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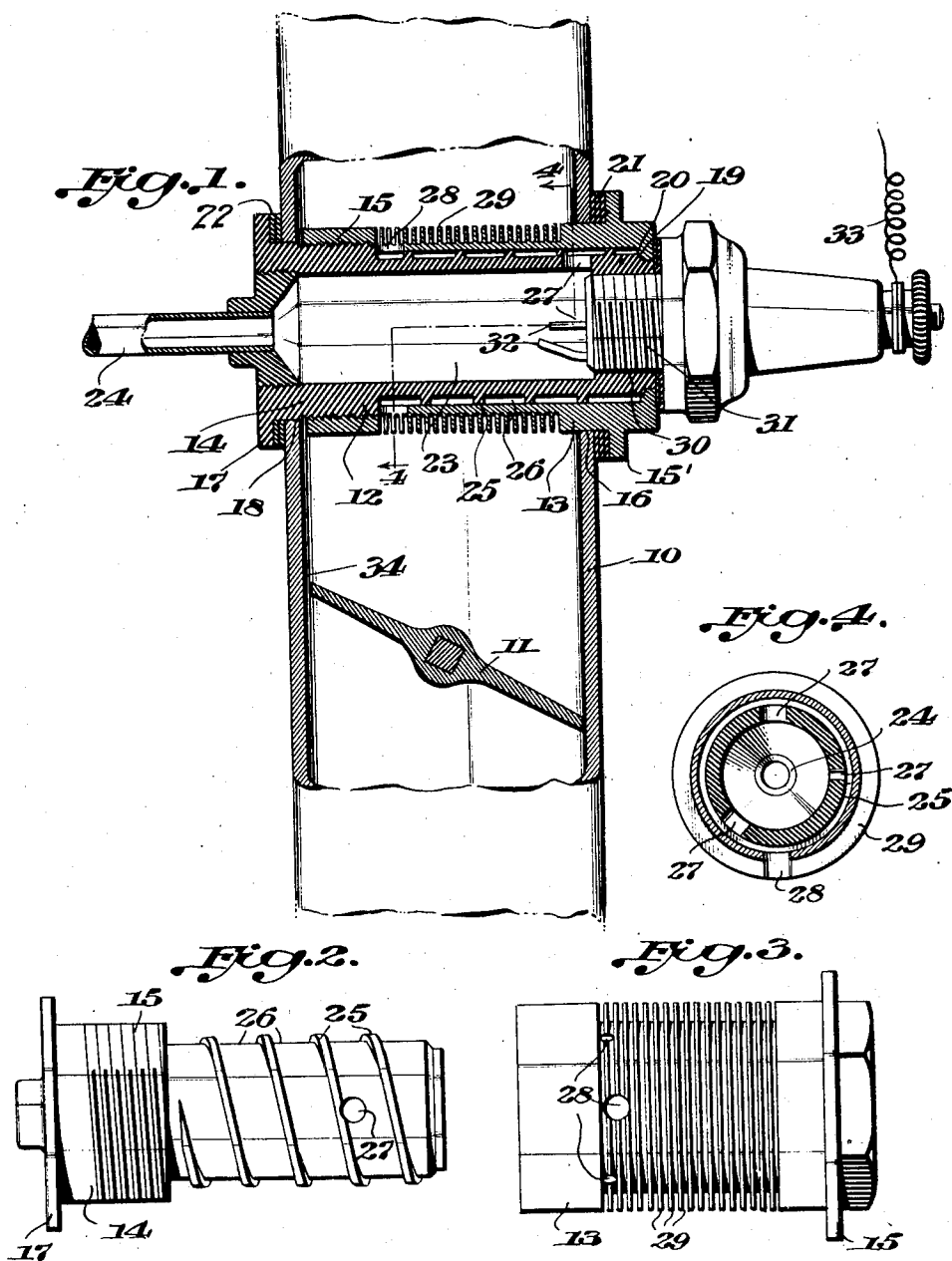
1,602,736

L. M. WOOLSON

HYDROCARBON MOTOR

Filed Sept. 26, 1919

2 Sheets-Sheet 1



Inventor,
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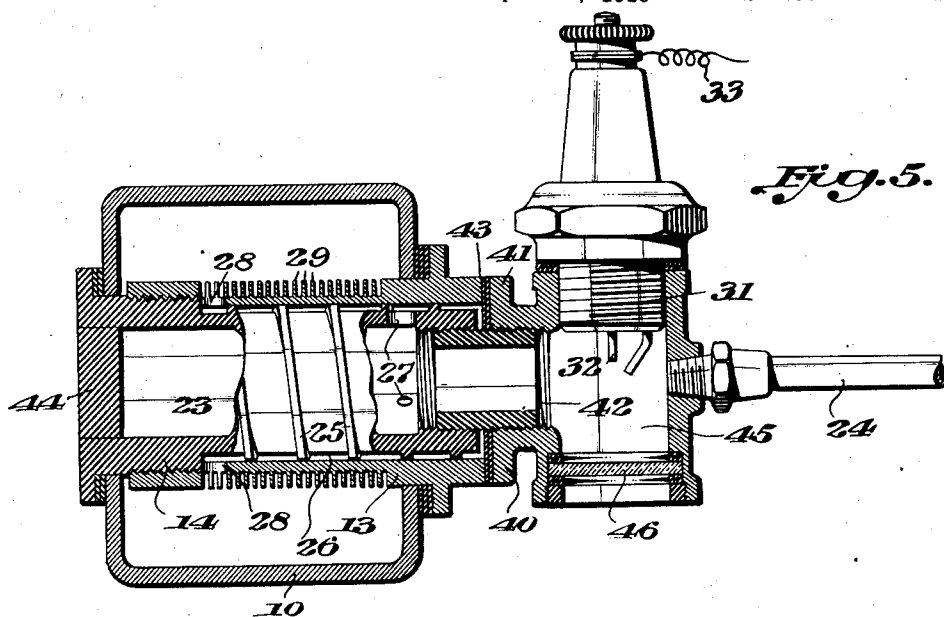
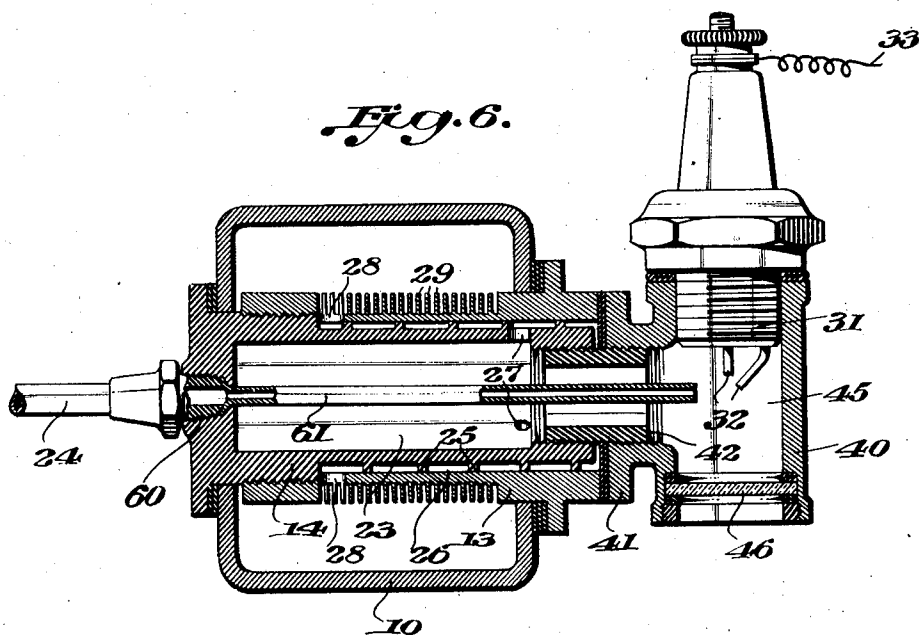
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

LIONEL M. WOOLSON, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON MOTOR.

Application filed September 26, 1919. Serial No. 328,649.

This invention relates to hydrocarbon motors, and particularly to means for heating the mixture passing from the carburetor to the motor.

One of the objects of the invention is to provide a detachable heater device of the combustion type for the intake pipe of a hydrocarbon motor.

Another object of the invention is to provide a combustion heater device made up largely of tubular parts for easy attachment to an intake pipe and for cheapness in manufacture.

Another object of the invention is to provide a heater device in which there is a circuitous outlet passage from the combustion chamber to the motor intake pipe.

Other objects of the invention will appear from the following description taken in connection with the drawings, which form a part of the specification, and in which:

Figure 1 is a vertical sectional view of the intake pipe of a hydrocarbon motor and a combustion heater made in accordance with this invention;

Figures 2 and 3 are detail views of two of the principal parts of the heater device;

Figure 4 is a transverse sectional view through the heater on the line 4-4 of Figure 1;

Figure 5 is a horizontal section through a motor intake pipe and a combustion heater made in accordance with this invention, but of slightly different form from that shown in Figure 1; and

Figure 6 is a view similar to Figure 5 illustrating a third form of the invention.

Referring to the form of the invention shown in Figures 1, 2, 3 and 4, 10 represents a motor intake pipe or manifold having a throttle valve 11 therein. The intake pipe is shown as substantially square in cross section and is vertically arranged, though it will be understood that it may be cylindrical or any other desired shape and may extend in any other desired direction, dependent largely upon the location of the carburetor of the motor relative to the intake passages in the cylinder block.

The combustion heater device is arranged in the intake pipe above the throttle valve 11 and it is indicated in general by the numeral 12. It comprises two principal pieces 13 and 14 which are threaded to-

gether as at 15. The piece 13 has a flange 15' and the entire piece is adapted to extend through an opening 16 formed in the intake pipe 10. The piece 14 has a flange 17 and the entire piece is adapted to extend through an opening 18 formed in the intake pipe 10 opposite the opening 16. The piece 14 is smaller than the piece 13 and telescopes within it, the inner end 19 of the piece 14 finding a seat against an inclined shoulder 20 at the outer end of the piece 13. By drawing the pieces 13 and 14 closely together by means of their threaded connection 15, and by providing suitable washers or gaskets 21 and 22 under the flanges 15' and 17 respectively, tight joints are made between the pieces 13, 14 and the adjacent flat sides of the intake pipe 10 and between the parts 19 and 20 of the pieces 13, 14.

The interior of the piece 14 forms a combustion space 23 which is fed by a combustible mixture from any suitable mixing device through a tube 24 connected to the outer end of said piece 14.

The exterior of the piece 14 where it enters the piece 13 is slightly smaller than the interior of the piece 13 and is formed with a spiral rib 25 as shown particularly in Figures 1 and 2. The exterior of this rib substantially fits within the piece 13 so that there is formed a spiral space or passage 26 between the periphery of the piece 14 and the interior surface of the piece 13. Near one end of the passage 26 a series of openings or ports 27 are formed in the piece 14 so that the passage 26 communicates with the combustion space 23. At the other end of the passage 26 there are a series of ports or openings 28 formed in the piece 13 so that said passage 26 communicates with the interior of the intake pipe 10. Thus it will be seen that the gas which may be burned in the combustion space 23 will expand and pass outwardly into the intake header 10 through the ports 27, the passage 26 and the ports 28, thus passing around the piece 14 several times and heating both it and the piece 13. The piece 13 is provided exteriorly with a series of fins or thin flanges 29 to more readily radiate the heat to the interior of the intake header.

The inner end of the piece 14 is threaded as at 30 to receive an igniter, shown in the

form of a spark plug 31 and having its points 32 arranged inside of the chamber 23. A wire 33 connects the spark plug with any suitable source of electric energy so the spark may be formed between the points 32 during the operation of the motor.

It will be understood that the intake pipe 10 and the pipe 24 are connected to suitable carburetors or mixing devices and that when the motor is to be started and is turned over by a suitable electric starter or otherwise, suction is created in the intake pipe 10 above the throttle 11, thus drawing a small amount of mixture past the throttle where it is "cracked" open as at 34. Suction is also created on the pipe 24 and mixture is drawn into the combustion space 23 where it is fired by the spark plug 31. The burning and expanding gases pass through the port 27 and into the passage 26, the flame of course being extinguished before the ports 28 are reached. The burnt gases pass through the ports 28 into the intake pipe 10 where they mix with the incoming gas and heat it. Also the burnt gases in passing through the passage 26 have heated the heater 12 so that it also acts as a stove to heat the incoming gases. By locating some of the ports 28 immediately above the upper part of the throttle valve 11 when it is in its idling position, the greatest amount of heat is immediately applied to the gases passing through the cracked opening 34.

In the form of the invention shown in Figure 5 the pieces 13 and 14 are the same as shown in Figure 1, except that the joint at one end is made by a separately attached piece 40 which has a flange 41 abutting against the extreme outer end of the piece 13 and which is secured to the piece 14 by a threaded connecting tube 42. Gaskets 43 are provided to make the joint tight. The piece 14 is also closed at its outer end as at 44 and the piece 40 provides an additional combustion chamber 45 into which the pipe 24 feeds the combustible mixture for the heater. The spark plug 31 is arranged in the piece 40 so that its points 32 are adjacent the discharge end of the pipe 24 to thereby readily ignite the mixture.

A glass window 46 is provided in the piece 40 opposite the spark plug 31 so that the operation of the device may be observed.

In this illustration of the device the intake pipe 10 is shown in horizontal section and its approximately square cross section may be more readily seen. The mixture enters the combustion chamber 45 through the pipe 24 and is fired by the spark plug 31. It then passes into the chamber 23 and into the intake pipe 10 through the ports 27, the spiral passage 26 and the ports 28.

In the third form of the invention shown in Figure 6, the pieces 13 and 14 are the same as shown in Figure 5 and the sepa-

ately attached piece 40 is also similar. It is secured to the piece 13 by a similar flange 41 and there is the same spark plug 31.

The combustible mixture pipe 24, however, feeds into the interior of the piece 40 somewhat differently from either of the other forms. Instead of being attached directly to the piece 40, the pipe 24 is threaded into the outer end of the piece 14 as at 60 and an extension tube 61 carries the mixture from this point to the interior of the piece 40 and discharges it adjacent the points 32 of the spark plug.

By this construction there is a preheating of the combustible mixture due to the fact that it is carried entirely through the combustion space 23 in which the gases are fired. This is of some advantage in connection with the use of heavier fuels.

It will be understood that other forms may be designed and used without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A heater device comprising a plug part forming a combustion chamber and adapted to be secured to an intake pipe, and a piece attached to said plug part and forming a continuation of the combustion chamber therein, and means for feeding a combustible mixture to said attached part.

2. A heater device comprising a plug part forming a combustion chamber and adapted to be secured to an intake pipe, and a piece attached to said plug part and forming a continuation of the combustion chamber therein, and means for feeding a combustible mixture to said attached part, said means comprising a tube passing through the plug part of the heater device.

3. In a hydrocarbon motor, the combination with the motor intake pipe extending from the carburetor to the cylinders, of a combustion chamber arranged in heat transferring relation to said intake pipe and having an outlet into said intake pipe, an igniter at one end of said chamber, means for feeding a heated combustible mixture to said chamber comprising a supply pipe extending through the chamber and having its discharge opening in the chamber adjacent said igniter.

4. A heater plug comprising a main combustion chamber and an extension forming a circuitous outlet passage immediately about the combustion chamber.

5. The combination with an engine intake pipe, of a heater plug adapted to be inserted within said pipe, said plug comprising a main combustion chamber and an extension forming a circuitous outlet passage around the combustion chamber and within said pipe.

6. The combination with an engine intake

pipe, of a heater device comprising two parts extending into said pipe from opposite sides and telescoped together, the inner of said parts forming a combustion chamber, and the outer of said parts having radiating fins in the intake pipe.

7. The combination with an engine intake pipe, of a heater device comprising two parts extending into said pipe from opposite sides and telescoped together, means for feeding a combustible mixture into said device, and means for igniting the mixture therein.

8. In a hydrocarbon motor, the combination with an intake pipe of substantially square cross section, of a combustion heater device connected to discharge into said pipe and comprising two telescoped parts extending into the pipe from opposite sides, each of said parts having flanges arranged against the two opposite flat sides of the intake pipe, and means for feeding a combustible mixture to said heater device.

9. The combination with an engine intake

pipe, of a heater device comprising telescoped tubular parts arranged in the intake pipe so that the mixture passing therethrough will come in contact with the exterior of the outer of said tubular parts, the inner of said tubular parts forming a combustion chamber and the space between the parts forming the outlet passage therefrom.

10. The combination with an engine intake pipe, of a heater device comprising two telescoped pieces, said device being arranged in the intake pipe so that the mixture passing therethrough will come in contact with the exterior of the outer of said tubular parts, the inner of said pieces forming a combustion chamber and the space between the pieces forming the outer passage from said chamber, and said device comprising a third piece secured to one of the telescoped pieces and forming a continuation of the combustion chamber.

In testimony whereof I affix my signature.

LIONEL M. WOOLSON.