March 7, 1944. E. E. PHILLIPS 2,343,797

CARBURETING APPARATUS FOR INTERNAL COMBUSTION ENGINES

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FIG. 1.

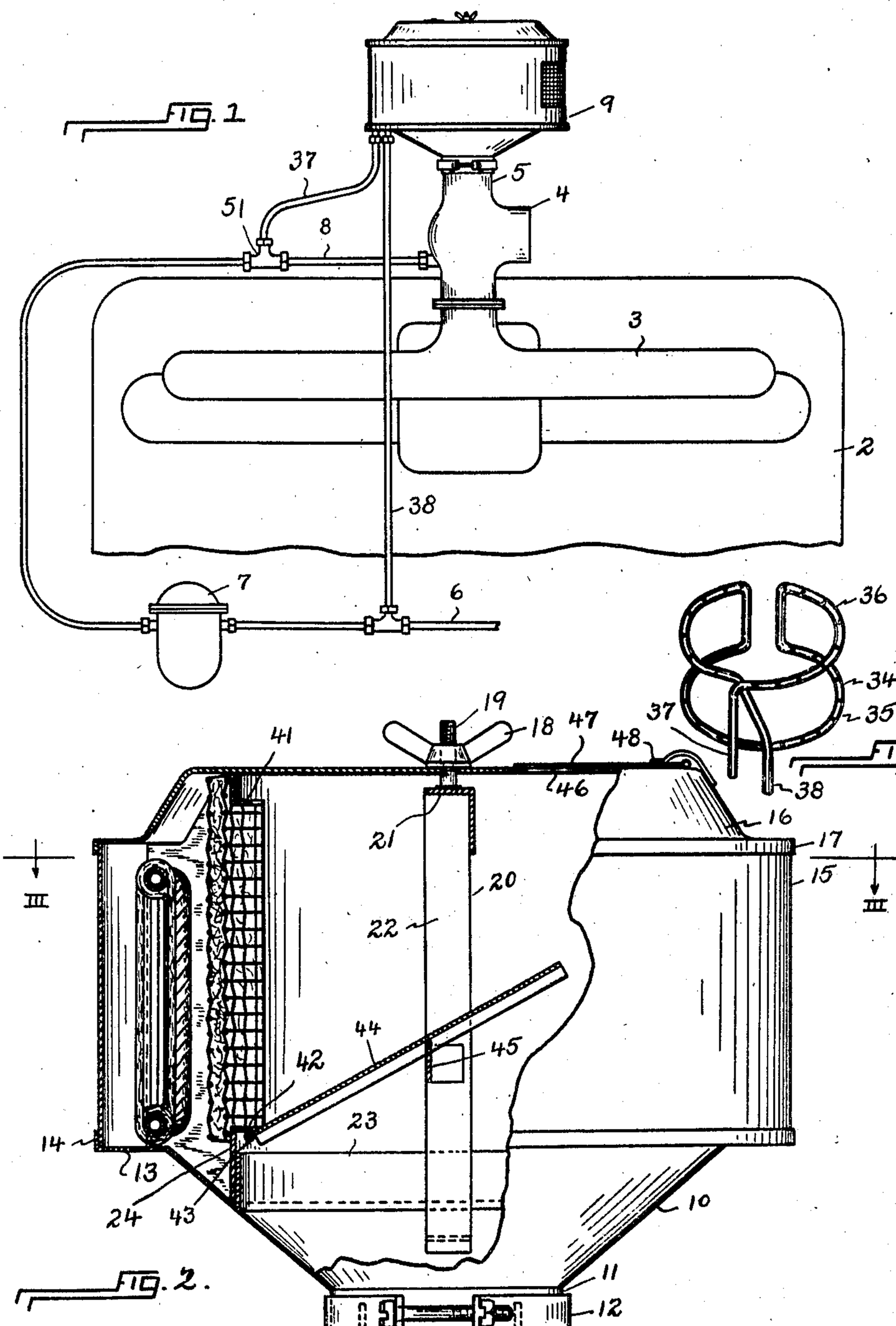

FIG. 5.

FIG. 2.

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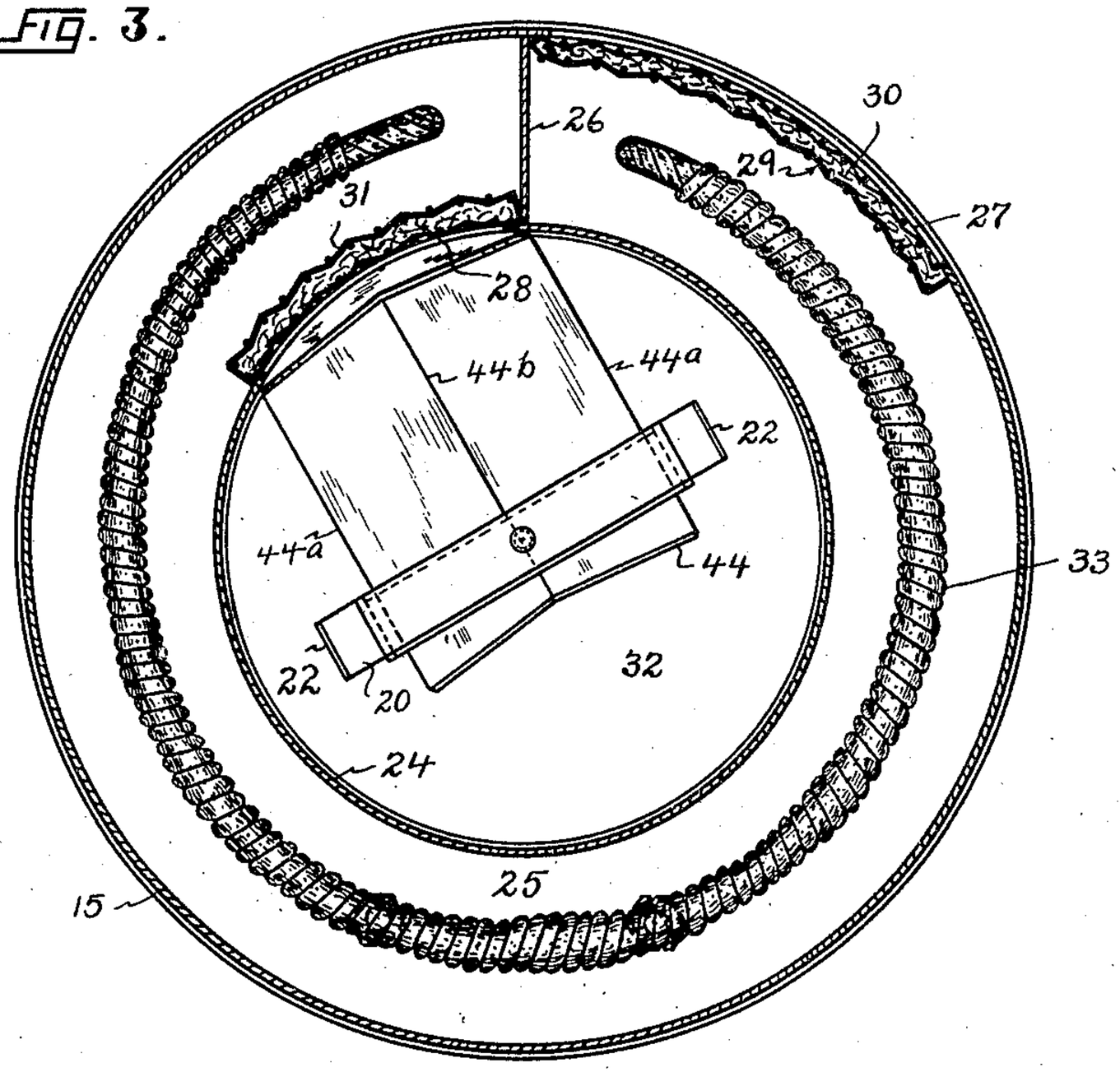
Fig. 3.



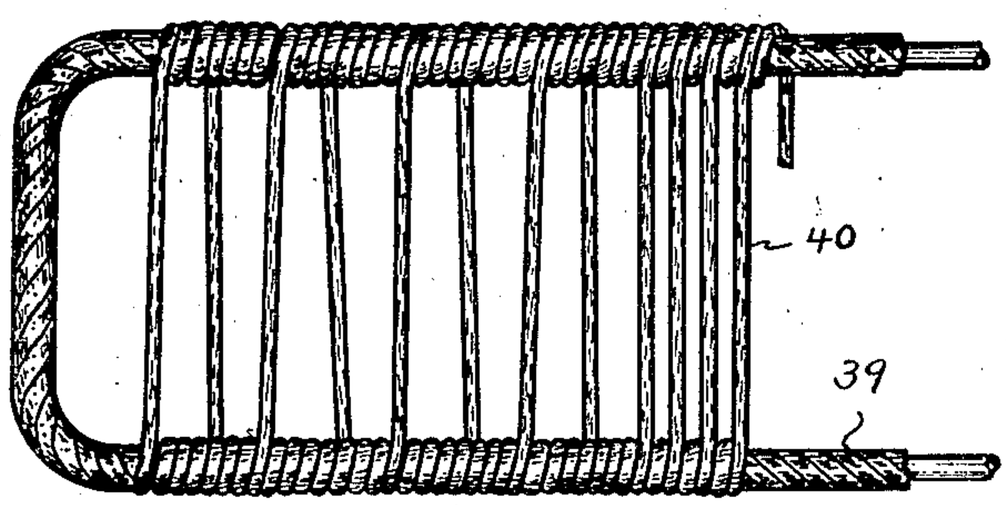


Fig. 4.

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Patented Mar. 7, 1944 2,343,797

UNITED STATES PATENT OFFICE

2,343,797

CARBURETING APPARATUS FOR INTERNAL COMBUSTION ENGINES

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Application July 27, 1942, Serial No. 452,404

6 Claims. (Cl. 261—97)

This invention is for a carbureting apparatus for internal combustion engines and is especially for an auxiliary carbureting device for use in conjunction with conventional general type carburetors. The present invention constitutes an improvement over the device disclosed in my copending application Serial No. 211,090, filed May 31, 1938 (now Patent 2,290,893, dated July 28, 1942).

In the device shown in my said copending application, there is disclosed a unit to be mounted at the top of a down draft carburetor in place of the customary air filter. This device is generally in the form of a drum having a reservoir to receive fuel and having a wick structure above the reservoir. The wick structure dips into the reservoir. The air is drawn in through the top of the drum, passes through the wick structure and out the bottom of the drum into the top of the down draft carburetor. An improvement in this structure is disclosed in the patent to Joseph C. Lang, No. 2,262,013, dated November 11, 1941, in which the wick structure is of general cylindrical form. The air enters through the sides of the drum, passed through the wick structure, then through a fire screen concentrically arranged inside the wick structure to the interior of the drum and thence into the top of the down draft carburetor. In both of these prior devices the air passed through the wick structure and was in contact with the wick for a relatively short period of time. One purpose of the present invention is to provide a construction wherein the air travels for a longer period of time in contact with the wick structure whereby it may evaporate more fuel from the wick structure. Also, for reasons which are unknown to me at the present time, it is desirable to increase the distance from the point where the air first is charged with vapor to the point where it obtains its complete carburization in the conventional carburetor, and the present invention is designed to give this increased distance of air travel. Finally, it is found that under some conditions a back-fire into the aforesaid devices was not always successfully blocked by the fire screen and the fuel on the wicks would become ignited, producing a fire hazard. The present invention provides protection against this fire hazard and eliminates the possibility of the fuel on the wick being ignited through a back-firing through the carburetor.

According to the present invention there is provided a structure which in its general appearance is similar to that disclosed in the said patent to Joseph C. Lang. However, in the present invention the drum shaped attachment is provided with concentric outer and inner walls, forming a substantially annular chamber. There is a radially extending partition across this chamber at one point and the wick structure is concentrically located in the chamber and extends from a point near one side of the partition around the chamber to a point adjacent the other side of the partition. An air inlet opening is provided in the outer wall of the structure adjacent one side of the partition and an opening is provided from the chamber through the inner wall of the structure adjacent the other side of the partition. Thus air which enters the chamber travels along the wick structure throughout substantially the full length of the chamber before it enters the compartment at the center of the structure. The form of device which is specifically illustrated is made to attach to the air intake at the top of a down draft carburetor and the mixture of fuel and air which is formed by the air traveling in contact with the wick is withdrawn from the center of the structure into the top of a conventional carburetor. In the chamber forming the inside of the structure is a hinged door which is biased to normally remain open and which is normally held open by the incoming air. When there is a back-fire creating a back pressure in the device, this door is blown from an open position to a closed position, cutting off communication between the carburetor and the annular chamber in which the wick is located. Hence the flame from the back-fire can not pass into the annular chamber. An outwardly opening gate which is normally biased to remain shut is provided in the top of the structure to relieve the pressure when a back-fire occurs.

The invention may be more fully understood by reference to the accompanying drawings which illustrate one preferred embodiment of my invention and in which:

Figure 1 is a more or less schematic view showing the unit applied to an engine with a conventional down draft carburetor;

Figure 2 is partly a side elevation and partly a vertical section of the auxiliary carbureting unit;

Figure 3 is a horizontal section in substantially the plane of line III—III of Figure 2;

Figure 4 is a detailed view of a portion of the wick structure; and

Figure 5 is a perspective view of the perforated pipe on which the wick structure is formed and through which the fuel is supplied to the wick.

In the drawings, 2 designates an internal combustion engine having a fuel intake manifold 3 which is supplied with carbureted air from a conventional jet type carburetor which is illustrated as being a down draft carburetor 4 with an air intake 5 at the top thereof. Fuel is supplied to the conventional carburetor from a pipe 6 through the usual pump 7 and a pipe 8 leading to the bowl of the carburetor. So much of the structure is conventional and forms no part of my invention.

The auxiliary carbureting device, designated generally as 9, is clamped to the air intake 5 of the conventional carburetor. This unit comprises a generally conical sheet metal member 10 having a cylindrical outlet 11 at the bottom thereof about which is a clamping collar 12 for clamping the structure to the air intake of the carburetor. The upper part of the cone shaped member 10 has an outwardly extending flange 13 about which there is a peripheral flange 14. Set on the flange 13 inside the peripheral flange 14 is a cylindrical outer wall member 15, which in practice is preferably several inches high but which is low enough to permit the structure to be mounted on the top of a carburetor under the hood of a car, although this is only a preferred method of mounting and other methods of mounting may be used where space does not permit a device to be at the top of a carburetor. Fitted on top of the cylindrical outer wall member 15 is a top cover 16 which is of inverted dish-like form with a peripheral flange 17 that fits around the outside of the enclosure 15. This cover is removably held in place by a wing nut 18 on top of a threaded post 19 that passes through the cover and which is supported by a metal frame 20 inside the structure. This metal frame has a horizontal bridge portion 21 at the top thereof and two downwardly extending spaced legs 22 which are welded or otherwise secured to the interior of cone 10, thereby tieing or clamping the end members 10 and 16 together.

Mounted on the inside of the cone 10 intermediate the top and bottom thereof is a vertically extending annular flange 23. A cylindrical band or partition 24 is concentrically positioned inside the cylindrical enclosure 15, the member 24 having its bottom edge resting on the cone 10 and having a friction fit about the flange 23. The top edge of the annular partition 24 tightly fits against the inside of the cover 16, and the tightening of the wing nut 18 against the cover 16 places the cover into tight contact with the top edge of this partition.

The concentric cylindrical wall members 15 and 24 being spaced from one another provide an annular chamber 25. A radially extending partition member 26 extends across this air space at one point forming an air-tight partition across the air space or chamber 25. As most clearly shown in Figure 3, the outer enclosure 15 has a window formed therein at 27 adjacent one side of the partition 26. The inner partition or cylindrical wall 24 has a window or passage 28 therethrough located adjacent the other side of the partition 26. Across the window 27 is an air cleaning filter 29 comprised of two spaced pieces of wire mesh with metal wool or shavings 30 therebetween. A similar filter 31 is provided over the opening 28.

It will be seen that air may be drawn into the structure through the window 27 and filter 29 to pass around the chamber 25 through the filter 31 and window 28 into the chamber 32 formed inside the inner concentric wall member 24, and from this chamber the air may pass downwardly in an axial direction into the carburetor. The top of the partition 24 fits tightly enough against the cover 16 to prevent any communication over the top of the partition 24 from the chamber 25 to the chamber 32 and in like manner air cannot pass under the partition 24 into the chamber 32 so that it must travel throughout substantially the entire length of the annular chamber 25 to enter the chamber 32.

In the chamber 25 is a concentrically arranged wick structure designated generally as 33. This wick structure is formed on a frame 34 (see Figure 5) formed of metal tubing bent in such manner as to provide a bottom loop 35 and a top loop 36 with inlet and outlet connections 37 and 38. This tubing is relatively rigid and is perforated at intervals with very fine holes. The wicking material, preferably corded glass fibers, is wrapped tightly about this frame, as indicated at 39 in Figure 4, and strands of like wicking material are wrapped around the upper and lower loops and stretched from one loop to the other, providing vertical stretches 40 in the wick. The inlet connection 37 of the supporting frame is connected into the fuel supply line 8 leading to the carburetor at 51 while the discharge end 38 leads back to the fuel supply side of the pump 7. This is substantially the fuel circulating system disclosed in the application of Joseph C. Lang, Serial No. 342,742, filed June 27, 1940 (now Patent 2,310,739, dated February 9, 1943) and metering devices are employed as described in said Lang application. With this arrangement the wick 39—40 may be kept at a constant degree of wetness. The air circulating along the passage 25 intimately contacts the wick and travels along the wick for a considerable distance, thus evaporating considerable fuel before it leaves the chamber 25 and enters the chamber 32. Preliminary carburization of air is thus effected although no attempt is made to supply sufficient fuel to the air with this device to operate the engine efficiently without further fuel being supplied to it. In other words, the auxiliary carbureting unit only supplies part of the total fuel requirement of the engine. From the point where the air first contacts the wick to the point where it receives its final amount of fuel in the conventional carburetor constitutes substantial distance and this distance is desirable.

Projecting inwardly at the top and bottom of the window 28 is a metal flange or lip, these flanges being designated 41 and 42. As shown in Figure 3, the free edge of each lip is cut on a slight angle toward the center in the form of a very wide V or chevron. Supported on a hinge 43 on the lower flange 42 is a sheet metal door 44. This door normally rests on a crossbar 45 extending between the legs 22 of the frame 20. When there is a back-fire the back pressure in the chamber 32 forces the door 44 upwardly to close the window 28. The side edges 44*a* of the door contact tightly with the inner face of the wall 24 when the door is thus closed while the top and bottom edges of the door 44 contact the V-shaped flanges 41 and 42, the door 44 being of similar form, i. e., having two wings which slope outwardly from a center line 44*b*. The purpose of forming the lips 41 and 42 on this annular container and correspondingly shaping the door is to assure the edges 44*a* of more closely contacting the inner surfaces of the wall 24 when the door 44 is blown shut. Normally the door is biased to remain open by gravity and also by the sweep of the incoming air. When there is backfire the door 44 remains closed as long as the pressure inside the chamber 32 is greater than the pressure inside the chamber 25 which is only an instant. The pressure blows back before the flame enters the chamber 32 so that the door is closed before the flame enters the chamber. In its open position the door slopes and extends over the carburetor intake, so that it is directly in the line of force of air and flame which blows back when a back-fire occurs. The filter 31

moreover, forms an effective fire screen through which the flame can not blow even though the door 44 should fail to close.

For relieving the pressure in the chamber 32 when there is a back-fire the cover member 16 is provided with an opening 46 over which there is a door 47 which is biased to remain closed by a light spring 48. When there is a back-fire the pressure will blow the door 47 open and vent the interior of the chamber 32 to the atmosphere.

With the exception of the wick structure the device for the most part may be formed of light sheet metal and can be economically produced. It constitutes an improvement over the devices disclosed in my prior patent and the prior patent of Joseph C. Lang, first in the provision of the long annular air chamber 25 providing a long passage for the air to contact the wick, and secondly in the provision of the door 44 that closes in the event of a back-fire while the door 47 vents to atmosphere. Because of the door 44 the device is protected against fuel on the wick becoming ignited and even without the door 44 the device is less hazardous insofar as fire is concerned, because the flame from back-fire can be more effectively confined in the chamber 32, whereas in the previous constructions there is danger of leakage under or over the fire screen.

While I have illustrated one specific embodiment of my invention and one particular application thereof it will be understood that this is merely by way of illustration and that various changes and modifications may be made in the construction and in the application of the device within the contemplation of my invention and under the scope of the following claims.

I claim:

1. An auxiliary carbureting device of the class described comprising a casing with a partition forming a central chamber and a surrounding chamber, a radial partition across the surrounding chamber, there being an opening through the casing into the surrounding chamber adjacent one side of the radial partition, there being an opening from the central chamber to the surrounding one adjacent the other side of the radial partition, and a concentrically arranged wick structure in the outer chamber coextensive with the greater portion of the extent of said surrounding chamber.

2. An auxiliary carbureting device of the class described comprising a casing, means forming within the casing a chamber, wick means within the chamber, a second chamber communicating with the first through an opening, there being an opening from said first chamber to atmosphere, and a door for closing the opening between the second chamber and the first, said door being biased to normally remain in an open position and being movable upon rapid increase in pressure in the second chamber to closed position over said opening.

3. An auxiliary carbureting device of the class described comprising a casing, means forming within the casing a chamber, wick means within the chamber, a second chamber communicating with the first through an opening, there being an opening from said first chamber to atmosphere, and a door for closing the opening between the second chamber and the first, said door being biased to normally remain in an open position and being movable upon rapid increase in pressure in the second chamber to closed position over said opening, a casing having an opening leading from the second chamber to atmosphere and a door which is biased to normally remain closed over said last named opening.

4. An auxiliary carbureting device of the class described comprising a generally cylindrical casing having an axially projecting extension adapted to fit the air induction means of an internal combustion engine, a concentric partition within said casing forming a central chamber which communicates with said axial extension, said partition forming with the casing a concentric outer chamber, a radial partition across such outer chamber, the casing having an opening leading from atmosphere to the outer chamber adjacent one side of said radial partition, there being an opening in the concentric partition from the outer chamber to the central one adjacent the other side of said radial partition whereby air must flow substantially entirely around the outer chamber to reach the central chamber, and means in the outer casing co-extensive with the greater portion of the length thereof forming an open ring-like wick which is concentric with the casing.

5. An auxiliary carbureting device of the class described comprising a generally cylindrical casing having an axially projecting extension adapted to fit the air induction means of an internal combustion engine, a concentric partition within said casing forming a central chamber which communicates with said axial extension, said partition forming with the casing a concentric outer chamber, a radial partition across such outer chamber, the casing having an opening leading from atmosphere to the outer chamber adjacent one side of said radial partition, there being an opening in the concentric partition from the outer chamber to the central one adjacent the other side of said radial partition whereby air must flow substantially entirely around the outer chamber to reach the central chamber, and a continuous length of perforated pipe formed into spaced upper and lower loops in the outer chamber, said pipe having wick material wrapped thereabout and having strands of wick material extending between the upper and lower loops, the wick structure thus formed being substantially concentric with the casing and being spaced from the casing and partition.

6. An auxiliary carbureting device of the class described comprising a generally cylindrical casing having an axially extending projection at one end thereof for attachment to the air induction system of an internal combustion engine, the other end of said casing having a cover, an annular partition within the casing forming an inner chamber and a concentric outer chamber, said partition having an opening therethrough establishing communication between the two chambers, a wick structure in the outer chamber to which an evaporative fuel may be supplied, a door inside said annular partition adapted to tightly close the opening between the inner and surrounding partitions, said door being movable from a closed to an open position and being biased to normally remain in the open position, the door in the open position projecting across the center of the casing whereby any explosion creating a back pressure through said axial extension into the inner chamber will act directly on said door to close it, the door being pivoted at its bottom edge and being adapted to swing in a vertical arc, and means for supporting the door in an inclined position when it is fully opened.

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