Aug. 19, 1941. G. M. BICKNELL 2,252,958

CARBURETOR STRUCTURE

Original Filed Aug. 7, 1936 2 Sheets-Sheet 1

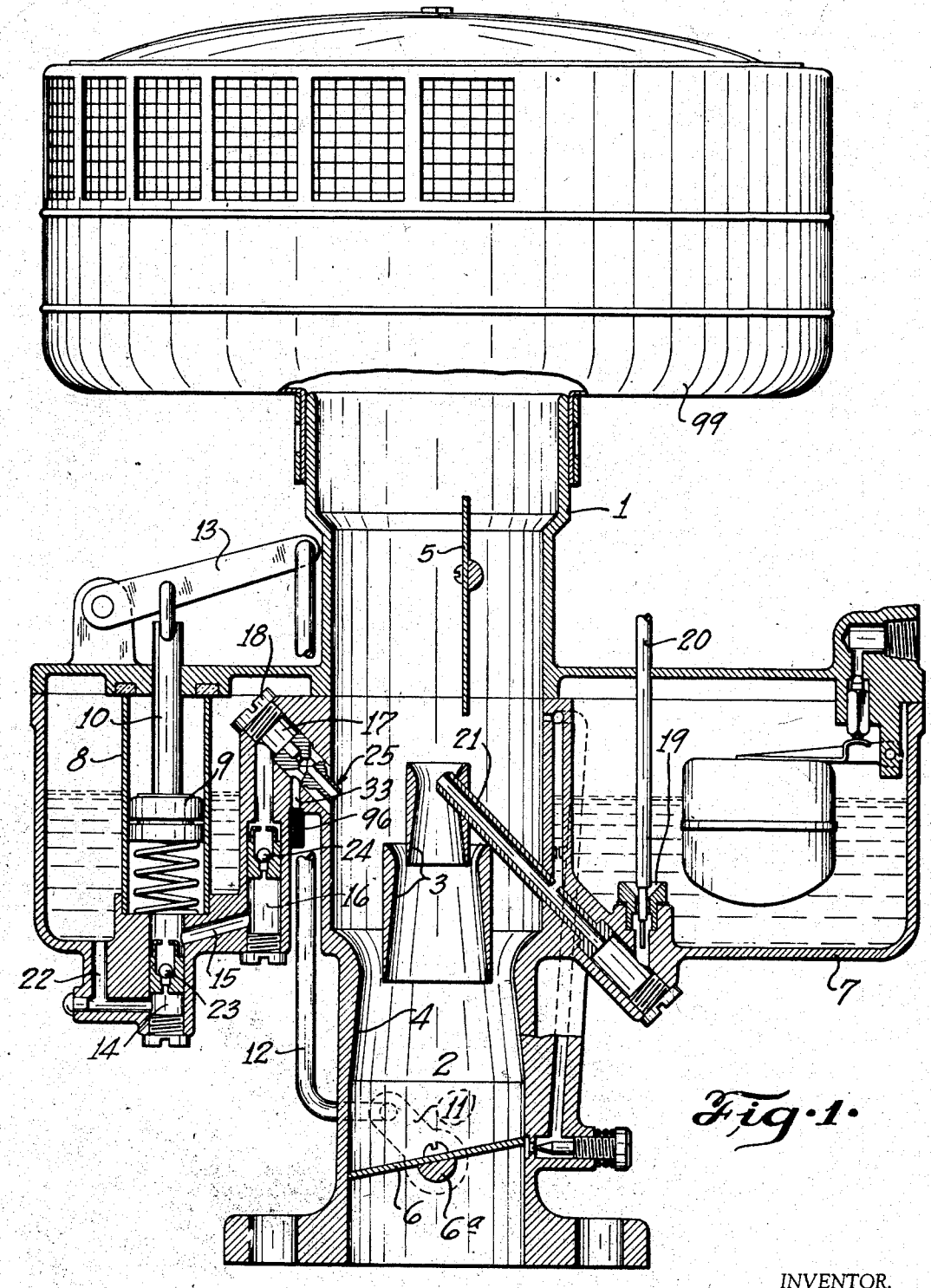


Fig. 1.

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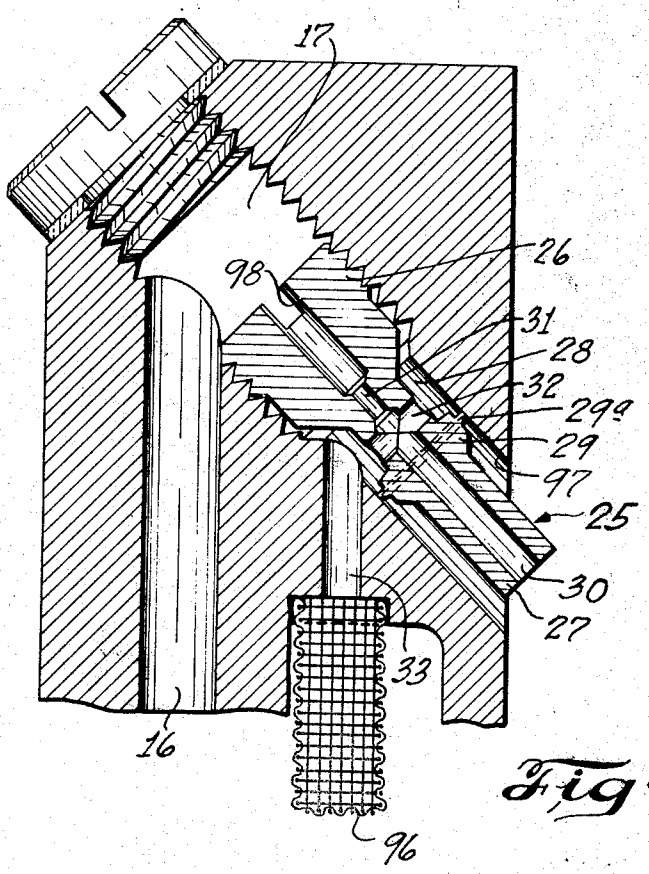


Fig. 2.

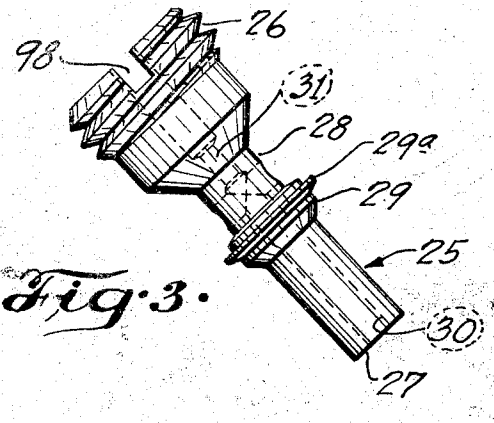


Fig. 3.

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UNITED STATES PATENT OFFICE

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CARBURETOR STRUCTURE

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Substituted for abandoned application Serial No. 94,764, August 7, 1936. This application July 19, 1939, Serial No. 285,410

2 Claims. (Cl. 261—34)

This invention relates to carburetors and particularly to arrangements for preventing the withdrawal of fuel through the accelerating pump by suction when the carburetor is passing a large volume of air. The present application is substituted for an abandoned application in the name of the same inventor, Ser. No. 94,764, filed Aug. 7, 1936.

Modern carburetors for automotive engines are usually provided with accelerating pumps for supplying additional fuel when the engine is being accelerated. Since the carburetor is also provided with a main nozzle and an idling port which, generally, are calibrated for supplying the entire normal requirements of the carburetor during constant speed operation, it is undesirable to have the accelerating pump discharge at such time because the additional fuel would cause the engine to be supplied with an unduly rich mixture. The accelerating discharge nozzle frequently is positioned so as to discharge a compact jet into a part of the mixture conduit where relatively high suction prevails at least at times, during normal operation of the carburetor, which suction tends to draw fuel from the accelerating system.

In order to avoid such discharge from the accelerating passage due to suction, there have been suggestions to provide an air bleed from this passage as, for instance, in Henning Patent No. 1,915,930 which provides an air bleed communicating with the inside of the mixture conduit. This arrangement has proved not wholly satisfactory due to substantial depression which exists even in the air inlet portion of the carburetor at higher speeds of operation. Such depression, though less than that which exists in the high suction zone of the carburetor adjacent the venturis, nevertheless seriously reduces the effectiveness of the bleed. This difficulty is enhanced by the air cleaner which is always mounted on the air horn of an automobile carburetor and restricts the entering air. Ball Patent No. 1,358,498 provides an outside air bleed for the accelerating discharge passage, but the arrangement is such that the accelerating fuel cannot be discharged in a jet into the mixture conduit and, indeed, will likely spill out through the air bleed. Other constructions developed for the same purpose require a valve to prevent the squirting of fuel into the outer atmosphere or constant level chamber of the carburetor and this valve is not only expensive but frequently is not reliable.

The object of this invention is to produce an arrangement for the discharge outlet of the accelerating pump which will effectively prevent the pulling over of fuel through the accelerating pump when the carburetor is operated under high suction conditions.

Other objects and advantages of the invention will appear from the following description and accompanying drawings referring to which:

Figure 1 is a vertical, sectional view of a form of carburetor embodying the invention.

Figure 2 is an enlarged view of a portion of the structure in Figure 1.

Figure 3 is an enlarged view of the discharge nozzle of the accelerating pump.

The carburetor shown includes a downdraft mixture conduit having an air inlet horn 1, mixing chamber 2, and a series of venturis 3 and 4. A choke valve 5 is pivotally mounted in the air horn, and a throttle valve 6 is mounted on pivot 6a in the lower part of the mixing chamber. The reference character 99 indicates an air cleaner or strainer which is applied to the inlet end of the air horn or mixing conduit. The interior construction of the air cleaner is not shown as it may be of any desired type but it may be noted that the object of this device is to remove dust and dirt from the air and also to silence the flow of air through the carburetor so that there is a certain amount of restricting effect on the air flow.

A fuel bowl 7 adjacent the mixture passage encloses an accelerating pump cylinder 8, piston 9, and piston rod 10 controlled from the throttle by means of a crank 11, link 12, and lever 13 pivoted to the fuel bowl cover. The pump cylinder communicates through passages 14, 15, and 16 with an inclined orifice 17 leading upwardly and outwardly through the wall of the mixture conduit. Orifice 17 is plugged at its upper end, as at 18.

During normal operation, fuel is fed from another portion of the fuel bowl through calibrated jet 19, controlled by metering rod 20, and main nozzle 21 discharging into the throat of primary venturi 3.

Upward movement of piston 9 draws fuel from bowl 7 through a passage 22, past check ball 23 into passage 14, and lowering of the piston forces fuel past check ball 24 into orifice or chamber 17 and the mixture passage through an auxiliary nozzle, generally indicated at 25. The general features of the carburetor structure described above are well known and, in themselves, do not constitute the present invention.

The accelerating discharge nozzle includes a body having a threaded upper portion 26 mount-

ed in orifice 17, and a tip 27 discharging into a relatively high suction zone of the mixture conduit adjacent venturis 3. The threaded portion of the auxiliary nozzle also includes a screw driver slot 98. Intermediate its ends, nozzle 25 is provided on its outer surface with an annular recess 28 separated from tip 27 by a collar 29 which substantially seals the recess from the port 97 of passage 17 and the mixture conduit. Collar 29 is provided with a very narrow annulus 29a, which, being made of brass is capable of being slightly deformed to fit the exact contour of the bore 97.

Extending longitudinally through the nozzle 22 is a bore or passage 30 having a restriction 31 intermediate its ends. When the nozzle is properly assembled with the carburetor body, as shown in the figures, bore 30 communicates with the atmosphere through radial passages 32, annular recess 28, and a passageway 33 connecting orifice 17 with the atmosphere outside the carburetor. The capacity of the vent due to the effective areas of radial passages 32, annular recess 28 and the passageway 33 is preferably greater than the capacity of the bore 30 so that substantially all the suction applied to bore 30 from the mixture conduit is killed by the open vent 33 so that it cannot be effective to pull fuel through the orifice 31. The effectiveness of the air ducts 32, 28 and 33 may be varied to conform with requirements due to other carburetor features.

During operation of the accelerating pump, liquid fuel under pressure will be forced through restriction 31 in nozzle 25 and ejected in a very fine stream or jet past radial passages 32. Passage 30 should be made sufficiently wide and short so that the jet will not strike the walls thereof. No fuel will escape outwardly through passage 32, due to the pressure of the fluid stream when emerging from restriction 31 and to the angle between passages 32 and bore 30. When the pump is inactive, suction communicated to bore 30 from the mixture passage will be substantially broken by air bleeding through the passages 32 and aperture 33, preventing drawing of fuel from the accelerating system.

The outside vent passageway is shown opening downwardly into a pocket between the fuel bowl and mixture conduit, but the passageway may be otherwise disposed so as to open through any convenient part of the carburetor body. In the arrangement shown, the passageway 33 is substantially protected against dust and foreign matter circulating in the vicinity of the carburetor. The protection is provided, in the present instance, by the location of the inlet of passage 33, but for greater assurance of protection from dust, a strainer or filter 96 may be provided.

For the convenience of those skilled in the art who wish to use the invention, a practical embodiment may be dimensioned as follows: If the restricted orifice 31 is made not greater in area than .00075 (#68 drill size) then the passageway 30 may be made .00169 or #56 drill size. The two passageways 32 may be of #58 drill size so as to total .00276 in area, and the passageway 33 may be drilled with a #42 drill which will give the passageway an area of .00686. All of the above areas are given in decimals of a square inch. It will be understood that the length of these passageways has an effect on the restriction presented thereby but good results were secured with a device constructed in approximate accordance with the scale used in Figure 2.

When the proportions indicated herein are used, the fine stream squirted through the jet 31 will shoot directly through the passageway 30 so that it will not be impeded by striking the walls thereof and the stream will not, accordingly, be broken into fine drops until it gets out into the mixing conduit beyond the end of the passage 30.

The accelerating nozzle described comprises a relatively simple unit which functions satisfactorily to supply partially atomized fuel to the mixture passage and to prevent pulling over of fuel from the accelerating pump by suction. Obviously, various features of the illustrated structure may be modified as will occur to those skilled in the art and the exclusive use of all such modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a carburetor, a mixture conduit having a restriction forming a suction zone, an accelerating fuel system including a pump, a passage connecting said pump with said conduit at one side of said zone including a discharge nozzle having its bore terminating adjacent and substantially in line with the mixture conduit wall for discharging a jet of accelerating fuel across said conduit, and a suction breaking bleed passage intersecting the inner end of the bore of said nozzle and communicating with a zone of substantially atmospheric pressure, said nozzle having a restricted fuel orifice immediately anterior to said bleed passage for forming the normal pump discharge into a jet, the portion of said bore posterior to said bleed passage being coaxial with said orifice and sufficiently wide and short so that said jet will be projected therethrough and beyond the mixture conduit wall during pump operation substantially without wall friction.

2. In a carburetor, a mixture conduit surrounding a high suction zone including a Venturi tube and a lesser suction zone adjacent the same, a main fuel supply system including a nozzle under the influence of said high suction zone, an accelerating fuel supply system including a pump, an accelerating nozzle having a passage connected with said pump at one end and its other end comprising a bore opening into said lesser suction zone adjacent the conduit wall, a suction breaking bleed passage intersecting the inner end of said bore and communicating with a zone of atmospheric pressure outside the mixture conduit, and said nozzle providing a restricted fuel orifice in said fuel passage adapted to form a liquid fuel jet immediately anterior to and coaxial with said bore, said bore being sufficiently wide and short so that said jet will be projected through said bore and beyond the conduit wall during normal operation of said pump substantially without striking the walls of said bore, said bleed passage being larger than said orifice so as to substantially satisfy suction applied to said orifice from said mixture conduit.

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