Jan. 5, 1926. 1,568,410

C. C. MINTER

CHARGE SUPPLY MEANS FOR INTERNAL COMBUSTION ENGINES AND MEANS FOR MAINTAINING UNIFORM MIXTURE CONDITIONS OF THE CHARGE

Filed Feb. 17, 1925

Fig. 1.

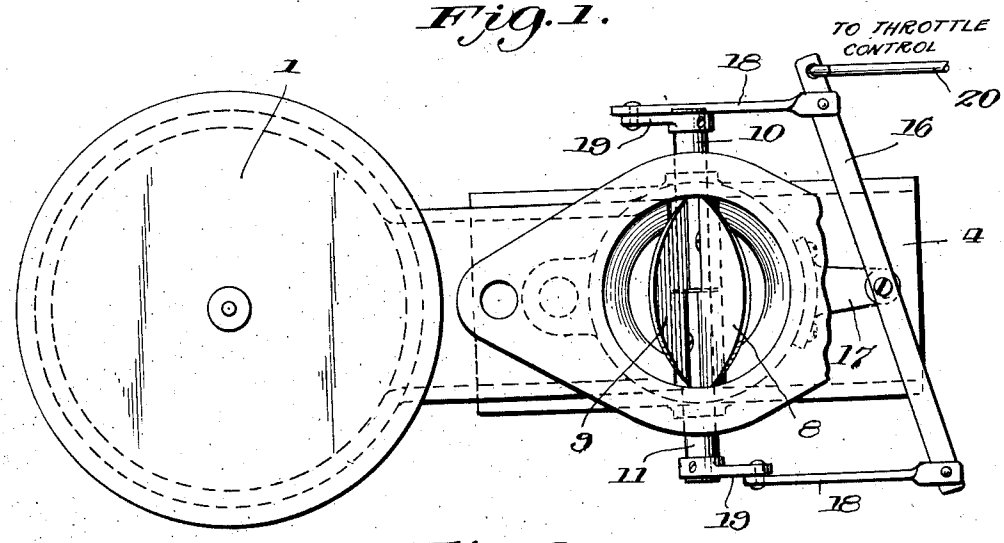


Fig. 2.

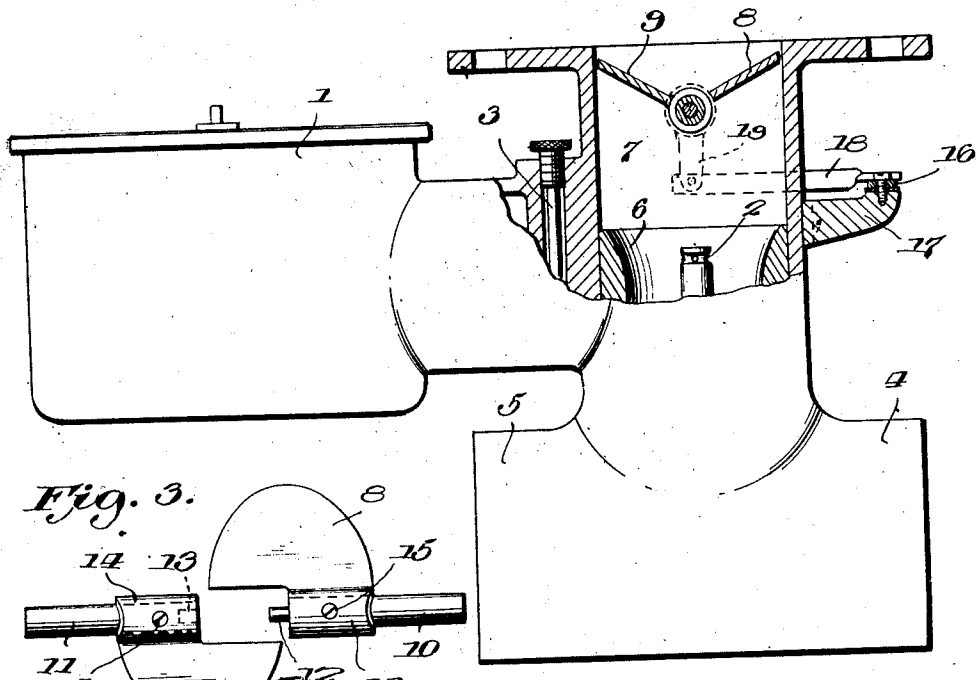


Fig. 3.

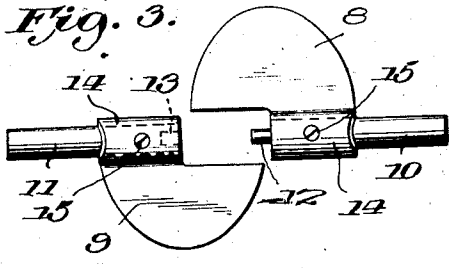


Fig. 4.

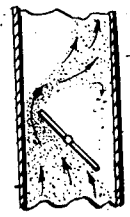
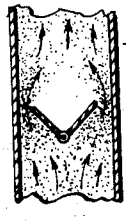


Fig. 5.



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UNITED STATES PATENT OFFICE.

CLARKE C. MINTER, OF BLOOMFIELD, NEW JERSEY.

CHARGE-SUPPLY MEANS FOR INTERNAL-COMBUSTION ENGINES AND MEANS FOR MAINTAINING UNIFORM MIXTURE CONDITIONS OF THE CHARGE.

Application filed February 17, 1925. Serial No. 9,835.

To all whom it may concern:

Be it known that I, CLARKE C. MINTER, a citizen of the United States, residing at Bloomfield, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Charge-Supply Means for Internal-Combustion Engines and Means for Maintaining Uniform Mixture Conditions of the Charge; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to charge supply means for internal combustion engines and means for maintaining uniform mixture conditions of the charge. More specifically, the invention relates to a charge forming device or carburetor for internal combustion engines and to a novel form of throttle valve controlling the outflow of the formed charge from the carburetor to the engine. The invention also relates to such a valve applicable to any usual type of carburetor.

A general object of the invention is to provide means whereby the mixture of air and gasolene, or other liquid hydrocarbon customarily used with internal combustion engines, initially formed by the air and liquid hydrocarbon supply elements of the carburetor, is maintained in condition of substantial uniformity of distribution of the hydrocarbon throughout the mass of air in the outflow of the charge from the carburetor.

Another object of the invention is to provide such a means of simple construction and of few mechanical parts.

Still another object of the invention is to provide a novel form of throttle valve for the outlet conduit of a carburetor which, in addition to its ordinary throttling function, will attain the foregoing general objects of the invention.

A further object of the invention is to provide such a throttle valve which may be readily applied to the outlet conduit of any of the usual types of carburetors, with but slight changes or additions required for its mounting.

The objects of my invention stated above, and other objects, as well as the principles thereof, will more fully appear from a detailed description hereinafter given of an illustrative embodiment of the invention in preferred form. It is to be understood, however, that the particular embodiment hereinafter described is merely illustrative of my invention and that the broad scope of the invention includes various other specific embodiments in accordance with its principles and as defined in the appended claims.

In the accompanying drawings, forming a part of this specification, is illustrated an apparatus embodying the principles of my invention and forming the present preferred embodiment thereof.

In the drawings:

Fig. 1 is a top plan view of a carburetor in which the invention is embodied;

Fig. 2 is a view of the apparatus of Fig. 1, partly in side elevation and partly in vertical sectional view;

Fig. 3 is a detached detail view, in side elevation of the throttle valve elements of the invention;

Fig. 4 is a longitudinal central sectional view, diagrammatic in character, through the outlet conduit of a carburetor or other charge forming device, with a butterfly throttle valve in the outlet conduit, the view being intended to illustrate the non-uniform conditions of the mixture of air and hydrocarbon in the outflow of the charge when such a valve is employed; and

Fig. 5 is a similar diagrammatic view with my present novel throttle valve in use in the outlet conduit and showing its effect upon the distribution of the particles of the liquid hydrocarbon throughout the outflowing body of air.

I have found upon extensive experimentation and tests of carburetor and engine operation, that charge mixtures, of the right proportions as initially formed by the air and liquid-hydrocarbon supply and mixing elements of the carburetor, in the majority of cases, especially at low and intermediate engine speeds, reach the various cylinders of a multi-cylinder engine with those proportions substantially changed and varying in the different cylinders, and that this is due in large measure to a deflection of the hydrocarbon portions of the charge to one side or another of the

body of air outflowing from the carburetor, and generally by the types of throttle valves heretofore employed.

This deflection of the hydrocarbon portions of the charge from positions of uniform distribution in the body of air outflowing from the carburetor is particularly marked in the use of the comparatively low grade gasolines on the market today which do not completely vaporize but remain suspended as finely divided liquid particles in the charge, forming our so-called "wet" mixtures.

This deflection of the liquid particles of the fuel has also been found of greatest occurrence in the use of throttle valves of the butterfly type in the outlet conduit of the carburetor, although the cause is not confined to such valves. The deflecting action of the butterfly type of throttle valve is illustrated diagrammatically in Fig. 4, the liquid particles of the charge being illustrated by the dots in the outflowing stream and their deflection by the arrows. When the valve is in partially open position, inclined to the left, as there shown, the upflowing body of the charge, in substantially uniform condition of distribution of the hydrocarbon particles therethrough, as shown by the dots below the valve, is, in major part, deflected to the left and its velocity increased in passage between the upper edge of the valve and the adjacent wall of the conduit. Due to the increased velocity of the charge and the inclined direction of flow of the liquid particles, those particles, contacting the wall of the conduit are next abruptly deflected upwardly to the right and hence to one side of the body of outflowing air. It has been found that this deflection of the liquid fuel particles is so substantial that the charge, during its passage through the manifold to the engine cylinders, does not, under most conditions of engine operation, return completely to its initial condition of uniform proportions of hydrocarbon and air, the result being a mixture too lean in one or more cylinders and too rich in others.

That this variation in hydrocarbon proportions of the charge reaching the different cylinders is due in large measure to deflection of the liquid particles by the throttle valve is indicated by the fact, shown by my tests, that with a carburetor equipped with the ordinary type of butterfly throttle valve journaled on an axis at right angles to the line of the engine cylinders, when the throttle valve is thrown to the left in partially open position, as illustrated in Fig. 4, the charge reaching the engine cylinder to the extreme right is of richest mixture and that reaching the engine cylinder to the extreme left, the leanest. When the axis of the throttle valve is disposed parallel to the line of the engine cylinders, there is still a variation in the air and hydrocarbon proportions of the charges in the different cylinders, although not always in the order of variation just referred to.

A primary object of my invention is to entirely avoid, or to compensate for, this deflection of the liquid fuel particles from positions of uniform distribution throughout the body of the charge. Under its broader aspects, the invention need not necessarily take the form of throttle-valve means either in substitution for or in addition to the throttle valve of the types heretofore employed, although certain particular advantageous features appear in its embodiment in such means.

All throttle valves necessarily present some surface so exposed to the stream-flow of the charge as to cause deflection of the liquid fuel particles thereof; and in one broad aspect, my invention contemplates, whether embodied in novel throttle-valve means taking the place of the types heretofore employed or not, means for so directing the necessarily diverted or deflected liquid fuel particles as to return them to the onward stream-flow of the charge on the engine-side of the carburetor in substantially uniform distribution throughout that charge.

Referring now more specifically to the preferred embodiment of the invention shown in the accompanying drawings: The carburetor employed may be of any suitable type but is shown as of the float-feed type, the float chamber being indicated by the numeral 1. The flow of the gasoline to the atomizer nozzle 2 is controlled by the manually adjustable needle valve 3. Preferably, but not necessarily, oppositely disposed air inlet or supply conduits 4 and 5 are provided so as to more certainly insure an upward flow of air of uniform density through the Venturi tube 6 past the fuel atomizer nozzle 2 and through the outlet conduit 7 of the carburetor.

The novel throttle-valve means in which my invention is here shown as embodied, comprises a two-part valve, with the separate parts 8 and 9 of wing-like form, semicircular in contour and complementarily mounted upon oppositely rotatable shafts 10 and 11, the complementary mounting and contour of the parts of the valves providing a closure for the outlet conduit in the position of the parts shown in Fig. 2, and the shafts being oppositely rotatable to fold the wings upwardly in approaching direction to varying opening positions of the valve, one opening position being shown in Fig. 1.

The shafts 10 and 11 extend through and are journaled in opposite side apertures bored through the cylindrical wall of

the chamber or outlet conduit 7 of the carburetor, and to provide a rigid shaft-mounting for the valve parts, one shaft 10, is provided with a reduced cylindrical end 12 extending within and journaled in a complementary formed recess 13 in the other shaft 11 in the assembled position of these shafts shown in Fig. 1.

To provide for a ready mounting of the valve parts 8 and 9 on the shafts and for a removal of the same therefrom, the valve parts are each provided with a sleeve-like extension 14 fitting about the shafts and secured rigidly to the shafts by screws 15. These provisions enable a ready assembly and disassembly of all the parts. In such assembly, the valve parts 8 and 9 are first properly positioned within the conduit or chamber 7 of the carburetor with their sleeves 14 in alignment with the side apertures of the chamber, the shafts 10 and 11 are then inserted through the apertures and sleeves and the valve parts secured thereon by the screws 15. In disassembling the parts, the screws 15 being first removed, the shafts are then withdrawn, leaving the valve parts free for removal.

Any suitable operating means may be employed for the shafts. That shown comprises a lever 16 pivoted at its center upon a lug 17 which may be one formed integral with the wall of the carburetor or detachably secured thereto in any suitable way. In the present instance it is shown as screw-attached to the carburetor wall. Links 18 are connected at one end to the opposite arms of the lever 16 and at their other ends to cranks 19 fixedly secured to the shafts 10 and 11 as shown in Fig. 1. An operating rod 20 extends from the lever 16 to the throttle control mechanism, which may be an automatic or manual control as desired. It is apparent that operation of the rod 20 will impart movement to the arms of the lever 16 in opposite directions and correspondingly opposite directions of rotation to the shafts 10 and 11, one direction of such operation of the rod 20 swinging the valve parts 8 and 9 upwardly in opening the valve and the other swinging them downwardly to closing position.

The valve parts 8 and 9 have plane sides as shown and in assembled position they form a V-shaped deflecting device in all positions of opening of the valve, with the sides of the device inclined upwardly from a centrally disposed apex and at equal angles of inclination. This device therefore presents abutting surfaces to the oncoming charge which evenly divides the charge into two oppositely deflected streams, the two streams being upwardly deflected at the same angle of inclination to the walls of the chamber or outlet conduit 7 of the carburetor. The upward flow of the divided streams at increased velocity due to the relatively restricted passage between the free edges of the valve parts 8 and 9 and the walls of the chamber 7 of the carburetor and at an inclination to those walls, causes a violent impingement of the liquid particles of the divided streams against the carburetor walls and their inward deflection after the valve is passed. This deflection of the liquid particles of the two divided streams being necessarily in opposite directions inwardly from opposite side walls of the outlet conduit of the carburetor, a violent commingling of the liquid particles results with a substantial return to the initial conditions of uniform distribution of the hydrocarbon throughout the outflowing stream of air. This effect of the deflecting device is diagrammatically illustrated in Fig. 5, which shows by the dots, representing the liquid fuel particles, the initial uniform distribution of the fuel particles throughout the body of air below the deflecting device, the dividing of the charge into two streams, their deflection upwardly in opposite directions toward the chamber walls by the deflecting device, the resulting inward deflection of the fuel particles after passing that device and the return of the charge above the device to the initial condition of substantially uniform distribution of the fuel particles therethrough.

What is claimed is:

1. A carburetor for internal combustion engines comprising, in combination, air and liquid hydrocarbon supply means cooperatively arranged to form a charge mixture, an outlet conduit for said charge mixture and a combined throttle valve and fluid deflecting means arranged in said outlet conduit on the engine side of said air and liquid hydrocarbon supply means, said combined throttle valve and fluid deflecting means comprising valve elements pivotally mounted to open and close said outlet conduit so as to control the flow of the charge to said engine, said valve elements presenting at least two surfaces extending from a vertical median plane of said outlet conduit at substantially equal angles of inclination oppositely toward the walls of said outlet conduit.

2. In association with a carburetor or the like charge forming device for multi-cylinder internal combustion engines, said carburetor having a charge outlet conduit adapted to be connected to the intake manifold of said engine, a combined throttle valve and fluid deflecting device arranged in said outlet conduit immediately adjacent its delivery outlet into said manifold, said last mentioned device comprising valve elements movable to open and close said outlet conduit and having two surfaces extending from a vertical median plane of said outlet conduit in opposite directions toward the

walls of said outlet conduit and at an inclination toward the outlet end of said conduit.

3. Combined throttle valve and fluid deflecting means for carburetors or the like, comprising, in combination, two substantially flat surfaced valve elements adapted to be mounted for pivotal movement, oppositely rotatable shafts for said mounting and movement, said shafts adapted for the mounting of said valve elements in opposite directions of upward inclination within the outlet conduit of the carburetor and with the shafts in parallel, one of said valve elements being mounted to extend wholly to one side of its shaft.

4. Combined throttle valve and fluid deflecting means for carburetors or the like, comprising, in combination, two substantially flat surfaced and wing-like valve elements adapted to be mounted for pivotal movement, oppositely rotatable shafts for said mounting and movement, said shafts and valve elements being cooperatively arranged and adapted for the mounting of said valve elements within the outlet conduit of the carburetor, with the shafts alined and with the valve elements extending upwardly in said outlet conduit in opposite directions in positions of opening of said valve.

5. In association with a carburetor or the like charge forming device for internal combustion engines, throttle valve means in the outlet conduit of said carburetor, said throttle valve means comprising two oppositely rotatable shafts extending in parallelism transversely through the outlet conduit of said carburetor and in the same vertical median plane of said outlet conduit, two substantially flat surfaced valve elements one mounted on each said shaft for pivotal movement in opposite directions to opening and closing positions, said valve elements being cooperatively arranged and mounted to extend in opposite directions upwardly toward the walls of said outlet conduit in opening positions, and one of said valve elements extending wholly to one side of its shaft, and means for imparting turning movements to said shafts in opposite directions.

6. In association with a carburetor or the like charge forming device for internal combustion engines, throttle valve means in the outlet conduit of said carburetor, said throttle valve means comprising two oppositely rotatable and aligned shafts together extending transversely through the outlet conduit of said carburetor and in a vertical median plane of said outlet conduit, two substantially flat-surfaced wing-like valve elements mounted on said shafts, cooperatively arranged and adapted for pivotal movement in opposite directions to opening and closing position in said conduit, and said valve elements extending upwardly in opposite directions at substantially equal angles of inclination toward the walls of said conduit in opening positions, and means for turning said shafts in opposite directions.

In testimony whereof I hereunto affix my signature.

CLARKE C. MINTER.