H. F. SHEPHERD.

HOT PLATE APPARATUS FOR EXPLOSIVE ENGINES.

APPLICATION FILED JULY 22, 1918. RENEWED MAY 8, 1919.

1,317,900. Patented Oct. 7, 1919.

FIG 1

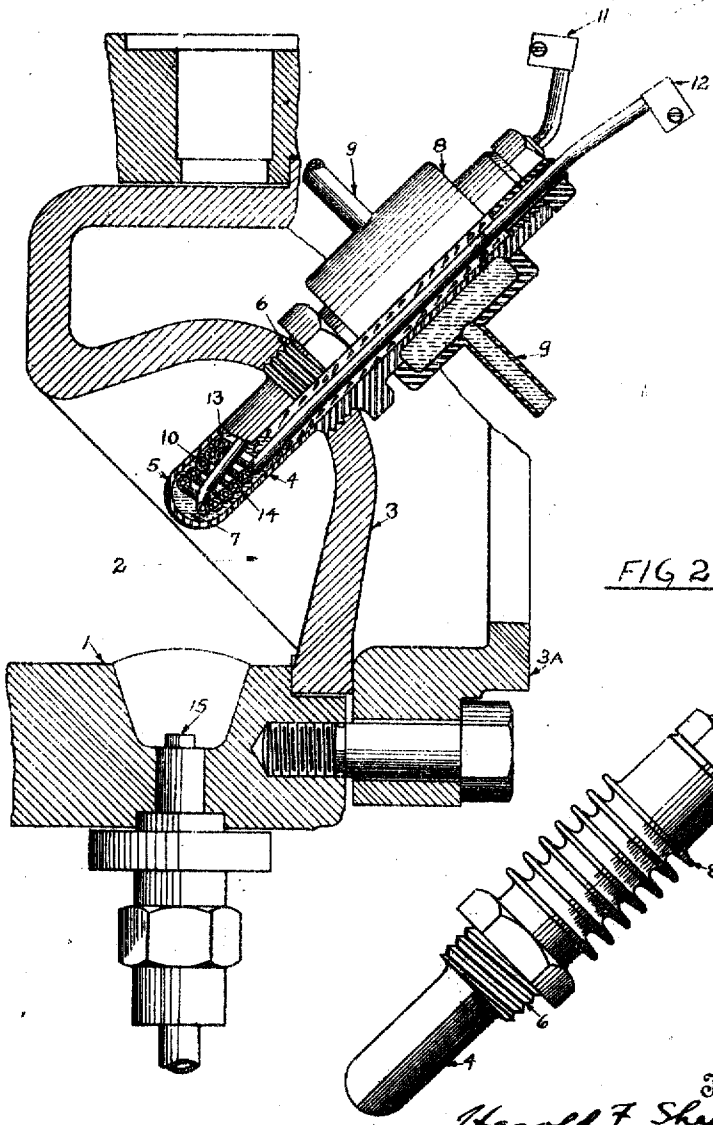


FIG 2

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HOT-PLATE APPARATUS FOR EXPLOSIVE-ENGINES.

1,317,900. Specification of Letters Patent. Patented Oct. 7, 1919.

Original application filed November 20, 1917, Serial No. 204,532. Divided and this application filed July 22, 1918. Serial No. 246,033. Renewed May 8, 1919. Serial No. 295,708.

To all whom it may concern:

Be it known that I, HAROLD F. SHEPHERD, a citizen of the United States, residing at Grove City, in the county of Mercer and State of Pennsylvania, have invented new and useful Improvements in Hot-Plate Apparatus for Explosive-Engines, of which the following is a specification.

This invention relates to hot plate apparatus for explosive engines and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

This application is a division of application Serial Number 204,532, filed by me Nov. 20, 1917, for improvements in hot plate apparatus in which the invention in its broader phase is claimed.

The invention is illustrated in the accompanying drawings as follows:—

Figure 1 shows a central section of the end of an explosion chamber of an explosive engine equipped with the hot plate apparatus.

Fig. 2 shows an elevation of an alternative construction of a hot plate apparatus.

1 marks the cylinder, 2 the explosion chamber, 3 the hot bulb operating at the end of the explosion chamber, 3^a a ring for securing the hot bulb in place and 4 a starting plug.

The starting plug comprises a hot plate in the form of a receptacle 5. The upper end of this receptacle is provided with a screw thread 6 which is inserted in a screw-threaded opening in the hot bulb. The receptacle contains a liquid 7 having a predetermined desired vaporizing point. This vaporizing point may be accomplished from the nature of the material used so as to have the desired pre-determined temperature at atmospheric pressure, or the pressure in the receptacle may be varied so as to vary the boiling or vaporizing point if desired. Ordinarily mercury is used in the starting plug, this having a vaporizing point approximating that desired. If a slightly higher temperature is desired this may be accomplished by subjecting the receptacle to a slight pressure and closing the receptacle by soldering. A water jacket 8 surrounds the outer end of the plug and is connected by the tubes 9 with the circulating system of the engine (not shown). This water jacket forms a condenser so that the vapor arising from the liquid when heated upon coming into contact with the upper walls of the receptacle adjacent to the water jacket is immediately condensed and the liquid so condensed is returned to the body of the liquid 7. The condenser is practically insulated from the liquid in that the vapor in itself is not a good conductor of heat. The heat, however, is dissipated automatically through the particles of vapor acting on the condensing plate. At the same time the temperature of the plate from its direct contact with the liquid is maintained approximately constant at the vaporizing point of the liquid.

In order to heat the plug for starting the engine an electric heating unit having a heating element 10 is used. This element is connected with the terminals 11 and 12 surrounded by an insulating coat 13 and a sheath 14. The heating unit, or element, is immersed in the liquid and heats the liquid to the vaporizing point and consequently heats the plate so as to start the engine.

The liquid not only maintains the plate below a temperature at which it can be injured through the excessive heat incident to the explosions of the engine but it also protects the plate against excessive heating through the action of the electric heating element 10.

The plug is preferably directly opposite the fuel injecting nozzle 15.

In Fig. 2 I have shown an alternative construction wherein an air cooling wall 8^a is substituted for the water jacket 8. Otherwise the construction is similar to that shown in Fig. 1.

What I claim as new is:—

1. In combination an explosion chamber of an explosive engine; means for introducing fuel to said chamber; a liquid receptacle comprising a plate subjected to variations of temperature incident to the explosions and acting on the fuel; a liquid in the receptacle vaporizing at a pre-determined desired temperature; and an electric heating element immersed in said liquid.

2. In combination an explosion chamber of an explosive engine; means for introducing fuel to said chamber; a liquid receptacle comprising a plate subjected to variations of temperature incident to the explosions and acting on the fuel; a liquid in the

receptacle vaporizing at a pre-determined desired temperature; an electric heating element immersed in said liquid; and means for condensing and returning the vapor.

3. In combination an explosion chamber of an explosive engine; means for introducing fuel to said chamber; a liquid receptacle comprising a plate in said chamber and acting on the fuel; liquid in the receptacle vaporizing at or above the ignition temperature; and an electric heating element immersed in said liquid.

4. In combination an explosion chamber of an explosive engine; means for introducing fuel to said chamber; a liquid receptacle comprising a plate in said chamber and acting on the fuel; a liquid in the receptacle vaporizing at or above the ignition temperature; an electric heating element immersed in said liquid; and means for condensing and returning the vapor.

5. In combination an explosion chamber of an explosive engine; means for introducing fuel to said chamber; a hot bulb by which said fuel is normally ignited; a liquid receptacle comprising a plate subjected to the explosions and acting on the fuel; liquid in the receptacle vaporizing at or above ignition temperature; and an electric heating element immersed in said liquid.

6. A starting plug for explosive engines comprising a receptacle adapted to be inserted into an explosion chamber; a condenser arranged on the outer end of said plug and adapted to be arranged without said chamber; a liquid contained in said plug vaporizing at a pre-determined desired temperature; and an electric heating element operating on said liquid.

7. A starting plug for explosive engines comprising a receptacle; a screw thread on said receptacle for securing the same to the walls of an explosion chamber; a condenser arranged on the receptacle and without the screw thread; a liquid contained in the receptacle having a vaporizing point at a predetermined desired temperature; and an electric heating element operating on said liquid.

In testimony whereof I have hereunto set my hand.

H. F. SHEPHERD.