A. F. CHRISTMAS.

VAPORIZER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAR. 27, 1918.

1,384,686. Patented July 12, 1921.

Fig. 1.

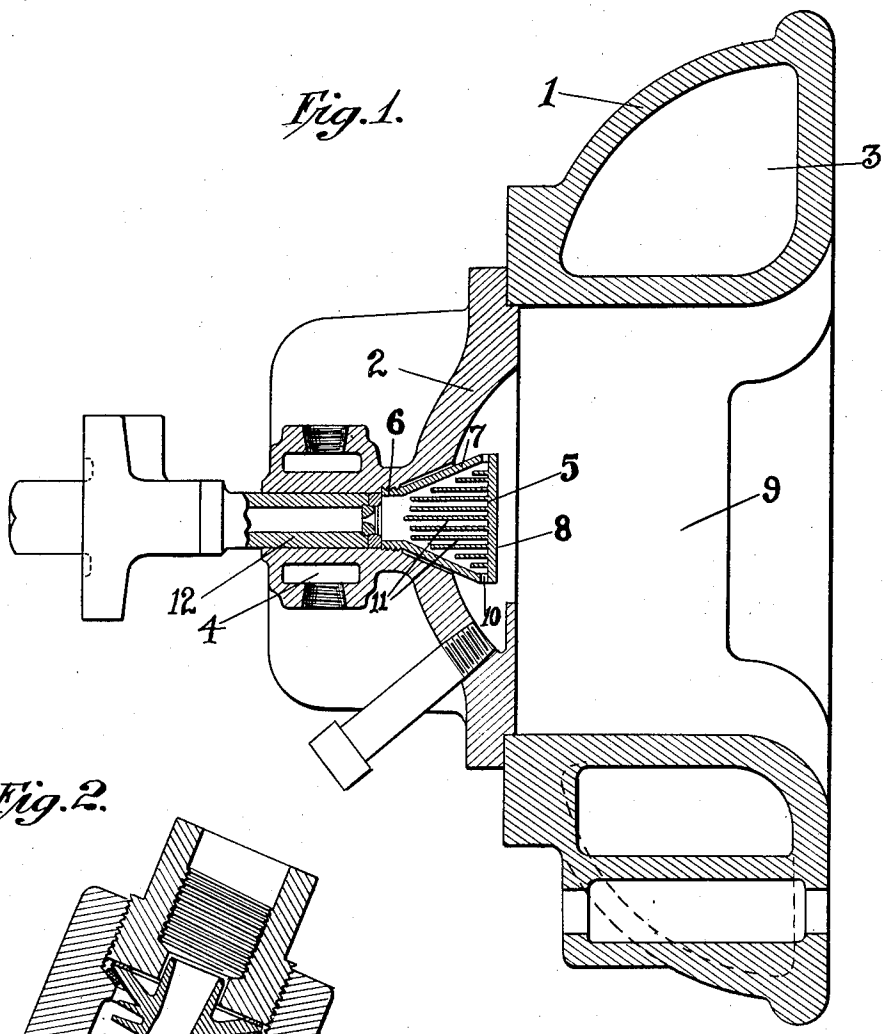
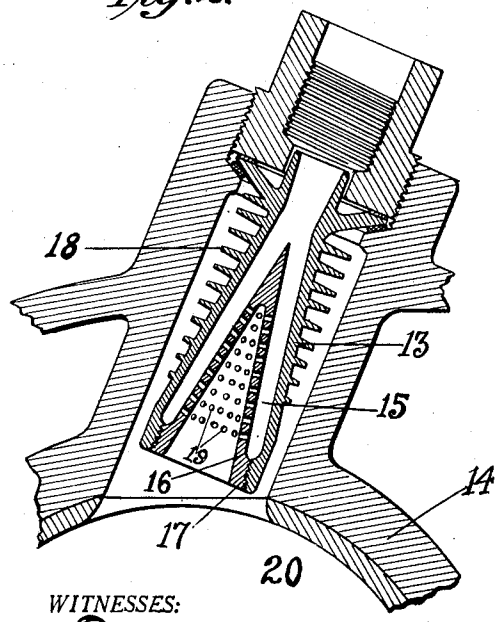


Fig. 2.



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VAPORIZER FOR INTERNAL-COMBUSTION ENGINES.

1,384,686. Specification of Letters Patent. Patented July 12, 1921.

Application filed March 27, 1918. Serial No. 225,074.

To all whom it may concern:

Be it known that I, ADOLPH F. CHRISTMAS, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented a certain new and useful Improvement in Vaporizers for Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines, and in particular to a vaporizer for the fuel oil used in such engines.

The objects of the present invention are to improve the vaporization of the fuel oil used in internal combustion engines, to transform it into an easily ignited vapor or gas at a high temperature before it is admitted to the combustion chamber, and to prevent the partial combustion and cracking of the fluid which is the common cause of carbon deposits and clogging of the admitting means as well as low efficiencies.

With these and other objects in view, I have devised the construction an embodiment of which is represented on the accompanying drawings and described in the following specification.

In the drawings annexed hereto and forming a part hereof,

Figure 1 shows a cross sectional view of the head end of an internal combustion engine cylinder with the vaporizer in place; and

Fig. 2, a modified form of the vaporizer placed in a slightly different position in the combustion chamber of the engine.

Referring more in particular to the drawings, 1 shows the cylinder head of an internal combustion engine adapted to be bolted or otherwise secured to the cylinder of an internal combustion engine (not shown). At the opposite end of the cylinder head 1 is the vaporizer head 2 which is preferably bolted to the cylinder head 1 on its surface opposite that by which the cylinder head 1 is attached to the cylinder. Both the cylinder head 1 and vaporizer head 2 are preferably supplied with jackets 3 and 4, respectively, through which water may be passed to maintain these parts at the proper temperature and to prevent their becoming overheated.

Located in the center of the vaporizer head 2 in the modification shown in Fig. 1 is the vaporizer 5 which as shown is screwed into the vaporizer head 2 at 6. In this form of vaporizer the walls of the body portion 7 are conical, terminating in a flat end 8 and having holes 10 about its periphery through which the fuel oil may pass into the combustion space. The vaporizer 5 is formed with a series of internal projections or ribs 11 preferably formed integral with the body portion and extending throughout the interior of the body, so as to provide a maximum of surface with a minimum of volume, or the cone may be filled with loose pieces.

By this means a large portion of the space within the vaporizer 5 is filled up leaving but little space between the substantially parallel surfaces of the projections through which the fuel oil must pass. This has the effect of materially raising the termperature of the incoming liquid for the reason that the vaporizer 5 extending into a pocket forming a part of the combustion space is itself maintained at a high temperature. This, through the medium of the projections or ribs 11 extending throughout the space of the vaporizer 5 thoroughly heats the oil or fluid passing through the vaporizer 5 so that when the fluid exudes from the orifices 10 of the vaporizer 5 it is in the form of a vapor or gas which has been raised to a high termperature by reason of its having passed over the plurality of surfaces of the vaporizer which cannot ignite it, as the scavenging air is excluded from the interior of the vaporizer. The ignition is readily and completely accomplished by the compression of the engine in connection with the temperature in the interior, without additional igniting means, after issuing from the vaporizer. The vaporizer should be so proportioned that nothing but exhaust gases will be compressed inside of it.

Adjoining the vaporizer 5 is the water cooled fluid inlet conduit 12 which is in communication with a suitable fluid pump (not shown).

In the modification of the invention shown in Fig. 2, the conical body portion 13 of the vaporizer is shown located at an oblique angle to the vaporizer head 14 and is of a slightly different shape. The free space 15 of the vaporizer in this form is reduced to a minimum by the inclusion of a cone 16 fitting within the outer conical body portion 13, the free space comprising merely the annular space between the substantially

parallel walls of the body portion and cone 16. The cone 16 may be integrally formed with the body portion 13 or separately formed and fastened thereto by screw threaded portions 17. To increase the heated portions of this form of vaporizer flanges 18 may be provided upon its outer surface. Orifices 19 provided on the surface of the inner cone 16 permit the passage of fuel oil into the combustion space 20 after becoming thoroughly heated and vaporized. In both of the modifications of the invention the vaporizer 5 or 13 is located in a portion of the combustion space of the engine into which the scavenging air does not penetrate so that there is no oxygen inside the vaporizer. This prevents an ignition of the oil while in a semi-fluid state, ignition taking place when the vapor meets and mixes with the oxygen after issuing from the small openings.

The vaporizers 5 or 13 may be made of any suitable metal or refractory material, but I have found that steel or nickel gives excellent results.

It is to be understood that the present showing and description disclose only certain specific embodiments of the present invention and that other forms and modifications are included within the spirit and scope of the invention as expressed in the appended claims.

What I claim is:

1. In a liquid fuel internal combustion engine, the combination with a cylinder having a combustion chamber, a vaporizer head for said cylinder, a vaporizer located within said head and adapted to absorb the heat of the explosion and impart said heat to the injected liquid fuel to convert the liquid into a vapor or gas, said vaporizer comprising a conical hollow body having a plurality of substantially parallel extensive internal surfaces with relatively small open spaces in order that the injected fuel may absorb sufficient heat in the vaporizer to become vaporized or gasified before entering the combustion chamber, said body portion increasing in diameter and volume of metal from inlet to outlet, lateral outlet apertures from said vaporizer to the combustion chamber and a fuel nozzle opening into an end of the hollow body portion of said vaporizer.

2. In a liquid fuel internal combustion engine the combination with a cylinder having a combustion chamber, a vaporizer head for said cylinder, a vaporizer located within said head and adapted to absorb the heat of the explosion and impart said heat to the injected liquid fuel to convert the liquid into a vapor or gas, said vaporizer comprising a hollow body having extensive internal surfaces formed by a plurality of internal projections with relatively small open spaces in order that the injected fuel may absorb sufficient heat in the vaporizer to become vaporized or gasified before entering the combustion chamber, and a water cooled fuel nozzle opening into the outer end of said vaporizer.

3. In a liquid fuel internal combustion engine, the combination with a cylinder having a combustion chamber, a vaporizer head for said cylinder, a vaporizer located within said head and adapted to absorb the heat of the explosion and impart said heat to the injected liquid fuel to convert the liquid into a vapor or gas, said vaporizer comprising a hollow conical body portion having a plurality of substantially parallel internal surfaces formed by a plurality of internal projections with relatively small open spaces between said surfaces in order that the injected fuel may absorb sufficient heat in the vaporizer from said surfaces to become vaporized or gasified before entering the combustion chamber, and a water cooled fuel nozzle opening into the outer end of the hollow body portion of said vaporizer.

In testimony whereof, I have hereunto set my hand.

ADOLPH F. CHRISTMAS.

Witnesses:

H. S. GILMAN,

H. W. BLACKBURN.