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CRUDE OIL BURNER

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This invention relates to oil burners and more particularly to crude oil burners.

A primary object of the invention is to provide an oil burner utilizing steam as an atomizer and which is so constructed that it may be used in any type of boiler furnace and throw a fan-shaped smokeless flame which is produced with a minimum amount of noise and which will successfully burn either heavy or light grade crude oil.

Another object is to so construct a burner of this character that it may be regulated to produce either an extremely low fire or a welding hot one, which is easy to light and when lit remains so.

Another object is to provide a crude oil burner constructed so as to avoid clogging with trash or sediment; which is quiet, economical and efficient and which will lift any oil which will flow through the suction pipe.

In carrying out these objects, the invention is susceptible of modification without departing from the spirit or sacrificing any of the advantages of the claimed invention; there being shown in the drawing for illustrative purposes a preferred and practical form, in which:—

Figure 1 represents a longitudinal section of a burner constructed in accordance with this invention,

Fig. 2 is a similar view taken in a plane at right angles to Fig. 1,

Fig. 3 is a front elevation thereof, and

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 1.

In the embodiment illustrated the burner constituting this invention which may be used in furnaces of steam boilers, of either marine or stationary type, comprises a body 1 in the form of a casting of brass, steel or cast iron, and a tip member 10 preferably of brass, and detachably connected with the body. The body 1 has a chamber 2 formed therein, the rear wall of which is tapped and threaded as shown at 3 to receive the steam supply pipe S through which steam enters a jet or nozzle 20 having a threaded engagement with the rear wall of the body 1 and which communicates with the steam supply pipe S. This jet 20 extends longitudinally

through the body 1 into the tip member 10 terminating in a flat nozzle 21 disposed slightly in rear of the nozzle 11 of the tip member 10 and in longitudinal alinement therewith, it being spaced about one inch from said tip nozzle. Both of these nozzles or mouths are flattened out and constructed to throw a fan-shaped spray which is accomplished by constricting the lips of the mouth of each nozzle at the center so that the lips approach closer to each other at this point but are still separated and then gradually separate toward the ends or sides of the mouth. As shown in Fig. 2 these lips are made convex or curved longitudinally outward with the corners spaced backward some distance from the centers of the lips.

An oil supply reservoir R is provided below the level of the mouth of the nozzle 11 and contains oil under atmospheric pressure. An oil supply pipe P leads from said oil supply and enters the chamber 2 of the body 1 at the rear thereof at a point below the steam pipe S, the chamber 2 and tip member 10 combining to form an oil chamber into which oil is drawn by the vacuum produced in said chamber incident to the discharge of steam from the nozzle 21 through the nozzle 11.

The tip member 10 may be of any desired length, preferably about six inches, and has its rear end threaded for threaded engagement with the front end of the body 1, and is divided adjacent said threaded portion with an annular collar or shoulder 12 which abuts the front end of the body 1 when the tip is screwed into opposite position. The front end of the tip 10 is flattened and constructed to throw the oil in a fan-shaped spray which is accomplished by constricting the lips of the mouth at the center thereof to about $\frac{3}{8}$ of an inch in width or rather the distance between said lips being this wide and then gradually separating them up to $\frac{5}{8}$ of an inch at the sides, the mouth being about $1\frac{5}{8}$ inches across the top. The mouth 21 of the jet 20 extends to about within one inch of the mouth of the tip so that the steam flowing at a high velocity through said jet will meet the oil at this point and break it up into a very fine mist and force it out of

the mouth of the tip in a fan-shaped spray at an angle of 45 degrees horizontally, thereby forming a vacuum in the chamber 2 of the body. This vacuum formed in the chamber 2 in connection with the atmospheric pressure behind the oil operates to force the oil through the pipe P which is caught in the flow of steam at the opening of the steam jet and broken up into a very fine mist or spray and forced out of the mouth of the tip member at a high velocity in a fan-shaped spray and when ignited will fill the furnace with a clear fire, without smoke, and which is comparatively noiseless.

By the novel arrangement of the steam jet and mouth piece lips of this burner the fuel oil lies in the body and mouth piece pipe to the level of the lower lip and the steam flowing through the jet pipe at high velocity preheats the oil causing it to froth the rushing steam from this nozzle forming a thin bladelike jet which skims the froth-like top off the oil and blows the fine particles into the furnace at a high speed. Owing to the shape and form of the jet so blown it readily mixes with the air resulting in a more economical consumption of fuel.

The flame so formed has raised from a very small diameter to one of enormous proportion which results in a greater amount of heat with the less fuel.

It is, of course, understood that the burner may be made in various sizes depending upon the use for which it is required, and, of course, suitable valves are provided for controlling the steam and oil passing through the burner, a $1\frac{3}{8}$ inch needle valve being preferably provided for the oil and a $1\frac{3}{8}$ inch globe or angle for the steam atomizer. By properly operating the valves controlling the steam jet and the oil supply pipe a very slow fire may be had which is very desirable when raising steam on a cold boiler or the flame may be so controlled as to produce a welding hot fire without any smoke.

This burner will lift oil from an underground tank without any trouble providing the oil will flow through the suction pipe P.

This burner may be used either with or without an oil pump and when a pump is used it is advisable to have a constant pressure.

Without further description, it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention or its scope as claimed.

I claim:—

1. An oil burner comprising a hollow body member having a hollow tip extending longitudinally therefrom and provided approxi-

mately medially of its height with an elongated transversely extending flat mouth with the lips thereof arranged opposite each other and the space between them constricted at one point and gradually increasing in width from said point in opposite directions to form a spread out fan-like flame, means for discharging a thin blade-like jet of steam into contact with the oil at the rear of said mouth whereby the oil is atomized and combined with the steam, said means including a flared steam discharge nozzle within said tip and in horizontal alignment with said mouth, and a steam supply pipe communicating with said steam discharge nozzle, a source of oil supply under atmospheric pressure below the level of said mouth, and an oil supply pipe communicating with said supply and with said hollow body member at a point below the level of said mouth.

2. An oil burner comprising a hollow body having a hollow tip at one end, said tip having a discharge mouth or nozzle located midway the height thereof and extending horizontally, said body and tip combining to produce a fuel oil chamber, the normal level of the oil being level with the lower lip of the tip, a steam jet nozzle located in said tip and spaced inwardly therefrom, said nozzle having a flat mouth in horizontal alinement with the mouth of the tip, a steam supply pipe communicating with said steam jet nozzle, the mouth of the steam jet nozzle having the lips thereof approaching at the center and diverging toward the corners whereby high speed steam flowing through said mouth forms a thin blade-like discharge jet adapted to skim the froth-like top off of the oil and blow it in fine particles through the mouth of the tip, said steam jet serving to produce a partial vacuum in said chamber, an oil supply under atmospheric pressure below the mouth of the tip, and an oil supply pipe leading from said supply and entering said chamber at a point below the level of the mouth of the tip.

3. A burner of the class described comprising a body in the form of a hollow casting having its rear wall tapped and threaded to receive a steam supply pipe, a steam jet in said body connected with said supply pipe and having a flat horizontally extending nozzle with a restricted mouth at its front end, a tip connected with the front end of said casting and having a flattened constricted mouth located in longitudinal alinement with and in advance of the mouth of the steam jet, said body and tip forming an oil chamber, an oil supply under atmospheric pressure below the level of said mouth, and an oil supply pipe leading from said supply and entering the rear of said chamber at a point below the level of said mouth.

4. An oil burner comprising a hollow body having a hollow tip at one end, said hollow

body and tip combining to produce an oil chamber, said tip having a discharge nozzle, an atomizer located in said tip adjacent said nozzle, said atomizer and nozzle each being in the form of a horizontally disposed flat broad mouth having parted lips which approach at the center of the mouth and are arranged opposite each other, said lips separating towards the corners of the mouth and the inner faces of the lips being flat and smooth, said smooth surface extending inward from the edge of the lips, said atomizer and nozzle being disposed in horizontal alignment and substantially mid-way of the height of said tip, a steam supply pipe communicating with said atomizer, an oil supply under atmospheric pressure below the level of said nozzle, and an oil supply pipe entering said chamber at a point below said nozzle.

5. In an oil burner, a hollow body member having a hollow tip extending longitudinally therefrom, provided with an elongated transverse flat mouth medially of the height thereof and with the lips thereof arranged opposite each other and the space between them constructed smaller at the central point thereof and gradually increasing from said point in opposite directions and extending forwardly from the edges of said mouth in arcuate relation to form a spread-out fan like flame and means for discharging a thin blade-like jet of steam and oil, uniform in pressure throughout the length of said mouth, comprising an inner flared hollow body member having a hollow tip positioned behind said flat mouth and in horizontal alignment therewith, a steam supply pipe communicating with said inner hollow body member, said second named hollow tip being adapted to force steam into engagement with oil at the rear of the mouth of said first named tip, an oil supply under atmospheric pressure below the level of said mouth, and an oil supply pipe leading from said supply and entering said first named hollow body member at a point below the level of the mouth thereof.

6. In an oil burner, a hollow body comprising an oil chamber, a steam jet in said chamber extending longitudinally of and concentrically arranged with respect thereto, a steam supply pipe communicating with said steam jet, the forward end of said steam jet terminating short of the forward end of said chamber and having a flared horizontally disposed discharge nozzle formed thereon, the forward end of said chamber terminating in a flared horizontally disposed discharge nozzle in substantially direct alignment with said steam nozzle and approximately midway of the height of said chamber, a source of oil supply under atmospheric pressure below the level of the discharge nozzle, and an oil supply pipe leading from

said supply and entering said chamber below said discharge nozzle whereby the vacuum produced in said chamber incident to the discharge of steam from said steam nozzle will act to draw oil through said pipe into said chamber.

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