July 3, 1923. 1,460,719

W. M. HOFFMAN

FUEL OIL BURNER

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Fig. 1

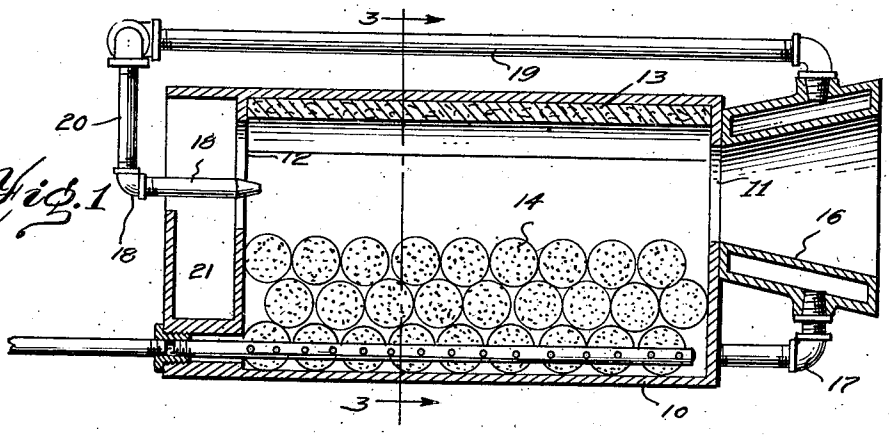


Fig. 2

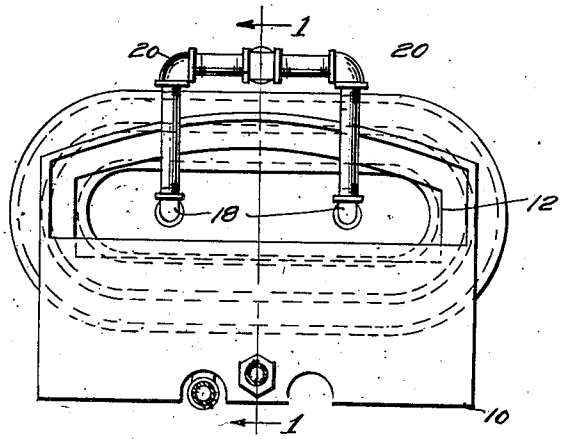
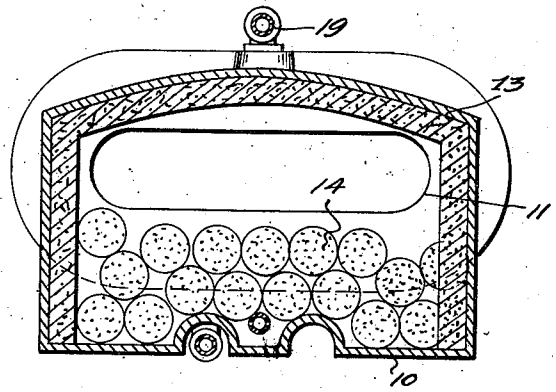


Fig. 3



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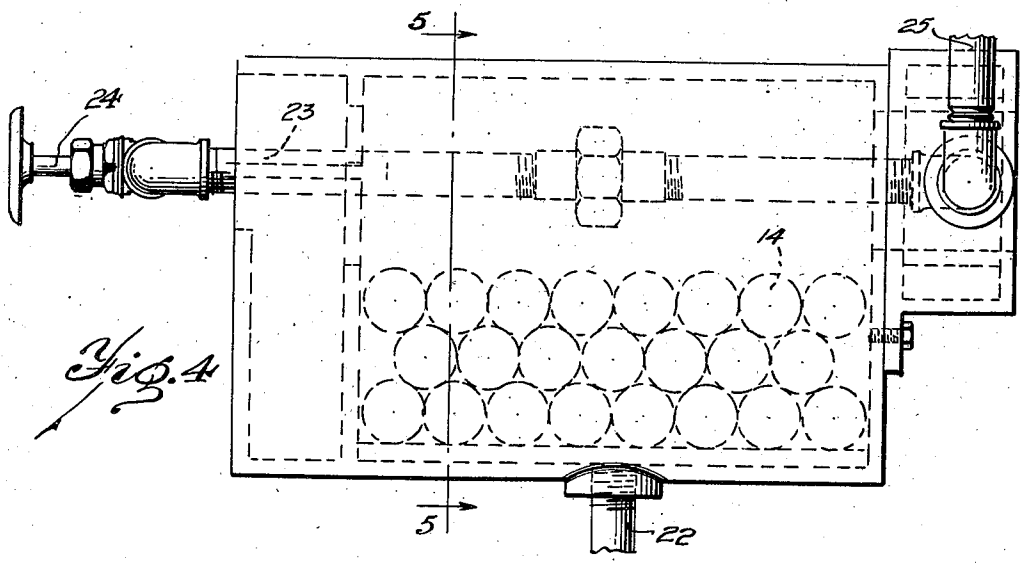


Fig. 4

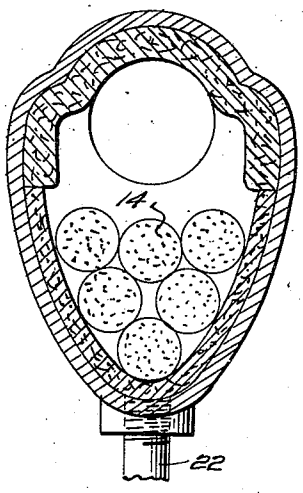


Fig. 5

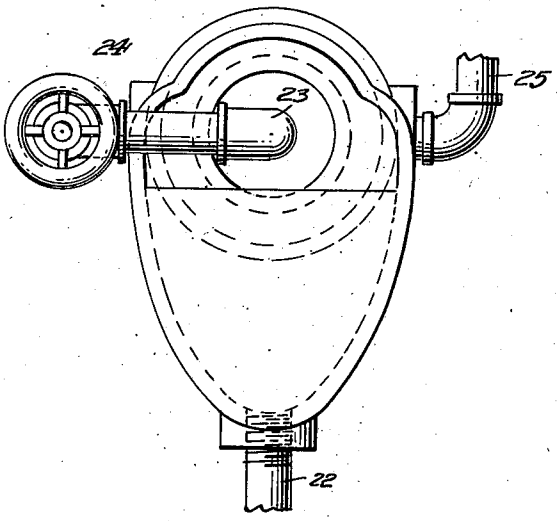


Fig. 6

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UNITED STATES PATENT OFFICE.

WILLIAM M. HOFFMAN, OF BUFFALO, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO OIL FUEL ENGINEERING CORPORATION, A CORPORATION OF NEW YORK.

FUEL-OIL BURNER.

Application filed March 13, 1922. Serial No. 543,182.

To all whom it may concern:

Be it known that I, WILLIAM M. HOFFMAN, citizen of the United States, residing at Buffalo, county of Erie, State of New York, have invented a certain new and useful Improvement in Fuel-Oil Burners, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in fuel oil burners. An object is to provide an improved fuel oil burner adapted to utilize the low-grade Mexican and Texan asphaltum base oils which contain a large percentage of asphalt and other tarry material. These oils are of such viscosity as to prevent their use in atomizing or spraying types of burners, as they flow with difficulty even at 60 degrees Fahr.

In my own pre-existing type of burner, as disclosed in my United States Patent No. 1,401,404, dated Dec. 27, 1921, which burner was adapted to utilize the low-grade fuel oils, these asphaltum base oils clogged up the pores of the asbestos core. Due to immense quantities of these asphaltum base oils and the very low price at which they may be purchased, they form a most desirable source of cheap fuel. My improved type of burner, here shown, has for its object the utilization of such oils economically and efficiently in connection with either large or small heating units and the production of a maximum of heat units from the use of a minimum of fuel.

The above, and other objects, together with the details of construction of the burner, and its method of operation, will more fully appear in the following description, appended claims and accompanying drawings, in which:

Figure 1 is a longitudinal cross-section through my improved burner.

Fig. 2 is a rear end elevation of the burner.

Fig. 3 is a vertical sectional view taken on the line 3—3, of Fig. 1.

Fig. 4 is a longitudinal cross-section through a modified form of my burner.

Fig. 5 is a vertical cross-section taken on the line 5—5 of Fig. 4.

Fig. 6 is a rear end elevation of the burner shown in Fig. 4.

My improved burner is comprised in a hollow elongate combustion chamber 10 within the interior of which combustion takes place, and provided with an elongate opening 11 for the discharge of products of combustion, and an atmospheric opening 12 for the admission of air to the combustion chamber. The top and side walls of this hollow casing are lined with a porous refractory material 13, such as an amorphous asbestos held together in a coarse texture by a suitable bond and molded to fit the interior of the casing.

As shown in Figs. 1 to 3 inclusive, this refractory lining does not extend throughout the interior of the casing, but the bottom of the casing which is adapted to serve as an oil pan is filled with loosely associated pieces of a suitable porous refractory substance, such as molded asbestos balls 14. These balls are adapted to loosely associate with each other, as distinguished from being packed closely together, so as to provide spaces between them to be filled with the liquid fuel. The fuel oil is fed to the lower part of this pan through a feed pipe 15, which leads from a suitable source of oil supply and is provided with perforations 15^A.

Positioned forwardly of the discharge opening is an outwardly flaring hollow jacketed superheater 16, adapted to be supplied with steam from a suitable source of supply through a conduit 17 and which in turn supplies dry, heated steam, superheated by the passage of the products of combustion through the superheater, to a pair of nozzles 18.

As shown in Figs. 1 to 3, a conduit 19 leads from the superheater to a T, 20 which supplies the two nozzles 18. Positioned at the rear of the asbestos-lined portion of the combustion chamber, is a sump 21 adapted to receive the oil from which overflows the top of the balls 14. It will be observed that the rear wall of this sump rises to a greater height than the forward wall so that should the sump be completely filled with oil, it

will flow back again into the combustion chamber. The type of burner just described and as illustrated in Figs. 1 to 3 is adapted for large heating units and it is obvious that nozzles in any desired number might be supplied and that the burner could be constructed in whatever size desired and adjusted to project the products of combustion where wanted for use.

In Figs. 4 to 6 I have shown a reduced size of burner of somewhat different shape and the interior of which is completely lined with an asbestos inner wall, as described, for the top and sides of the burner shown in Fig. 1. The fuel oil is fed to this modified type of burner through an inlet pipe 22 directly to the bottom of the casing or oil pan, in which pan are disposed the molded asbestos balls. This burner is provided with a single nozzle 23 supplied with steam from the superheater in the manner previously described, except that the steam line is provided with a regulating valve 24, which valve, however, might well be omitted. Steam is supplied to the superheater itself through conduit 25 which leads from a suitable source of steam supply, not shown in the drawing.

The construction and operation of both types of burners is similar.

Oil is fed into the lower part of the burner or pan partly filling the same and rising between the asbestos balls.

When the burner is lighted the oil is volatilized and burns on the surface of the balls and around the sides and top of the burner. The oil will work upwardly through the porous refractory side wall and the volatilized oils rising from the bed will burn on the top and sides of the combustion chamber. Dry, heated steam is projected by means of the nozzles through the burning zone and a draft of air is drawn into the burner around the steam nozzle through the opening 12, furnishing oxygen and hydrogen to mix with the volatilized hydrocarbon in the combustion chamber.

The outwardly flaring superheater serves as a portion of the combustion chamber in which combustion is completed.

It has been found that the asphaltum base oils above referred to may be completely burned in this type of burner and that the side wall and top are substantially free from carbon formation; during the burning process the upper layer of balls becomes white hot and the oil rises through the porous texture of the loosely associated balls and burns on the surface thereof.

What I claim is:

1. In a fuel oil burner, in combination, a hollow combustion chamber within the interior of which combustion takes place, which combustion chamber has a continuous encircling wall and is open at one end for the discharge of products of combustion and the bottom of which is covered with a bed of loosely associated pieces of porous refractory material, and means for projecting a vapor jet into said chamber over said bed toward the open end thereof.

2. In a fuel oil burner, in combination, a cylindrical hollow combustion chamber having a continuous outer wall and open at one end for the discharge of products of combustion, the bottom of which chamber is covered with a bed of loosely associated pieces of porous refractory material over the surface of which a vapor jet is projected toward the discharge opening and means for supplying fuel oil to said bed.

3. In a fuel oil burner, a hollow combustion chamber open at one end for the discharge of products of combustion and having an outwardly flaring discharge mouth extending from said open end, said combustion chamber provided with a porous refractory lining and an oil pan filled with loosely associated pieces of porous refractory material, and means positioned at the opposite end of said chamber for projecting a vapor jet thereinto.

4. In a fuel oil burner, a hollow combustion chamber open for the discharge of products of combustion and having an outwardly flaring jacketed discharge mouth adapted to serve as a steam superheater, said combustion chamber provided with a porous refractory lining on the sides and at the top and an oil pan positioned at the bottom which pan is filled with loosely associated porous refractory material, means for feeding oil to said pan and means for projecting a steam jet fed from said superheater into the interior of said chamber over said pan.

5. In a fuel oil burner, a hollow combustion chamber lined with a porous refractory material and having an outlet for the discharge of products of combustion, the lower portion of which chamber serves as an oil pan and is covered with a bed of disassociated porous refractory material, and a vapor jet projecting nozzle positioned to project a jet of vapor into said combustion chamber over said oil pan toward the outlet from the chamber.

6. In a fuel oil burner, a combustion chamber consisting of a hollow metal casing, the interior of which is lined with a porous refractory material and the bottom of which is covered with loosely associated porous refractory balls in communicating contact with the porous refractory lining of the casing, said casing provided with an outlet for the discharge of products of combustion, and a jacketed discharge mouth extending outwardly from such outlet, a nozzle so disposed as to project a jet into and through said combustion chamber toward the out-

let therefrom, vapor communicating means leading from said jacketed discharge mouth to said nozzle, and fuel communicating means leading to the lower portion of said casing.

7. In a fuel oil burner, a hollow combustion chamber having a continuous encircling wall and open at one end for the discharge of products of combustion, a vapor jet projecting nozzle positioned at the opposite end of said chamber to project a jet of vapor through the chamber toward the discharge therefrom, said combustion chamber lined with a porous refractory material through which fuel oil may percolate and the bottom of which chamber is covered with a bed of loosely associated porous refractory balls, and an oil sump within said chamber separated by a partition from said bed of balls and adapted to collect the overflow of fuel oil therefrom.

In testimony whereof, I sign this specification.

WILLIAM M. HOFFMAN.