July 23, 1935. M. SPRENGER 2,009,280

CARBURETOR

Filed Aug. 28, 1933 2 Sheets-Sheet 1

Fig. 1.

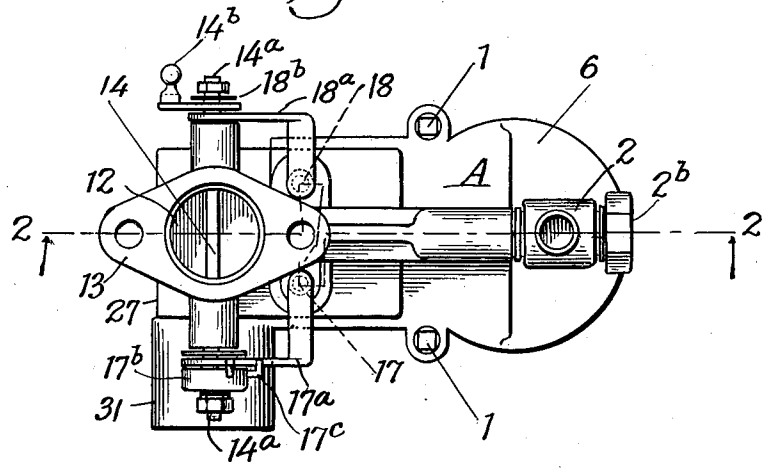


Fig. 2.

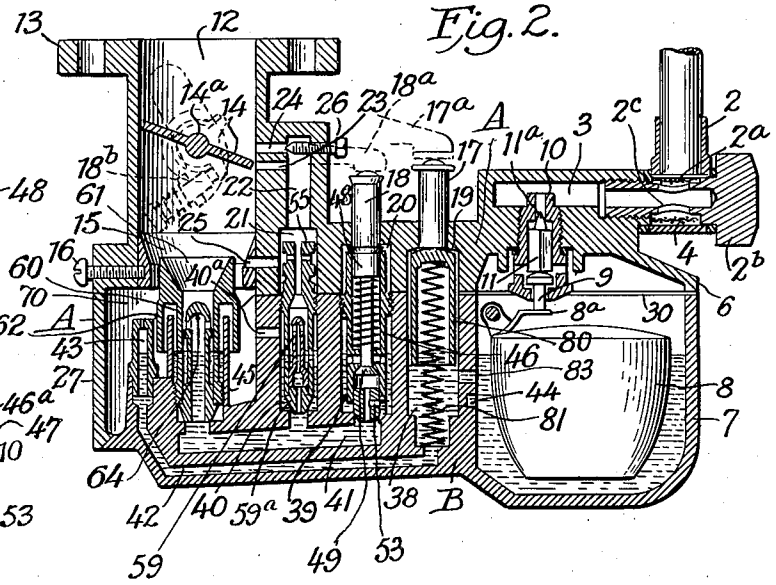


Fig. 5.

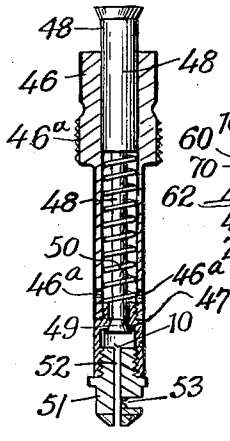


Fig. 10.

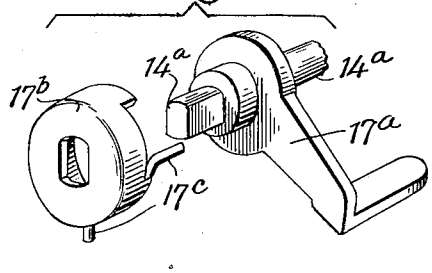
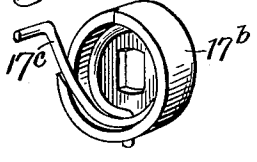


Fig. 11.



INVENTOR.
Max Sprenger
BY
ATTORNEYS

July 23, 1935. M. SPRENGER 2,009,280

CARBURETOR

Filed Aug. 28, 1933 2 Sheets-Sheet 2

Fig. 3.

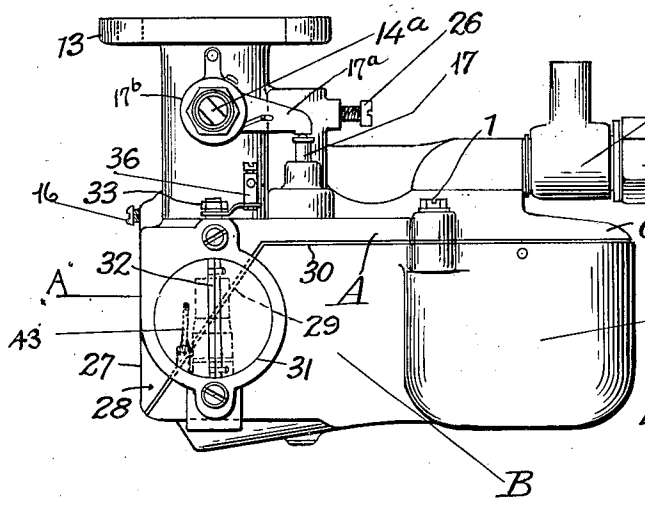


Fig. 7.

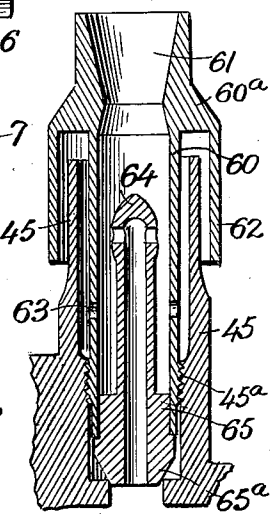


Fig. 4.

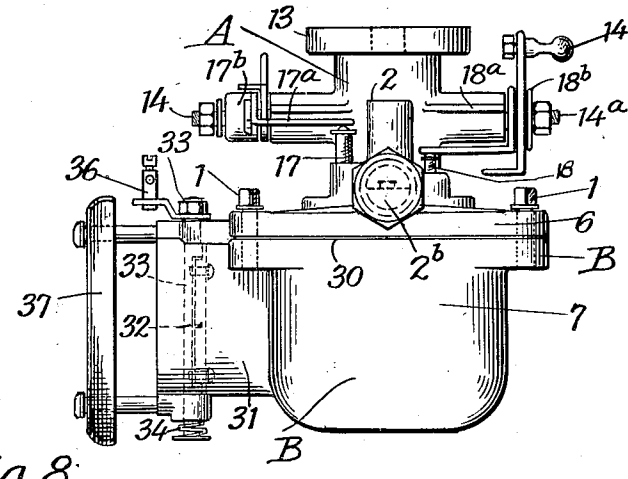


Fig. 6.

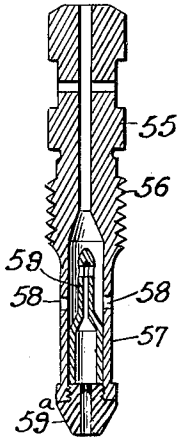


Fig. 8.

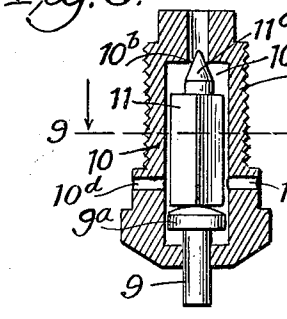
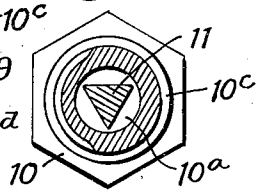


Fig. 9.



INVENTOR.

Max Sprenger

BY

Alexander Ault

ATTORNEYS

Patented July 23, 1935 2,009,280

UNITED STATES PATENT OFFICE

2,009,280

CARBURETOR

Max Sprenger, Basel, Switzerland, assignor to John Zimmerli, Dallas, Tex.

Application August 28, 1933, Serial No. 687,181

4 Claims. (Cl. 261—34)

This invention is a novel improvement in carburetors, and the principal object of the invention is to provide a carburetor consisting of a casing having upper and lower sections, the lower section being removably bolted to the upper section and when removed exposing for repairs, inspection, or replacement, a removable mixer, a removable idling nozzle, a removable high speed nozzle with compensator valve; and an accelerating pump, said vital parts of the carburetor being readily accessible from the lower half of the casing.

Further objects of the invention will be hereinafter set forth.

I will explain the invention with reference to the accompanying drawings which illustrate one practical embodiment thereof to enable others familiar with the art to adopt and use the same; and will summarize in the claims the novel features of construction, and novel combinations of parts, for which protection is desired.

In said drawings:—

Fig. 1 is a top plan view of my novel carburetor.

Fig. 2 is a section on the broken line 2—2, Fig. 1, in which the accelerating pump, high speed nozzle, and idling nozzle are shown for clearness, in longitudinal alignment within the casing.

Fig. 3 is a side elevation of the carburetor.

Fig. 4 is an end elevation, looking towards the float chamber.

Fig. 5 is an enlarged vertical section through the high speed nozzle and compensator valve, detached.

Fig. 6 is an enlarged vertical section through the idling nozzle, detached.

Fig. 7 is an enlarged section through the mixer, showing the adjacent parts of the mixing chamber.

Fig. 8 is an enlarged vertical section through the float chamber needle valve assembly.

Fig. 9 is a section on the line 9—9, Fig. 8.

Fig. 10 is an expanded perspective view of the yieldable connection between the throttle valve shaft and pump operating arm.

Fig. 11 is a perspective view showing a detail.

As shown, my novel carburetor preferably comprises a casing made in two sections, the upper section A containing the fuel inlet with needle valve, also the cover plate of the float chamber, also containing the carburetor outlet and a portion of the mixing chamber of the carburetor. The lower section B in brief contains the float chamber, accelerator pump, the high speed nozzle, and idling nozzle, and the lower section is removably secured to the upper section by bolts 1. When the lower section B is removed, the above mentioned parts carried thereby are readily accessible for adjustment, repairs, or replacement.

Upper section A is provided with a fuel inlet duct 3 into which is fitted a gasoline elbow union 2 provided with the annular filter screen 4 (Fig. 2) retained in the bore 2*a* of the elbow by a hollow bolt 2*b*, which bolt is provided with ports 2*c* for the passage of fuel through the screen 4, to the needle valve and float chamber. Upper section A also has a plate 6 forming the cover of the float chamber 7 of the lower section B, containing the float 8 which is provided with a lever 8*a* adapted to engage the underside of a plunger 9 (Figs. 2 and 8), which operates the needle valve 11*a*.

The needle valve assembly comprises a hollow bolt 10 (Figs. 2, 8 and 9) tapped into fuel duct 3, the bore 10*a* of the bolt 10 being reduced at both ends, the upper reduced end 10*b* forming the seat for the needle valve. Plunger 9 enters the lower end of bore 10*a* and has an enlarged head 9*a* within the bore engaging the underside of a slidable carrier 11 of non-circular cross-section, preferably triangular, and separate from plunger 9, which carrier carries upon its upper end the needle valve 11*a* adapted to stop the flow of fuel into float chamber 7 when float 8 is raised. In the side of bolt 10 are ports 10*d* for the passage of fuel. Bolt 10 is exteriorly threaded as at 10*c* and may be readily replaced by an assembly having larger or smaller needle valve. My novel two-part needle valve reduces overflow to a minimum, and largely prevents catching or binding of the needle valve, and overflow cannot occur unless the lever 8*a* carried by float 8 is badly damaged or worn.

At the opposite end of upper section A is the carburetor outlet 12 with coupling flange 13 for connection to an intake manifold (not shown). Within outlet 12 is a butterfly valve 14 mounted upon a shaft 14*a*, operated by an arm 14*b* connected with the usual operating rod (not shown). An air funnel 15 is placed in the lower end of outlet 12 below the butterfly valve, said funnel being removably secured by set screw 16. Upper section A also carries the end plate 27 of the casing below outlet 12; and the side portions 28 of the upper section slant upwardly along the line 29 (Fig. 3) from the lower end of plate 27 to meet the horizontal plane 30 of the lower face of the cover plate 6. End wall 27 and sides 28 form part of the mixing chamber 70 (Fig. 2) in which my novel mixer is mounted, the remaining

portion of the mixing chamber being formed by the lower section B.

In upper section A, between fuel intake 3 and outlet 12, are mounted a pair of plungers 17 and 18 for operating the accelerating pump and the high speed compensator valve, respectively, said plungers being actuated by arms 17a and 18a mounted upon opposite ends of the butterfly valve shaft 14a, as shown in Fig. 1. In the underside of upper section A are three cylindrical recesses 19, 20 and 21, for receiving the upper ends of the accelerator pump, high speed compensator valve, and idling nozzles, respectively, which parts are carried by the lower section. Plunger 17 enters the upper end of recess 19, and plunger 18 enters the upper end of recess 20. Recess 21 for the idling nozzle is provided with an air intake port 25 opposite air funnel 15, and is also provided with a vertical extension 22 having lateral ports 23, 24, emptying into outlet 12 at opposite sides of the butterfly valve 14 when in closed position. An idling regulator valve screw 26 is tapped into the upper port 24 for adjusting the idling speed of the engine.

The air intake for mixing chamber 70 is through a lateral branch 31, of relatively large diameter, formed upon one side plate 28 of the upper section, said branch 31 being provided with a butterfly valve 32 mounted upon a shaft 33. Valve 32 is normally maintained in open position by a spring 34 (Fig. 4) around shaft 33, and an arm 36 on shaft 33 operated by a control rod (not shown) permits adjustment of the valve. A guard plate 37 is placed over the duct 31 to protect the entrance to the mixing chamber, preventing foreign matter being drawn thereinto.

Lower section B of the casing is provided with float chamber 7, also three vertical bores 38, 39 and 40 disposed in alignment with recesses 19, 20 and 21, respectively of the upper section. The lower ends of bores 39 and 40 discharge into a lateral duct 41 which feeds fuel directly into the base of a cylindrical member 45 forming part of the main fuel mixer disposed in the mixing chamber 70 immediately below funnel 15, while the lower end of bore 38 discharges into a small duct 42 conducting fuel from the accelerator pump to a small jet 43 disposed beside and slightly below the mixer in the mixing chamber 70.

A port 44 (Fig. 2) in the side of the float chamber 7 permits fuel to flow directly from chamber 7 into the bore 39 around the high speed nozzle, from whence the fuel passes through duct 41 into the bore 40 around the idling nozzle; or through duct 41 directly into the base of the mixer in mixing chamber 70. The normal level of fuel standing in the bores 39, 40 and in the mixer 45 is substantially the same as in float chamber 7.

Bore 39 is provided with internal threads at its upper end into which is threaded the high speed nozzle assembly (Fig. 5) containing the high speed compensating valve. This nozzle assembly comprises a tubular member 46 having exterior threads 46a adjacent its upper end for engagement with the threads in bore 39, and having a valve seat 47 adjacent its lower end, with perforations 46a in its side above the valve seat 47. A plunger 48 extends down through the bore of member 46, and carries a valve 49 on its reduced lower end cooperating with seat 47. A coil spring 50 around the plunger within the member 46 tends to normally maintain valve 49 closed against its seat. The upper end of the plunger 48 extends above the member 46 and is engaged directly by the plunger 18 carried by the upper section A. The lower portion of the member 46 is reduced in diameter to form a chamber between the member and the wall of bore 39 for holding fuel. The lower end of the member 46 is internally threaded to receive a plug 51 having a conical lower end adapted to close the lower end of the bore 39, and plug having a nozzle 52 therein adapted to permit fuel flowing past valve 49 to pass into duct 41. In the side of the plug 51 is a fixed high speed jet 53 permitting fuel to flow from bore 39 into duct 41, and to the idling nozzle and mixing chamber. The object of the nozzle 52 is to pass on the overflow of fuel from the bore 39, so the mixing chamber at higher engine speeds will receive the necessary quantity of fuel. As soon as additional fuel supply for high speeds is no more required valve 49 automatically closes with the operation of the gas throttle.

My high speed compensator valve 49 is depressed when the gas throttle of the engine is about one-third opened, and for this purpose the arm 18a for operating the high speed valve has a predetermined dwell 18b (Figs. 1 and 4) of any desired type in its connection with shaft 14a, whereby after the lever 14b is operated to open the butterfly valve 14 a predetermined amount, the high speed compensator valve will be opened by plunger 18 at the proper time. The particular construction of the dwell forms no part of my present invention.

Idling nozzle (Fig. 6) is removably mounted in bore 40 in the lower section B and comprises a tubular member 55 exteriorly threaded as at 56 for engagement with threads in the upper end of bore 40. The lower end of member 55 is reduced as at 57 and a series of perforations 58 are provided therein whereby air which enters a port 40a in the side of mixing chamber 70 may enter the interior of member 55 and pass upwardly past the idling nozzle 59. Nozzle 59 is preferably of tubular form, provided with a cylindrical portion at its lower end snugly fitting within the lower end of member 55. The lower end of the nozzle is closed by a threaded plug 59a containing the idling jet. The air entering port 40a passes down bore 40 and upwardly through perforations 58 past the idling nozzle 59, and the fuel mixture passes upwardly through the bore in member 55 into the outlet 12 through ports 25 opposite air funnel 15, or through ports 23 or 24.

The main fuel and air mixer (Fig. 7) comprises a tubular member 60 having an enlarged head 60a at its upper end provided with a flaring bore 61 disposed substantially opposite the air funnel 15. Member 60 extends down within the cylindrical base 45 and is externally threaded at its lower end for engaging threads 45a in the lower end of the base. Depending from the periphery of head 60a is an annular skirt 62 which extends downwardly substantialy half the height of member 60 and forms with the cylindrical base 45 a tortuous passage for air entering under the skirt 62 which air passes upwardly between the skirt 62 and base 45, over the top of the base, and downwardly between the base 45 and member 60, and inwardly through openings 63 in the side of member 60, and upwardly through the fuel standing in the base 45, past the nozzle 64. Nozzle 64 is formed at the upper end of a tubular member 65 making a sliding fit within the lower end of member 60, and having a conical lower end 65a adapted to close the entrance from duct 41 when the mixer 60 is screwed into place. Air enter-

ing the mixing chamber 70 from the intake 31 also rises exteriorly of skirt 62 and passes between head 60a of the mixer and the air funnel 15, thereby insuring a thorough vaporization of the fuel.

In the bore 38 is housed the accelerating pump (Fig. 2), which consists of a plunger cap 80 closed at its upper end, adapted to slidably engage the walls of the bore. A coil spring 81 is interposed between the bore and the lower end of the bore for yieldably maintaining the cap in elevated position. The upper end of cap 80 is engaged by the plunger 17 carried by upper section A. A port 82 is provided in the float chamber 7 whereby fuel will enter the bore 38 and will stand therein at substantially the same height as in the float chamber. The lower end of the bore 38 communicates through duct 42 with the accelerating pump nozzle 43 in the mixing chamber 70, whereby when the pump is actuated a very fine stream of gasoline will be sprayed past the open throttle valve into the intake manifold, thereby increasing the richness of the mixture, for starting and quick acceleration, while permitting a very light mixture for ordinary operation.

Accelerator pump 80 is operated by a pressure spring from the main gas throttle through arm 17a. The operating means for the plunger 17 comprises an arm 17a loosely mounted upon shaft 14a of the butterfly valve, beside a cap 17b (Figs. 4, 10 and 11) fixedly mounted on the shaft. Within cap 17b is a coil spring 17c around shaft 14a, one end of spring 17c being fixed in the cap and the other end being fixed in the arm 17a. Spring 17c causes arm 17a to move as if keyed to shaft 14a only when shaft 14a is rocked slowly, but when the shaft 14a is rocked at intermediate speeds, the spring 17c will yield and thereby move the plunger 17 slowly so that some only of the fuel in bore 38 will be forced by pump 80 through the jet, the remainder of the fuel in the bore 38 being returned to the float chamber; but when shaft 14a is rocked extremely quickly the spring 17c will absorb the pressure created by the inertia of the moving parts and then arm 17a will come to rest in a position relative to the travel of the shaft, and because of the internal pressure in the cylinder and because of the smaller size of the outlet of nozzle 43 as compared to the return passage 83, less fuel by volume will be discharged through said nozzle 43 than at said intermediate speeds.

The tests made on automobiles prove a fuel saving of thirty to forty per cent, even on old models which have run fifty thousand miles.

I claim:—

1. In a carburetor, a casing comprising upper and lower sections detachably connected, a float chamber, a mixing chamber having an outlet; a throttle valve in said outlet; a mixing nozzle in the mixing chamber; said lower section having a plurality of bores closed by the upper section; an idling nozzle in one bore; a high speed nozzle and compensator valve in the second bore; a fuel duct connecting the float chamber, bores, and the mixing nozzle; means for operating the high speed valve by the throttle valve; said high speed nozzle and compensator valve comprising a tubular member threaded into the bore in the lower section; a plunger in said member engaging the operating means of the upper section; a valve seat within the member; a valve stem carried by the plunger; a valve on said stem; means for yieldably maintaining the valve closed; said member having perforations above the seat; and a plug closing the lower end of the member having a nozzle extending therethrough for the passage of fuel when the valve is opened; and a fixed high speed jet in the side of said plug discharging into the said nozzle.

2. In a carburetor, a casing comprising upper and lower sections detachably connected, the lower section including a float chamber, and said sections having complementary portions forming a mixing chamber having an outlet; a throttle valve in said outlet; a mixing nozzle in the mixing chamber carried by the lower section; said lower section having a plurality of bores closed by the upper section; a removable idling nozzle in one bore; a high speed nozzle and compensator valve in the second bore; a fuel duct in the lower section connecting the float chamber, bores, and the mixing nozzle; an accelerator pump in the third bore; the float chamber having a port supplying fuel to said third bore; an accelerator jet in the mixing chamber carried by the lower section; a second duct in the lower section connecting the third bore and jet; means for actuating the compensator valve and accelerator pump by the throttle valve; said idling nozzle comprising a tubular member having perforations therein adjacent its lower end; a nozzle within the member slidably entering the lower end thereof; and a plug closing the lower end of the member and having a bore with a fixed jet therein.

3. In a carburetor, a casing comprising upper and lower sections detachably connected, the lower section including a float chamber, and said sections having complementary portions forming a mixing chamber having an outlet; a throttle valve in said outlet; a removable mixer in the mixing chamber carried by the lower section; said lower section having a plurality of bores closed by the upper section; a removable idling nozzle in one bore; a high speed nozzle and compensator valve in the second bore; a fuel duct in the lower section connecting the float chamber, bores, and the mixer; an accelerator pump in the third bore; the float chamber having a port supplying fuel to said third bore; an accelerator jet in the mixing chamber carried by the lower section; a second duct in the lower section connecting the third bore and jet; means for actuating the compensator valve and accelerator pump by the throttle valve; said lower section having a cylindrical base within the mixing chamber; and said mixer comprising a tubular member adapted to fit within the base; an enlarged head on said tubular member having a flaring bore therethrough; and a skirt depending from the periphery of the head adapted to fit over the upper portion of the base; a nozzle in the tubular member; and perforations in the walls of the tubular member below the nozzle.

4. In a carburetor, a casing comprising upper and lower sections detachably connected, the lower section including a float chamber; said sections having complementary portions forming a mixing chamber having an outlet; a throttle valve in said outlet; a removable mixer in the mixing chamber carried by the lower section; said sections having a plurality of opposed bores; a removable idling nozzle in one bore in the lower section; a high speed nozzle and compensator valve in a second bore in the lower section; a fuel duct below the fuel level connecting the lower ends of said bores with the mixing nozzle and float chamber; an accelerator pump in a third bore in the lower section; the float chamber having a

port below the fuel level for supplying fuel to said third bore; an accelerator jet carried by the lower section adjacent the mixer; a second duct in the lower section connecting the third bore and jet; plungers in the bores of the upper section for actuating the high speed compensator valve and accelerator pump; and means on the upper section operated by the throttle valve for actuating said plungers, the float, mixer, accelerating jet, idling nozzle, high speed nozzle and compensating valve, and accelerating pump being readily accessible when the sections are separated, said lower section having a cylindrical base for the mixer; and said mixer comprising a tubular member adapted to fit within the base, an enlarged head on said tubular member, and a skirt depending from the periphery of the head adapted to fit over the upper portion of the base, a nozzle in the tubular member, and perforations in the walls of the tubular member below the nozzle.

MAX SPRENGER.