Nov. 30, 1937. F. G. C. BASHFORD ET AL 2,100,466

MEANS FOR PROMOTING COMBUSTION IN INTERNAL COMBUSTION ENGINES

Filed Jan. 22, 1936 2 Sheets-Sheet 1

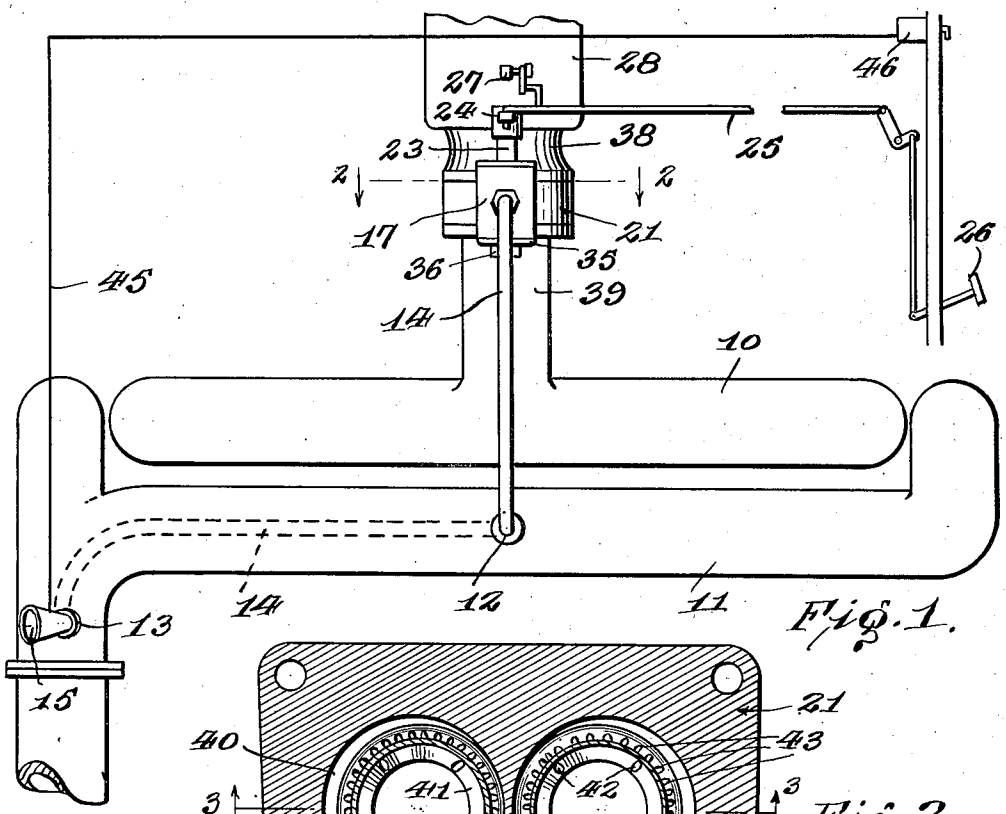


Fig. 1.

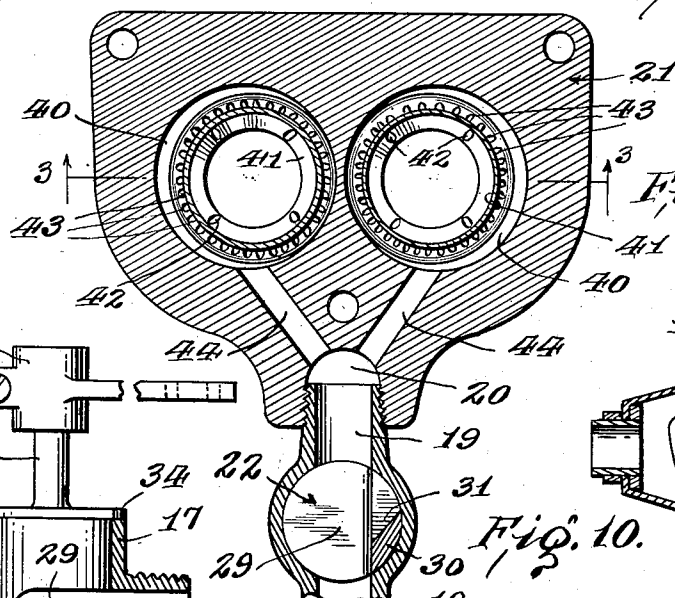


Fig. 2.

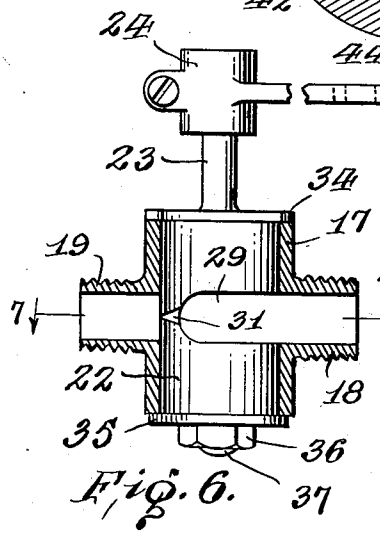


Fig. 6.

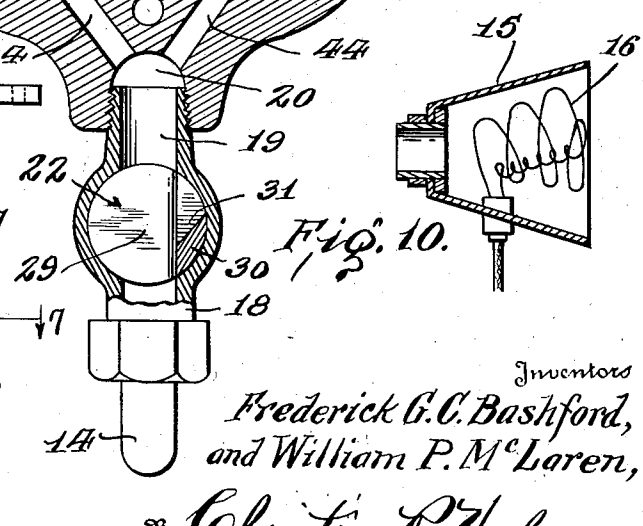


Fig. 10.

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MEANS FOR PROMOTING COMBUSTION IN INTERNAL COMBUSTION ENGINES

Filed Jan. 22, 1936 2 Sheets-Sheet 2

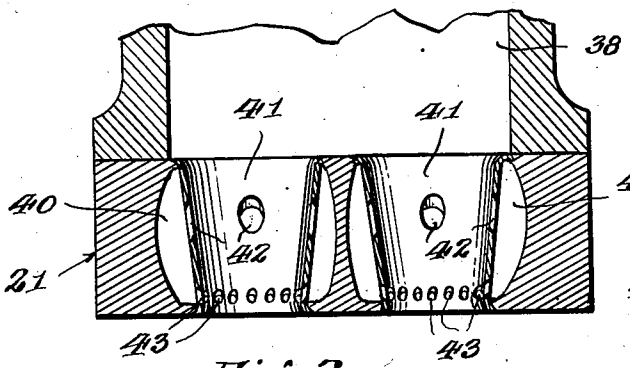


Fig. 3.

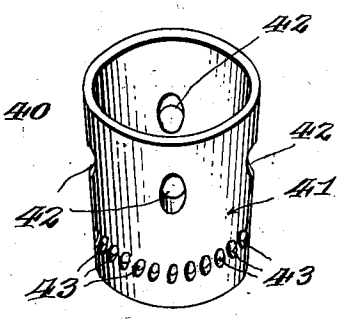


Fig. 5.

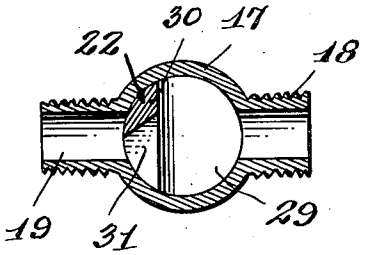


Fig. 7.

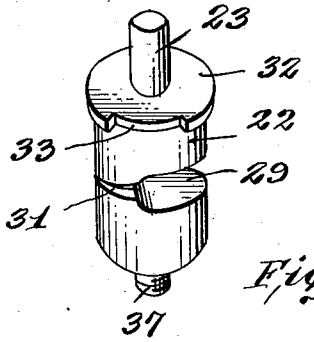


Fig. 8.

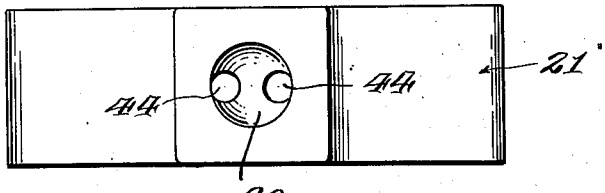


Fig. 4.

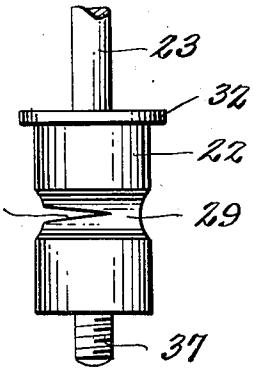


Fig. 9.

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MEANS FOR PROMOTING COMBUSTION IN INTERNAL COMBUSTION ENGINES

Frederick George Cavendish Bashford and William Perry McLaren, Montreal, Quebec, Canada

Application January 22, 1936, Serial No. 60,334

3 Claims. (Cl. 123—119)

This invention relates to means for promoting combustion in internal combustion engines and is a continuation in part of the subject matter described and claimed in our pending application filed July 23, 1934, Serial No. 736,446.

The invention consists essentially of the synchronal feeding of the fuel mixture and supplemental heated air in graduated quantities, as well as embodying means for re-mixing the fuel charge prior to its entry into the cylinders of an engine.

The objects of the invention are to increase the turbulence of the fuel mixture immediately preceding its entry to the engine cylinders, thereby insuring a very complete mixture of air and fuel and thus eliminate production of unburnt gases; reduce consumption of gasoline and avoid the accumulation of carbon and generally to facilitate the maintenance and operation of an engine.

It is a still further object of the invention to provide a novel construction of re-mixing chamber for the fuel, which may be readily installed in engines of present day constructions.

Additional objects, advantages and features of invention will be apparent from the following description and accompanying drawings, wherein,

Figure 1 is a side elevation of a portion of an engine, showing the attachment installed.

Figure 2 is a cross section on the line 2—2 of Figure 1, illustrating the mixing chamber.

Figure 3 is a cross section on the line 3—3 of Fig. 2.

Figure 4 is an end elevation of the mixing chamber.

Figure 5 is a perspective view of a sleeve associated with the mixing chamber.

Figure 6 is a vertical sectional view of the control valve.

Figure 7 is a cross section on the line 7—7 of Figure 6.

Figure 8 is a perspective view of the valve proper.

Figure 9 is an elevational view thereof.

Figure 10 is a sectional view of the air heater.

Attention is now particularly invited to Figure 1 of the drawings, wherein there is shown, graphically, the intake manifold 10 and exhaust manifold 11, of an internal combustion engine. The exhaust manifold 11 is apertured at 12 and 13, for admission of an air pipe 14 which extends through the chamber of the exhaust manifold, one end of which is connected with a cone-shaped casing 15 containing an electric heater 16. The other end of the air pipe 14 is elbowed and extended for connection with the valve casing 17, by means of the nipple 18. The valve casing 17 also has a nipple 19 for screw threaded engagement with a port 20 of a mixing device 21 presently to be described. The valve casing is shown as embodying a cylindrical bore within which there is oscillatably mounted a similarly shaped valve 22, one end of which includes a stem 23 for securement of a lever 24. A connecting rod 25 actuated through an accelerator pedal 26 is connected with the lever 24 and the main control 27 of the carburetor 28. Therefore, upon actuation of the accelerator pedal for the purpose of admitting gas to the engine, the valve 22 will be rotated to admit heated air to the mixing device 21 and the cylinders of the engine.

Intermediate the length of the body of the valve 22 a port 29 is formed adapted to register with the nipples 18—19, this port extending transversely across the valve and opening circumferentially therearound except for a small connecting portion 30. A tapering opening 31 is formed in the portion 30 extending circumferentially thereof and is in communication with the port 29. The opening 31 tapers in the direction of the portion 30 to a mere slit and thus a graduated quantity of air will be admitted commensurate with the degree of actuation of the accelerator 26. The admission of air through the valve 22 will thus be from the minimum (through the slit) and the maximum when the port 29 is aligned with the nipples 18—19. The valve 22 is flanged as at 32, the flange being provided with a cut-away arcuate part 33, forming a path for a stop pin 34. The pin 34 serves to limit rotative movements of the valve, as will be apparent, and preferably the valve 22 is maintained within the shell 17 by means of a washer 35 and nut 36, the latter being engaged upon the threaded shank 37 of the valve.

It should be noted that during full closed position of the valve 22, the slit portion of the opening 31 will align with the bore of the nipple 19, thus admitting sufficient supplemental air in the fuel mixture to cause complete combustion and eliminate the accumulation of poisonous gases.

The mixing device 21 will now be dealt with, attention being first invited to Figures 1 and 2, wherein, it will be seen that the mixing device 21 is suitably connected between the Venturi tube 38 of the carburetor and the intake branch 39 of the manifold 10, the carburetor in the present instance being shown as of the "down-draft" type. Obviously, the device is susceptible to use with the "updraft" type equally well, as only a reversal of the mixing device 21 is necessary.

The mixing device 21 includes a pair of chambers 40, extending vertically thereof and in a plane coincident with the tube 38 of the carburetor, and fixed within these chambers there is an apertured sleeve 41. The sleeves 41 are of tapered formation, tapering in the direction of flow of the gaseous charge from the carburetor,

thereby producing a Venturi-effect upon the charge, as will be apparent. The sleeves 41 are preferably given a slight curvature at their junctures with the sides of the chambers 40, thus offering the least possible resistance to the flow of gases. The chambers 40 circumscribe the sleeves 41, and in the walls defining the sleeves, a plurality of apertures 42 are formed establishing communication with respective compartments. These apertures 42 are positioned approximately midway of the length of the sleeves and taper in the direction of the compartments.

Adjacent the base of each of the sleeves 41, a plurality of smaller apertures 43 are formed, which are tapered slightly in the direction of the longitudinal axis of respective sleeves.

A pair of diagonally extended bores 44 are formed in the body of the mixing device one opening upon each of the chambers 40 and being in communication with the port 20. By the provision of diagonal bores an equal distribution of heated air will be supplied to the chambers 40, and further, it will be noted that the bores 44 enter the chambers 40 at a tangent, thereby causing the air to partake of a circumferential path around the sleeves 41 for discharge through the openings 42. It should also be noted that the sleeves 41 are positioned eccentrically with respect to the chambers 40, (see Fig. 2), the lesser distance between the sleeves and the walls of the chambers being at a point in the path of travel of the air, farthest removed from the discharge openings of the bores 44. This arrangement further insures equal distribution of the air and proper mixture with incoming gaseous charge from the carburetor. Obviously, by the provision of a pair of mixing chambers 40 a very thorough intermingling of heated air and gaseous charge is effected, and since the air is admitted to the chambers at a tangent to the vertical axis of the chambers, by way of the bores 44, the air is given a whirling action circumferentially of the chambers.

As shown diagrammatically in Figure 1, the heating coil 16 is electrically connected through the cable 45 with the starter switch 46 in order that the heater 16 may be in operation long enough to thoroughly preheat the supplemental air prior to admission of the gaseous charge from the carburetor.

The operation

The operation will be readily understood from the following description.

Upon manipulation of the starter switch 46 to energize the heater coil 16, heated air will be drawn into the mixing device 21, through the cone-shaped casing 15 by way of the tube 14 the heated air passing into the chambers 40 by way of the slit in the port 31, through the diagonal bores 44. From the chambers 40 the heated air passes to the intake manifold 10 by way of the apertures 42—43 and thence to the cylinders of the engine. This is made possible by the suction created by the reciprocation of the pistons of the engine. After reasonable length of time, the accelerator 26 is actuated to operate the main control 27 of the carburetor, which it will be apparent also rotates the valve 22 to a position to admit additional heated air from the heater element 16. At such time, a gaseous charge will be drawn through the tube 28 of the carburetor passing through the apertures 42 into the chambers 40 to be met by the heated air drawn in by way of the tube 14 and bores 44. The gas drawn in from the carburetor will obviously be quite "cold" and when this cold mixture of raw gas meets the heated air from the heater element 16 a turbulence in the mixture will be created, insuring mating of the carbon and oxygen atoms, the resultant charge delivered to the cylinders of the engine at the time of ignition being essentially steam and carbon dioxide, thereby eliminating the production of carbon monoxide from the exhaust of the engine.

Obviously, the mixing device 21 functions to more thoroughly mix the combustible mixture from the carburetor with the incoming heated air, and does in fact produce a secondary Venturi effect upon the gaseous mixture, which produces a more perfect combustible mixture.

The release of the starter switch 46 de-energizes the heater element 16, which is no longer necessary, as the exhaust gases passing around the tube 14 within the exhaust manifold are very hot and will heat the air passing through the tube to such an extent as to function in the manner above stated without the use of the heater element.

We claim:

1. Means for promoting combustion in internal combustion engines comprising a carburetting device associated with the intake manifold, a secondary mixing device between the carburetor and the intake manifold, said mixing device comprising a pair of chambers defined by circumscribing spaced walls, the inner of said walls tapering in the direction of flow of the gaseous fuel and having gas inlet apertures opening upon the chambers, gas outlet apertures formed adjacent the base of the chambers, a common hot air connection for the mixing device, means for feeding hot air thereto in graduated quantities, and separate conduit means between the air connection and the chambers.

2. Means for promoting combustion in internal combustion engines comprising a casing interposed between the carburetor and the intake manifold of an engine, said casing having a pair of annular chambers, the inner walls of which taper in the direction of flow of the gaseous mixture, said walls having inlet apertures formed therein, intermediate the length thereof and in communication with respective chambers, said walls further having outlet apertures adjacent one end and separate air ports in communication with said chambers.

3. Means for promoting combustion in internal combustion engines comprising a casing interposed between the carburetor and the intake manifold of an engine, said casing having a pair of annular chambers, the inner walls of which taper in the direction of flow of the gaseous mixture, said walls having inlet apertures formed therein intermediate the length thereof, said apertures being inclined downwardly toward the outer wall of the chambers, said inner walls further having a plurality of outlet apertures adjacent one end thereof, said apertures being inclined in the direction of flow of the gas, hot air inlet means connected to the casing, and separate port means between the respective chambers and the hot air inlet means.

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