

C. E. ECKERLE.
VAPORIZER FOR OIL BURNERS.
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1,384,522.

Patented July 12, 1921.

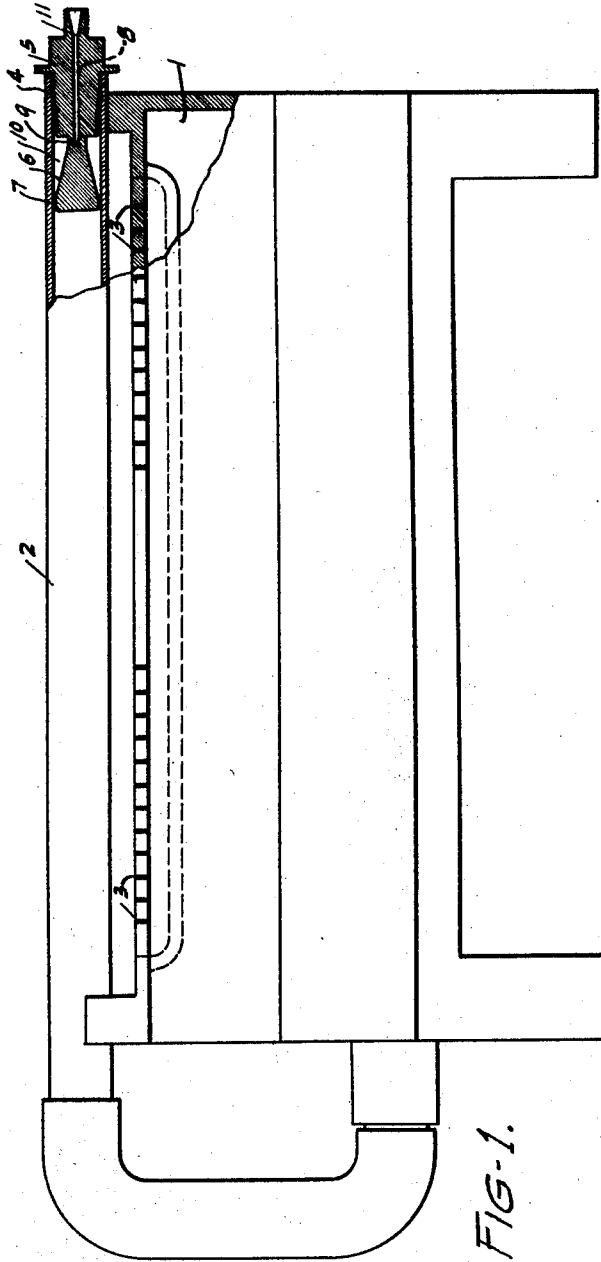


FIG-1.

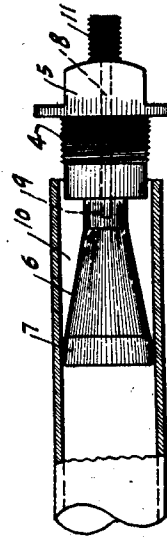


FIG-2.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES E. ECKERLE, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Vaporizers for Oil-Burners, of which the following is a specification.

My invention relates to a vaporizer for the heavier hydrocarbon oils and is especially designed to avoid the use of wicks or other agencies liable to become carbonized, and to utilize a taper plug disposed within the highly heated vaporizing pipe or tube and fitted therein with so close a clearance that the oil is forced past the plug in the shape of an extremely thin annulus or sheet which travels along the highly heated wall of the tube or pipe. The advantages of this construction are obvious in that the oil is reduced to an extremely fine annular jet or spray which is forced to make its exit from the oil reservoir along the highly heated walls and thus becomes immediately and completely vaporized.

A further important advantage is that the flow of oil being uniform and continuous over and about the large end of the cone or taper plug keeps the latter at all times moist and avoids the hot dry spots which occasion the deposit of carbon.

A further advantage is that such a plug can be very readily removed and cleaned if it should in any manner become fouled.

Another important feature of my invention is the designing of the plug so as to form a chamber of substantial capacity between its middle portion and the vaporizer tube wall, which chamber forms a reservoir that is supplied with a conduit of greater cross sectional area than the area of the clearance between the cone and the tube. As a result this reservoir, which is highly heated, is maintained full of oil and in this manner I protect the cone from carbonization.

The advantages and preferred construction of my invention will be better understood by reference to the accompanying drawings and to the specification and appended claims descriptive thereof.

According to the drawings:—

Figure 1 illustrates a hydrocarbon oil burner in side elevation with its vaporizer tube and cone plug shown in cross section.

Fig. 2 is an enlarged view of the cone plug in the tube.

Similar reference numerals refer to similar parts throughout the drawings.

I have illustrated my invention in combination with a burner 1 which is typical of any hydrocarbon oil burner and which in its detail structure forms no part of the subject matter of this application. This burner has mounted above it a vaporizing tube 2 exposed to the heat of the burner throughout the major portion of its length and especially at its ends where the burner orifices 3 will highly heat the tube. The tube at its intake end is internally threaded to receive a plug which comprises a threaded body 4, a wrench grip 5 on its outer end, and a cone 6 on its inner end, the cone comprising a sharply tapering body portion terminating in a very slightly beveled base portion 7 which terminates at the base of the cone. An axial oil duct 8 leads through the plug to the point of junction between the cone and the threaded end 4 of the plug and there it is intersected by a radial duct 9 at right angles to the duct 8, which duct 9 opens into the clearance or annular tapering reservoir 10 surrounding the cone and formed between the cone and the vaporizing tube 2. The walls of the vaporizing tube opposite this reservoir are heated by the burner and the circular base of the cone is disposed concentrically in the tube with its marginal edge leaving an extremely fine annular clearance between it and the inner wall of the tube. In practice, what would be regarded as a snug fit in the cone in the tube will leave the desired clearance which should not exceed in its area the area of the duct 9. In this way the escape of oil is less than the feed, the chamber 10 is kept full, and the annular oil spray or jet is of an extremely fine thin nature so that practically every particle of oil is forced to pass over and travel along the highly heated walls of the tube 2. No adjustments of the cone are required, the oil flow, if desired, being controlled by a valve in the feed pipe (not shown), which couples to the threaded nipple 11 on the outer end of the plug.

I prefer that the taper end of the plug be conical and this permits screwing the plug into the tube 2, but it is only essential that the taper end of the plug fit so closely in and conform to the internal cross section of the tube that an extremely fine marginal clearance will be left for the escape of the oil spray into the tube.

In operation, oil is admitted through the duct 8 of the plug and flows radially outwardly through the conducting duct and fills the chamber 10 surrounding the cone and there becomes rapidly preheated by exposure to the flame in the burner. The pressure under which the oil is supplied causes it to completely fill this chamber and to flow outwardly through the annular clearance between the cone and tube wall, the taper of the cone reducing the radial depth of the oil as it approaches the end of the cone until the oil is reduced throughout its flow past the slightly tapered zone 7 of the cone into an extremely thin annulus which becomes more and more highly heated until, as it emerges from the clearance, it is thoroughly vaporized and is jetted into the tube along its highly heated walls and is thus volatilized to the desired extent. As the burner tube becomes more and more highly heated it tends to expand away from the cone which is maintained at a much lower temperature by the bath of oil surrounding it and thus the volumetric flow of oil is automatically increased responsive to the increase in temperature of the vaporizing tube and accordingly of its capacity to vaporize oil. In this manner, notwithstanding the variation in the area of the clearance between the cone and tube, the degree of the vaporization remains substantially constant.

I do not limit myself to the peculiar design of the cone as the same may be varied without departing from my invention, but I do consider it essential that the cone or its equivalent should be so designed and shaped as to cause the oil in its flow past the cone to be effectually vaporized by the highly heated walls of the vaporizing tube.

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

1. A vaporizer for hydrocarbon oils comprising a vaporizing tube, a conical plug therein providing a fine marginal clearance between its inner end and the tube, and means to feed the oil to be vaporized between the plug and inner wall of the tube, substantially as described.

2. A vaporizer for hydrocarbon oils comprising a vaporizing tube, a conical plug therein providing a fine marginal clearance between its inner end and the tube, said plug being reduced to provide space for a substantial oil reservoir between it and the tube, and means to feed the oil to be vapor-

ized to the reservoir between the plug and inner wall of the tube, substantially as described.

3. The combination with a vaporizing tube, of a plug fitted therein and having a conical inner end which is adapted to leave only a fine annular clearance between its inner end and the inner wall of the tube, and means to feed the oil to be vaporized into the clearance between the tapering walls of the cone and the inner wall of the vaporizing tube.

4. In combination, a vaporizing tube and means to heat it, of a plug therein having its inner end flared to fit in the tube leaving a very fine clearance surrounding it, and a feed duct for the fuel oil greater in cross sectional area than the area of the smallest clearance between the plug and tube in a transverse plane.

5. The combination with a vaporizing tube and means to heat it; of a plug having its outer end threaded to screw into the tube, its intermediate portion circumferentially reduced and its inner end gradually flaring on a taper to terminate in a snug fit which leaves a substantially uniform and very small clearance between its inner end and the inner wall of the tube; and a fuel oil feed duct leading through the threaded end of the plug and opening laterally through the reduced intermediate portion of the plug.

6. The combination with a vaporizing tube and means to heat it; of a plug having its outer end threaded to screw into the tube, its inner end reduced to form a symmetrically tapered body, the walls of which flare outwardly sharply until they approach the inner end of the plug and then flare at an extremely acute angle to the inner wall of the tube to the inner end of the plug which is disposed concentrically in the tube and spaced therefrom by an extremely fine annular clearance; there being an oil supply duct leading through the plug body and opening laterally through the tapered intermediate portion of the plug, the cross sectional area of said duct being greater than the area of the fine annular clearance between the inner end of the plug and the tube, substantially as described.

In testimony whereof I affix my signature.
CHARLES E. ECKERLE.

Witnesses:

R. G. WESTBROOK,
J. N. MARTIN.