertia members having lugs co-acting under the action of said control member urging means, to maintain the auxiliary throttle valve against opening movement; and a lost-motion operative connection between said actuating and control members, by which the latter will be rotated against its urging means by the actuating member, so as to move the control member lug away from the inertia member lug, to permit opening movement of the auxiliary valve to be effected by back pressure at the downstream side of the valves.

2. A carburetor as embodied in claim 1 wherein said actuating member is provided with a cam shoulder; and a yieldably mounted detent with which said shoulder co-acts when the main valve has been opened a predetermined amount, to offer resistance to further opening of the main valve.

3. In an internal combustion engine, a carburetor comprising: a plurality of carbureting units having a main throttle valve and an unbalanced auxiliary throttle valve, respectively, and shafts to which the respective valves are fixed, to mount them for rotation independently about laterally offset and parallel axes; a manually operable actuating member fixed to the shaft of the main valve; a control member freely mounted on the shaft of the auxiliary valve; means urging said control member to rotate in a direction to close the auxiliary valve; an inertia member fixed to the shaft of the auxiliary valve; said control and inertia members having stops co-acting under the action of said urging means, to maintain the auxiliary valve closed; and a lost-motion operative connection between the actuating and control members including gears by which the control member will be rotated counter to its urged direction when said main valve has been opened to a predetermined position, so as to move the control member away from the inertia member stop to free the auxiliary valve for opening movement by vacuum in the induction system at the downstream side of the valve; the ratio between said gears being such that opening movement of the main valve beyond said predetermined position to a maximum open position will render the auxiliary valve free to move from its closed position to a maximum open position so as to obtain maximum volumetric efficiency from both carbureting units.

4. A carburetor as embodied in claim 3 wherein at least one tooth of one of said gears is omitted to facilitate meshing of said gears when the auxiliary valve is to be freed for opening movement as aforestated, whereby to compensate for variations in idling adjustment of the auxiliary valve.

HARRY T. SCOTT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,152,031	Lobdell	Aug. 31, 1915
1,916,906	Aseltine	July 4, 1933
2,140,776	Trisler	Dec. 20, 1938
2,193,533	Kishline et al.	Mar. 12, 1940
2,307,486	Carlson	Jan. 5, 1943
2,402,361	Bicknell	June 18, 1946
2,420,925	Wirth	May 20, 1947
2,436,319	Meyer	Feb. 17, 1948
2,443,464	Leibing et al.	June 15, 1948