March 27, 1928. 1,663,804

M. MACKIE

CARBURETOR ATTACHMENT

Filed May 19, 1922

Fig. 1.

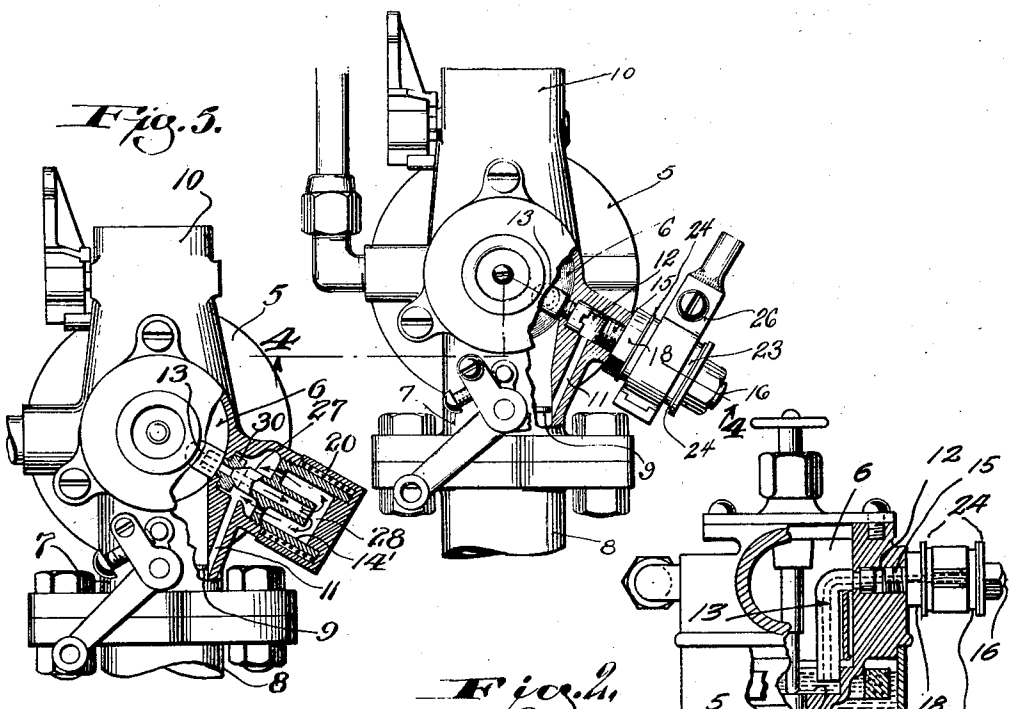

Fig. 3.

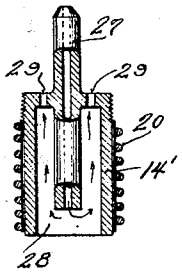

Fig. 2.

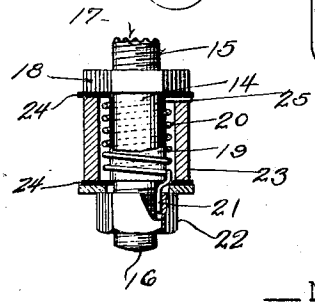

Fig. 4.

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UNITED STATES PATENT OFFICE.

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CARBURETOR ATTACHMENT.

Application filed May 19, 1922. Serial No. 562,195.

This invention relates to a new and useful attachment for a carburetor, and is more especially designed for use in connection with internal combustion engines of that type employed as the motive power for vehicles.

Many attempts have been made in the past to facilitate the starting of internal combustion engines in cold weather all of which have met with more or less failure, in that they do not operate except after the engine has been running for some time, as in the case of devices employing the engine exhaust gases as a heating medium, or else they involve other complicated electrical appliances arranged to heat the entire charge and requiring large radiating surfaces.

In view of the above and other objections to internal combustion engine charge heating devices now in general use, this invention has for one of its objects to provide a device so designed and constructed as to be capable of application to carburetors in use or at the time of their manufacture and which require but a small heating surface which comes in contact with the initial fuel and is preferably rendered inoperative after the engine has started or become warm by its own operations.

Some of the conventional types of carburetors now on the market have a by-pass leading from the fuel supply to a point adjacent the engine side of the throttle valve when in nearly closed position so that a rich starting and idling charge is supplied the engine, and, in so constructing the carburetors, an opening is provided for convenience in coring, which opening has heretofore been plugged to seal the by-pass against communication with the atmosphere.

This invention contemplates the threading of this opening which has formerly been plugged and the screwing therein of one end of a heating unit whereby the fuel drawn through the passage is thoroughly heated by contact with the end of the heating member to assist the starting operation of the engine.

It is a further object of this invention to provide a heating unit so designed and constructed as to require but a minimum amount of energy to properly heat the radiator plug thereof whereby no energy is wasted by the heating of an excessive area of the carburetor device but the heat is applied and limited as much as possible to the fuel passing through the by-pass to the engine side of the throttle valve.

The priming of an internal combustion engine, when cold, may have a deleterious effect as the heavier particles of the raw fuel do not ignite, but may leak past the pistons into the crank case, diluting the lubricating oil therein and causing a severe loss in engine efficiency. Therefore, this invention has for a still further object to provide means for priming an engine and, at the same time, eliminate crank case oil dilution.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a top view of one type of carburetor equipped with my invention, parts thereof being broken away and in section to more clearly illustrate details of construction;

Figure 2 is a detail view of the heating unit detached from the carburetor, said view being partly in section and partly in elevation to more clearly disclose the construction thereof;

Figure 3 is a view similar to Figure 2 of a slightly modified form of my invention;

Figure 4 is a view, partly in section and partly in elevation, taken through Figure 1 on the plane of the line 4—4, and

Figure 5 is a view similar to Figure 1 illustrating the manner of connecting that form of my invention illustrated in Figure 3 with a carburetor.

In the drawings, the numeral 5 designates the fuel bowl or float chamber of a carburetor having a mixing chamber 6 connected therewith by a suitable fuel supply and an

outlet 7 which is connected with a manifold 8 and controlled by a throttle valve 9. Air is supplied the combustible mixture through a controlled air inlet 10.

In a number of carburetors, an idling by-pass 11 is formed in the side wall of the mixing chamber with its outer end communicating with the interior of outlet 7 adjacent valve 9, when in closed position, and its inner end terminating in a pocket or recess 12 connected by a duct 13 with a well, or fuel passage 13′, communicating with the mixing chamber.

The by-pass 11 comes into play when the engine is being started with the throttle valve substantially closed when the raw liquid fuel in the well, with which duct 13 communicates, is drawn therethrough into the engine cylinders. The drawing of liquid fuel into the cylinders of a cold internal combustion engine for starting is objectionable in many ways as the heavier particles of the raw fuel leak past the pistons and into the crank case and mix with the lubricating oil, diluting the same. Furthermore, this raw fuel entering the cylinders tends to dampen the spark and thus hampers instead of facilitates the starting of the engine.

In practice I have found that very efficient results are obtained by internally threading recess 12 and inserting therein a heating element, with which all fuel passing through by-pass 11 is subjected and thus reduced to a substantially vapor state or at least sufficiently heated so that the heavier particles vaporize readily and thus eliminate dampening of the spark and consequently greatly facilitate starting.

As illustrated in Figures 1 and 2, the means I provide for heating the fuel consists of a plug or stud member 14, the opposite ends of which are threaded, as at 15 and 16, end 15 being preferably corrugated, as at 17, and secured in recess 12 with its inner end adjacent the inner termination of by-pass 11 and flange 18, formed on stud 14, engaging the carburetor casting.

That portion of stud 14 between flange 18 and end 16 is provided with an insulating covering of mica, or the like 19 around which is wound a heating coil or element 20, one end of which is electrically connected with stud 14 by a securing nut 22 for a sleeve or guard 23 enclosing the heating element. The sleeve or guard is insulated from nut 22 of the heating element and from flange 18 by washers 24 and the other end 25 of heating element is electrically connected with the sleeve so that a suitable terminal 26 may be conveniently electrically connected therewith to afford means for connecting the heating element, a one wire circuit. It will be readily appreciated that coil 20 may be insulated from stud 14 and connected in a two wire circuit.

With end 15 corrugated as illustrated an increased heating surface is provided and in the operation of the device, fuel drawn into recess 12 strikes end 15 and is reduced to a vapor state or else heated to a degree sufficient to volatilize the heavier particles and facilitate starting of the engine.

As illustrated in Figure 3, the stud designated at 14′ may be hollow and has a tubular stem or nozzle 27 projected centrally therefrom which is directly connected with the conduit 13 so that all fuel drawn through by-pass 11 is first drawn into a heating chamber 28 within stud 14′ and then out through apertures 29 and by-pass 11 leading to the intake manifold. The chamber 28 is connected with the fuel supply in the manner illustrated in Figure 5 and previous to securing the attachment in position, the screw or nut 30 fixing the conduit 13 in place preferably has its central bore tapered to have a snug fit with the tapered end of the nozzle 27.

What I claim as my invention is:

1. The combination with a carburetor having a fuel mixture passage adapted for connection with an engine intake manifold, a throttle valve in the passage for controlling the volume of air and fuel supplied the engine and a by-pass formed in the wall of the fuel mixture passage and leading direct from the fuel supply to the fuel mixture passage near the engine side of the throttle valve, of means for heating only the fuel passing through the by-pass and including an electrical heating member.

2. An attachment of the character described, comprising a tubular stem having one end threaded to provide means of securement in an opening communicating with a carburetor idling by-pass, a nipple extended from the tubular stem into the fuel passage of the by-pass, the bores of said stem and nipple communicating, an outlet connecting the bore of the stem with the outlet side of the fuel passage, whereby fuel flowing through the fuel passage enters the tubular stem through the nipple and re-enters the passage through the outlet, and a heating element carried by the unthreaded portion of the stem.

3. The combination with a carburetor having a fuel mixture passage adapted for connection with an engine intake manifold and an idling by-pass one end of which is connected with the source of fuel and the other with said passage, said by-pass being formed in the walls of the carburetor and having a substantial bend therein at a medial point of a heating member adapted to be inserted into said by-pass at the bend therein whereby fuel flowing through the by-pass contacts with said member as it passes the bend therein.

4. The combination with a carburetor hav-

ing a fuel passage medially formed with a substantial bend, of a cylindrical member, a heat conveying nipple extending from one end of the cylindrical member, the outer end of said nipple being inserted into said passage at the bend therein, said nipple discharging into the cylindrical member, an outlet leading from the cylindrical member and communicating with the outlet portion of the passage, whereby fuel flowing through the passage flows through said nipple and cylindrical member, and an electric heating coil for heating the nipple and cylindrical member.

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