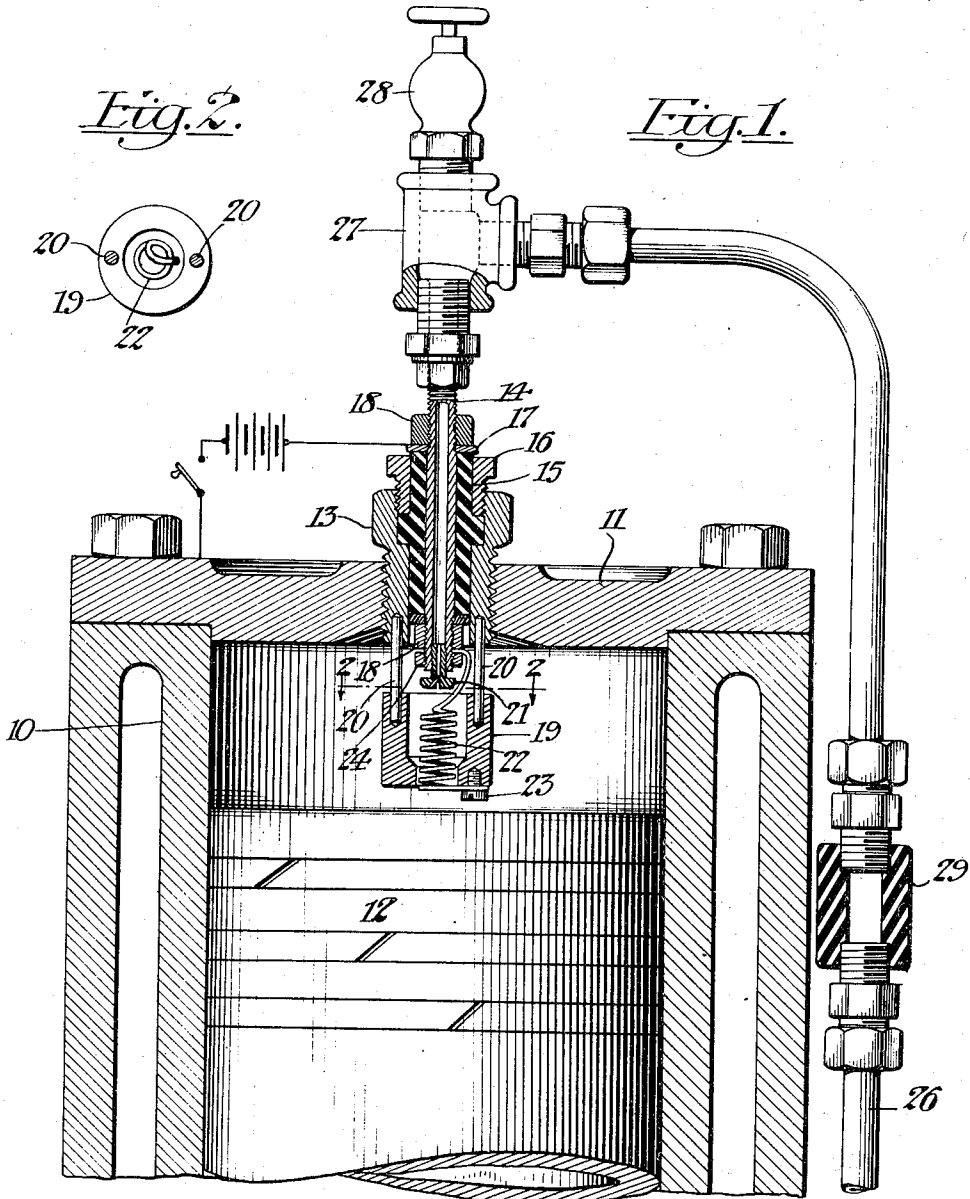


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VAPORIZER AND IGNITER FOR INTERNAL COMBUSTION ENGINES.
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1,223,124.

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UNITED STATES PATENT OFFICE.

ARTHUR W. THOMPSON, OF OTTAWA, ONTARIO, CANADA.

VAPORIZER AND IGNITER FOR INTERNAL-COMBUSTION ENGINES.

1,223,124.

Specification of Letters Patent.

Patented Apr. 17, 1917.

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To all whom it may concern:

Be it known that I, ARTHUR W. THOMPSON, a citizen of the Dominion of Canada, and a resident of the city of Ottawa, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Vaporizers and Igniters for Internal-Combustion Engines, of which the following is a specification.

10 This invention relates to certain improvements in combined vaporizers and igniters for internal combustion engines burning oils or other liquid fuel not readily vaporized, such for instance as kerosene. One object 15 of my invention is to provide a device which may be readily applied to the ordinary gasoline burning internal combustion engine to adapt it to the burning of less readily vaporized fuels. To secure this object, I so design 20 the combined igniter and vaporizer that it may be inserted and secured in place in the threaded aperture usually provided for the reception of the spark plug.

A further object of my invention is to 25 more effectively vaporize the fuel in starting by the heat of an electrical resistance wire so positioned in respect to the fuel inlet and receiving parts that the fuel is subjected to both the direct and indirect heating effect 30 of the resistance wire.

As an important feature of my invention, I support within the cylinder a member presenting a wall against which the liquid fuel is delivered and down which it may flow, 35 and position, closely adjacent to this wall, the resistance wire acting to directly heat such oil as flows or spatters on to the wire, to heat the wall from the wire and to indirectly heat the oil by radiation from the wire 40 while on said wall. Other important features and objects of my invention will be pointed out more particularly hereinafter.

Reference is to be had to the accompanying drawing in which I have illustrated only 45 one embodiment of my invention and in which similar reference characters indicate corresponding parts in the two views. In these drawings,

50 Figure 1 is a central longitudinal section through a portion of an engine and through a device constructed in accordance with my invention, and

Fig. 2 is a transverse section on the line 2-2 of Fig. 1.

55 In the specific form illustrated, I have

shown my invention applied to an ordinary type of internal combustion engine having a cylinder 10, a cylinder head 11 and piston 12. Through the cylinder head extends a metal plug 13 preferably of the same diameter and pitch of thread as the ordinary 60 spark plugs now employed in connection with gasoline burning internal combustion engines. Through the plug extends the liquid fuel delivery pipe 14, the two being 65 separated and electrically insulated from each other by a sleeve 15 of porcelain, mica, or any other suitable non-combustible insulating material. This sleeve may be similar in construction and held in place in substantially the same way as in any common 70 form of spark plug. As shown, it has an annular flange seating within the plug 13 and held in position by a gland 16. The liquid fuel pipe 14 is rigidly secured to this 75 sleeve so as to prevent relative movement and prevent leakage along the pipe. As shown, a pair of gaskets 17 engage one with each end of the insulating sleeve 15 and these are held in place by nuts 18. 80

At the inner end of the plug and spaced a short distance therefrom, I provide a fuel vaporizing member in the form of an annular sleeve or cup 19. It is shown as suspended or supported from the plug 13 by a 85 pair of pins 20 each having one end extending into a socket into the end of the plug and the other end extending into the upper edge of the wall of the member 19. Any other suitable means might be employed for 90 supporting said member. The fuel vaporizing member 19 is of approximately the same diameter as the plug but is preferably sufficiently small so that it can be removed from the cylinder head through the opening with- 95 in which the plug 13 is screwed.

At its inner end, the oil delivery pipe 14 is provided with means for delivering the liquid fuel against the inner surface of the member 19. As shown, a plug 21 is threaded 100 into the end of the pipe 14 and has a hole bored axially down to the head and from this hole an outlet passage leads diagonally downward through the head and delivers in such a direction that the oil in issuing will 105 impinge upon the inner surface of the wall forming the member 19. At its lower end, the member 19 has a central opening through which air or gas may circulate and from which the oil may issue in case it is not 110

entirely vaporized from the heated surface. Within the member 19 is a coil 22 of resistance wire, the lower end of the coil preferably extending through and substantially fitting the opening in the bottom of the member 19 to hold the coil centrally and steady it. The lower end of the coil may be supported and electrical contact insured by the attachment of the lower end of the wire to the wall of the metal member 19 by a screw 23. The opposite end of the wire may be rigidly secured to the oil inlet pipe 14 by means of a nut 24.

In delivering the oil to the pipe 14, any suitable fuel pump (not shown) may be employed and connected to a supply pipe 26. This may be connected to the pipe 14 by a T or any other suitable connection, but preferably there is an air outlet controlling needle valve 28 at the uppermost part in the circuit to insure the pipe being completely filled by the fuel pump. At some convenient place in the fuel pipe and between the fuel pump and the injection pipe 14, I provide a coupling including a section 29 of fiber or any other suitable insulating material so as to electrically insulate the portion of the pipe between the coupling and the resistance coil. It will be noted that none of the metal parts directly connected to the injection pipe 14 is in contact with the metal of the plug 13. By connecting the wire from one pole of the battery or other source of electrical energy to the oil pipe anywhere between the insulating section 29 and the point where the injection pipe enters the plug, and by connecting a wire from the other pole to the body of the engine, the current will flow through the resistance coil 22 and heat it. The heat from this resistance coil vaporizes the fuel which has issued from the outlet in the plug 21, the heating action being indirectly by the heating of the wall of the member 19, directly by radiation from the coil to the fuel on said wall, and directly by heating any of the fuel which may have splashed on the coil. It also acts to ignite the mixture of vapor and air in the cylinder when compression takes place.

The spacing of the member 19 or hot pot from the plug, permits the manipulation of the units 18 and 24 and the screw 21, and also permits free circulation of the gas. The said member, as shown, forms a part of the electric circuit but the lower end of the wire might be connected directly to the plug and the member be made of any other material than metal and which will hold the heat.

I do not wish to be limited to the specific details of construction, as various changes may be made within the spirit of my invention and without departing from the scope of the appended claims.

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

1. A combined vaporizer and igniter for internal combustion engines including a delivery conduit extending into the combustion chamber and insulated from the wall of the latter, and an electrical resistance element adjacent the inner end of said conduit and having one end electrically connected to said conduit and the opposite end to said wall.

2. A combined vaporizer and igniter for internal combustion engines including a plug adapted to be screwed into the wall of the cylinder, a delivery conduit extending therethrough and insulated therefrom, and an electrical resistance element adapted to be heated by the passage of a current therethrough and having one end connected to said conduit and the opposite end to said plug.

3. A combined vaporizer and igniter for internal combustion engines, including a plug adapted to be screwed into the wall of the engine cylinder, a liquid fuel conduit extending through said plug and insulated therefrom, a member within the cylinder and against which the liquid fuel may impinge from said conduit, and an electrical resistance element for heating said member, one end of said element being connected to said member and the opposite end being connected to said conduit.

4. A combined vaporizer and igniter for internal combustion engines including an annular member disposed within the cylinder, an electrical resistance coil encircled by said member, and means for delivering liquid fuel against the inner surface of the wall of said member.

5. A combined vaporizer and igniter for internal combustion engines, including a plug adapted to be inserted through the cylinder wall, an annular member within the cylinder and supported from said plug and open at the top and bottom, a liquid fuel delivery conduit extending through said plug and adapted to deliver against the inner surface of said member, and a heating coil within said member for vaporizing the liquid on said surface.

6. A combined vaporizer and igniter for internal combustion engines, including an annular member open at the top and bottom and supported within the cylinder, an electrical resistance and heating coil within said member, and having one end thereof connected to said member, connections for delivering heating current through said coil and said member in series, and means for delivering liquid fuel against the surface of said member.

7. A combined vaporizer and igniter for internal combustion engines including a member within the cylinder and presenting

a depending wall, an electrical resistance coil closely adjacent to said wall, and a conduit for delivering liquid fuel against said wall, said conduit being insulated from the cylinder and said coil having one end connected to said cylinder and the opposite end to said conduit.

8. A combined vaporizer and igniter, including a plug adapted to extend through and be supported within the wall of an internal combustion engine, a conduit extending therethrough and insulated from said plug and from said wall, a member within

the cylinder and presenting an annular wall, means for supporting said member from said plug, a nozzle at the inner end of said conduit for delivering oil from said conduit against said member, and an electrical resistance coil within said member and having one end connected to said conduit and the opposite end to said member.

Signed at New York, in the county of New York, and State of New York, this eleventh day of May, A. D. 1916.

ARTHUR W. THOMPSON.