May 9, 1933. G. W. JARGSTORFF 1,908,609

CARBURETOR

Filed June 8, 1929

Fig. 1.

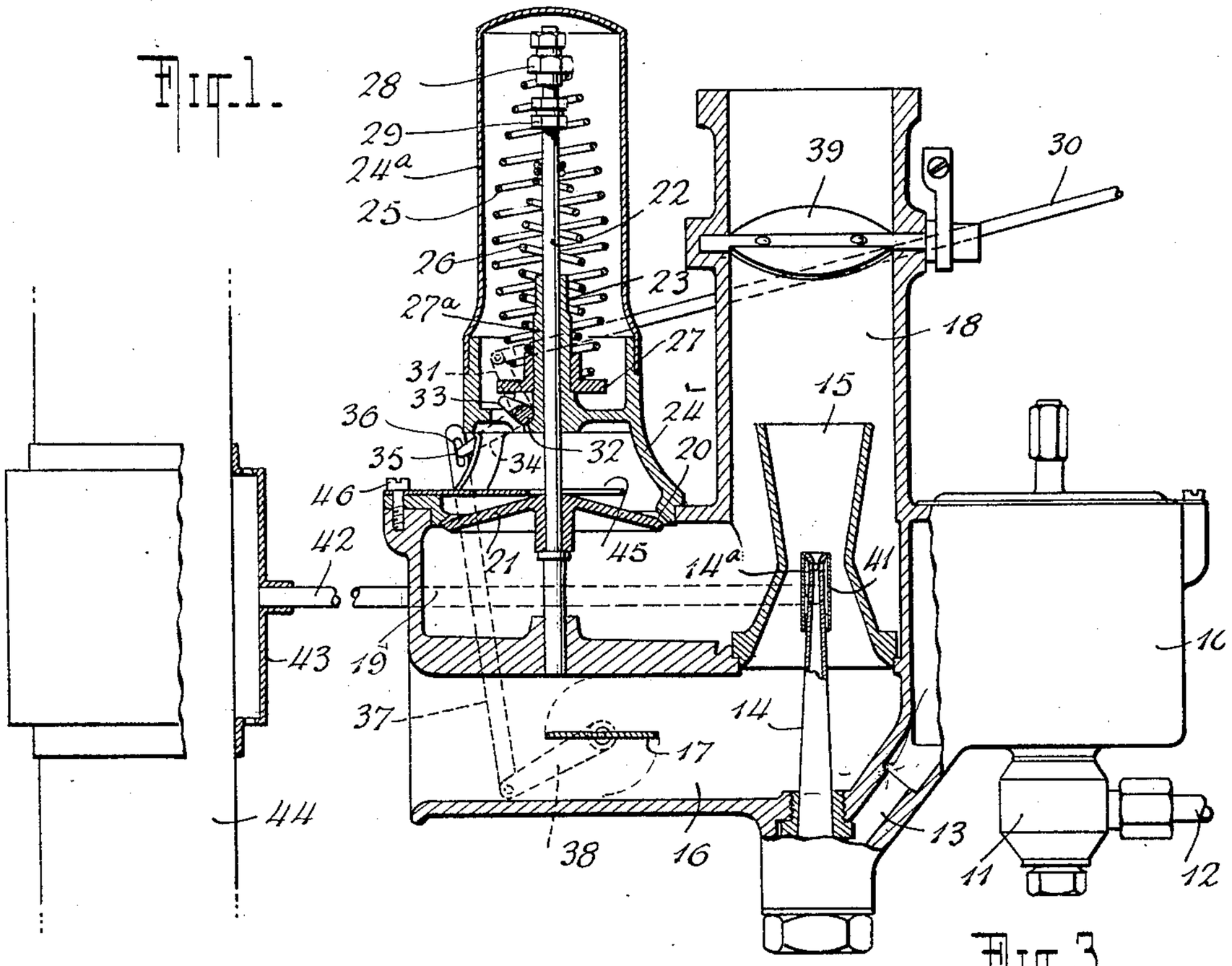


Fig. 2.

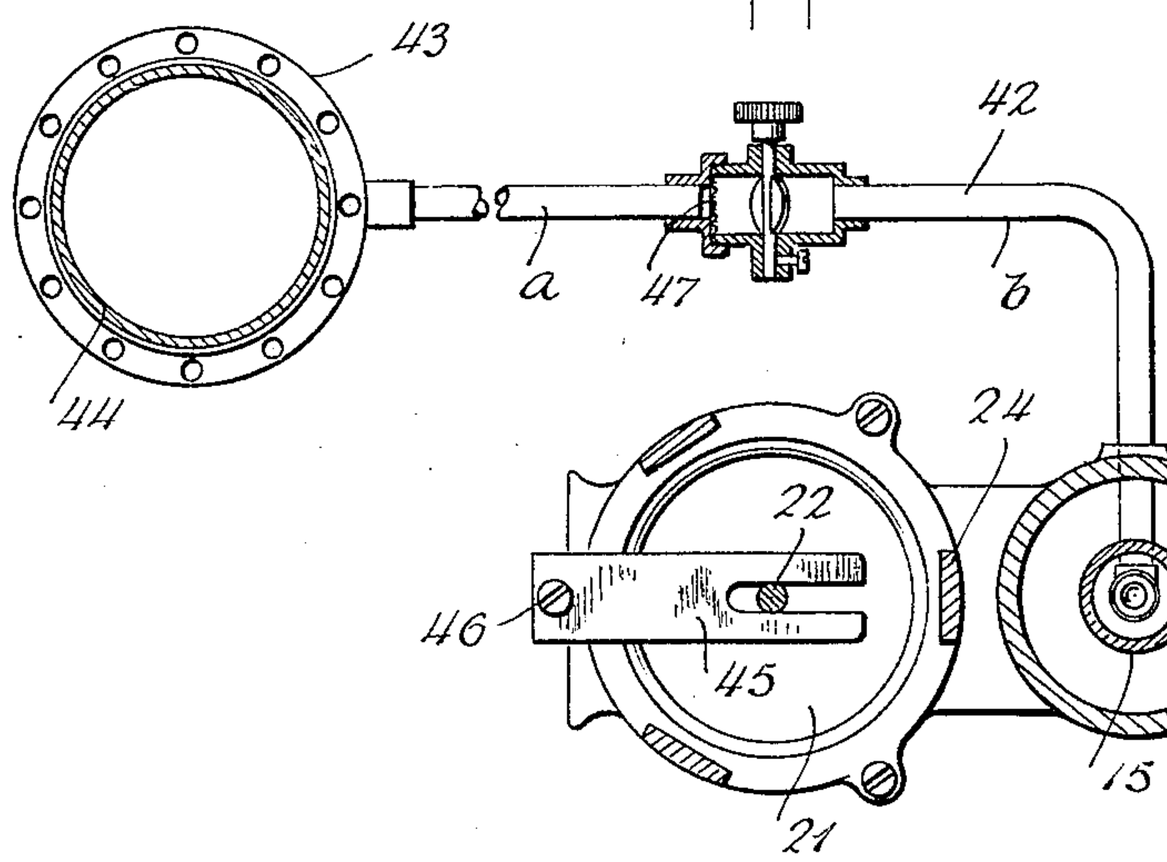
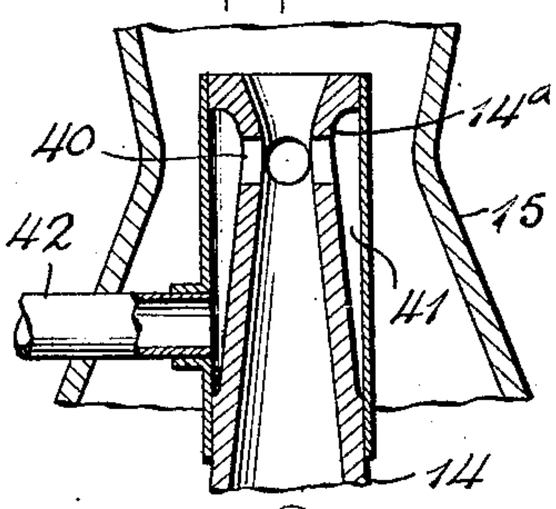


Fig. 3.



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CARBURETOR

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My invention relates to carburetors and more particularly to carburetors for supplying fuel mixtures to the internal combustion engines of automobiles and other automotive vehicles. The object of the invention is to provide a carburetor of simple construction whereby a fuel mixture of maximum efficency is delivered to the engine at all speeds, and whereby the proportions of air and fuel are automatically controlled to give the best results under all conditions of operations. Other more specific objects of the invention will appear from the description hereinafter and the features of novelty will be pointed out in the claims.

In the accompanying drawing, which illustrates an example of the invention without defining its limits, Fig. 1 is a sectional elevation of the novel carburetor; Fig. 2 is a plan view thereof with parts in section; and Fig. 3 is a fragmentary section of the spray nozzle and associated elements on an enlarged scale.

As shown in the drawing, the carburetor comprises the customary float chamber 10 provided with a coupling connection 11 adapted for connection, by means of a suitable tube 12, with a source of gasoline or other fuel in the well known way. The communication between the connection 11 and the fuel chamber 10 is automatically controlled in the conventional manner by means of a float and a suitable needle valve co-operating with a valve seat with which said connection 11 is provided in the well known way. The float chamber 10 further is connected, by means of a channel 13, with a spray nozzle 14 which projects upwardly into a Venturi tube 15 as shown in Fig. 1. The Venturi tube 15 is in open communication with the customary air inlet or intake 16 which is controlled in the well known way through the medium of the customary choke valve 17, said Venturi tube 15 further projecting upwardly into and communicating with the mixing chamber 18, which is connected with the manifold of the engine in the conventional way. The mixing chamber 18 is in open communication with an auxiliary air chamber or intake 19 provided with a valve seat 20 with which an air inlet valve 21 is arranged to co-operate in the manner to be set forth more fully hereinafter. The air valve 21 is carried by a valve stem 22, which is vertically slidable in an upright bearing 23 supported in a fixed position by means of brackets 24 upon the auxiliary air chamber 19, as shown in Fig. 1. The valve 21 is controlled by means of an outer spring 25 and an inner spring 26, which is stronger than the spring 25; the spring 25 at its lower end bears against a projection 27 extending outwardly from a sleeve 27a slidably mounted upon the valve stem 22 and normally seated against the bearing 23, and with its upper end is in permanent engagement with an adjustable abutment 28 consisting, for instance, of a nut threaded upon the stem 22. The inner spring 26 with its lower end engages a shoulder formed on the bearing 23 and has its upper end normally located at a distance from a movable abutment 29 consisting, for instance, of a nut which is also threaded upon said stem 22; in either case, suitable lock nuts may be provided for preventing unintentional disarrangement of the abutments or nuts 28 and 29 respectively. The previously mentioned choke valve 17 is manually controlled by means of the customary choke rod 30, the one end of which is located, in any conventional manner, within easy reach of the operator of the vehicle, and which, at its other end is pivotally connected with a lever 31 pivotally mounted at 32 in the bearing 23. The pivot 32 is further provided with a cam 33 arranged to bear against the projection 27 from below, and with an arm 34 the free end of which carries a pin 35 extending into the slot 36 of a link 37; the latter in turn is pivotally connected with an arm 38 rigidly secured to the pivot of the choke valve 17, as shown in Fig. 1 of the drawing. For the sake of clearness the parts above set forth have not been illustrated in Fig. 2 as they are well known in the art. For purposes of control the customary manually operated throttle valve 39 may be located within the mixing chamber 18.

As illustrated in the drawing, the spray-nozzle 14 is in the customary form of a tube

provided with a flaring exit end, and a constricted neck 14ª near said exit end. In the novel arrangement illustrated, the spray tube or nozzle 14, in close proximity to and preferably at its constricted neck 14ª, is provided with openings or admission ports 40, the diameter of each of which preferably corresponds approximately to the internal diameter of the spray tube 14 at the neck 14ª. The openings 40 establish communication between the interior of the spray tube 14 and a closed chamber 41 located exteriorly of and surrounding said tube 14 within the lower portion of the Venturi tube 15. A conduit or pipe 42 passes through the Venturi tube 15 and connects from the chamber 41 to a stove or equivalent device 43, which surrounds the exhaust pipe 44 at a convenient point in any conventional manner such conduit charging heated air into the nozzle 14. It will be evident that, particularly as the air conduit 42 is connected with the hot exhaust pipe, the reduced portion of the nozzle 14 and the openings 40 therein should be situated sufficiently above the level of the fuel in the chamber 10 to prevent the flow of fuel into the conduit 42. In addition to the parts so far described, the novel arrangement includes means whereby the air valve 21 is normally prevented from fully seating itself against the seat 20, and is normally maintained at a predetermined distance therefrom so as to provide an air inlet of restricted area or dimensions at said valve 21; in other words, the arrangement is such that a limited supply of air under normal conditions is continuously admitted to the auxiliary air chamber 19. In the illustrated example, this result is obtained by providing a leaf spring 45, which is secured at 46 to a suitable stationary portion of the carburetor and bears downwardly against the valve 21, said spring 45 being forked, as shown in Fig. 2 and straddling the valve stem 22. The tension of the leaf spring 45 is such that it will under normal conditions prevent the spring 25 from seating the valve 21, but will maintain the latter at the aforesaid predetermined distance from the seat 20.

In practice, the float and its needle valve operate in the well known manner to admit fuel into the float chamber 10 as required, the fuel passing from said chamber 10 through the channel 13 to the spray tube or nozzle 14. With existing and conventional arrangements fuel is drawn through the nozzle 14 and atomized in the Venturi tube 15 and is drawn into the mixing chamber 18 in such atomized condition to become mixed with air which is drawn through the air inlet 16 and through said Venturi tube 15 into said chamber 18 by the suction action of the engine. The amount of air drawn through the air inlet 16 may be controlled in the well known way by the choke valve 17, while the speed of the engine may be adjusted at will through the manual operation of the throttle 39 in the conventional manner. As the speed of the engine passes beyond a predetermined point, the developed suction will be sufficient to draw the air valve 21 away from the seat 20 against the tension of the spring 25, so that additional air will be drawn into the mixing chamber 18 to be added to the fuel therein, and reduce the richness of the fuel mixture, or, in other words, said fuel mixture will become leaner. The tension of the spring 25 is sufficient to assure a proper fuel mixture at medium high speeds. As the valve 21 is thus operated, the opening thereof will be arrested as the abutment 29 comes into engagement with the upper end of the inner and stronger spring 26. If the speed of the engine increases still further, the developed suction will be sufficient to open the valve 21 still further against the tension of both of the springs 25 and 26 so that still more air is admitted to the mixing chamber 18 to still further reduce the fuel richness of the mixture. It has been found in practice that the operation of the carburetors, particularly when the engine is running at more than medium high speeds, is not altogether reliable and that the fuel mixture supply to the engine under such conditions is not of maximum efficiency.

The novel arrangement illustrated in the drawing and described herein not only overcomes this disadvantage, but improves the character of the fuel mixture and renders it of maximum efficiency at all speeds of the engine. That is to say, during the aforesaid operations of the carburetor, the stream of fuel will exert a sucking effect at the reduced portion 14*a* and warm air will be drawn through the conduit 42 into the chamber 41 and will pass through the openings 40 into the spray tube 14 into contact with the stream of fuel before it issues from the exit end of the nozzle 14 and before it enters the mixing chamber 18, or Venturi tube 15. This not only results in a pre-warming of the fuel as it leaves the nozzle 14, but also brings about an actual atomization of the fuel as it leaves the spray tube or nozzle 14, this effect being secured by the air which is drawn through the openings 40; in addition to this a preliminary amount of air is supplied to the fuel before it reaches the Venturi tube 15 and the chamber 18. This pre-warmed and pre-mixed fuel mixture then becomes mixed in the customary manner with the air in the mixing chamber 18, and is supplied to the combustion chambers of the engine in a highly volatile and completely vaporized condition. As the speed of the engine is reduced, the valve 21 will gradually move back toward its seat 20 by the action first of the combined springs 26 and 25, and subsequently by the action of the spring 25 alone.

The tension of the latter is, however, insufficient to completely overcome the tension of the leaf spring 45, with the result that the valve 21 is normally maintained at a slight distance from its seat 20, as hereinbefore set forth. Under normal conditions a restricted supply of additional air is thus at all times admitted to the auxiliary air chamber 19 and to the mixing chamber 18 for admixture therein with the fuel, with the result that a mixture of fuel and air of extremely high combustibility is at all times supplied to the engine. It will, of course, be understood that the leaf spring 45 may be replaced by other means whereby the valve 21 is maintained in an equivalent position away from its seat 20. It will be understood, however, that when the engine is first started and the choke rod 30 is used to close the choke valve 17 to a predetermined extent, by the action of the lever 31, arm 34, link 37 and arm 38, the cam 33 will press upwardly against the projection 27 and force the valve 21 to a completely closed position on its seat 20, against the tension of the leaf spring 45, and thereby prevents any air from entering the auxiliary air chamber 19 during the starting period of the engine. The cam 33 by pressing the projection upwardly serves to increase the tension of the springs 25 and 26 on the valve 21 and accordingly firmly seats the latter against its seat 20 as long as is necessary to bring about a smooth operation of the engine at the start. The pin 35 and slot 36 permit the aforesaid tension to be materially increased before the choke valve 17 begins to close, this tension being progressively increased as said choke valve 17 moves toward its completely closed position.

For the purpose of preventing foreign matter from being drawn through the stove 43 and conduit 42 into the nozzle or spray tube 14, the conduit 42 may be made in two sections *a*, *b*, and provided with a screen or equivalent device 47 located at the junction of the two sections *a* and *b* for arresting the passage of such foreign matter through the conduit 42 to the chamber 41. The customary protecting cover 24*a* may also be removably fixed upon the brackets 24 for enclosing the springs 25 and 26 and their associated elements.

The carburetor, provided with the novel features hereinbefore set forth, is of extremely high efficiency with a complete absence of complicated construction and without the necessity for any special readjustment of its parts to bring about this result.

Various changes in the specific forms shown and described may be made within the scope of the claims without departing from the spirit of the invention.

I claim:—

1. In a carburetor, the combination with a mixing chamber, an air intake for supplying air thereto, a fuel conduit having a discharge opening situated in the path of such air, said conduit, in the vicinity of its fuel-discharge opening, being provided with a reduced portion and with an adjacent discharge portion of increased cross-section, such that the tube expands in both directions from said reduced portion, to provide a region of reduced pressure at said reduced portion when fuel flows through said conduit, and air-admission ports situated at the said reduced portion of said conduit, and intermediate of the two adjacent expanding portions of said conduit and operative to admit air into the conduit under the suction effect of the fuel stream flowing through said conduit, said reduced fuel conduit portion and said air-admission ports being located at such a height that no fuel can escape through said ports.

2. A carburetor such as described in claim 1 in which the air-admission ports include a series of spaced openings arranged in the wall of the fuel conduit at the reduced portion thereof.

3. A carburetor such as described in claim 1, including a jacket arranged around the restricted portion of the fuel conduit and forming an annular chamber around said reduced portion, openings in the reduced portion of the fuel conduit in communication with said chamber, and an air-admission line leading into said chamber, said air-admission line being in communication with a source of hot air, so that the air from said source, when it enters the flowing fuel at the reduced portion of the fuel conduit, is in heated condition.

4. In a carburetor, the combination of a mixing chamber, a Venturi tube discharging into said chamber, a fuel nozzle in said tube arranged to discharge fuel thereinto, said nozzle being provided with a reduced portion spaced from its discharge end, so that the nozzle expands in both directions from said reduced portion, a main air intake connected to said Venturi tube, an auxiliary air intake connected to the mixing chamber, and a conduit arranged to discharge air into said nozzle, at such reduced portion, whereby the fuel is first atomized by the air fed by said conduit, is then mixed in the Venturi tube with the air coming from the main air intake, and is finally mixed in the mixing chamber with the air entering from the auxiliary intake.

In testimony whereof I have hereunto set my hand.

GEORGE W. JARGSTORFF.