Sept. 1, 1936. F. J. BISHOP 2,052,747

OIL BURNER

Filed May 13, 1935

Fig. 1

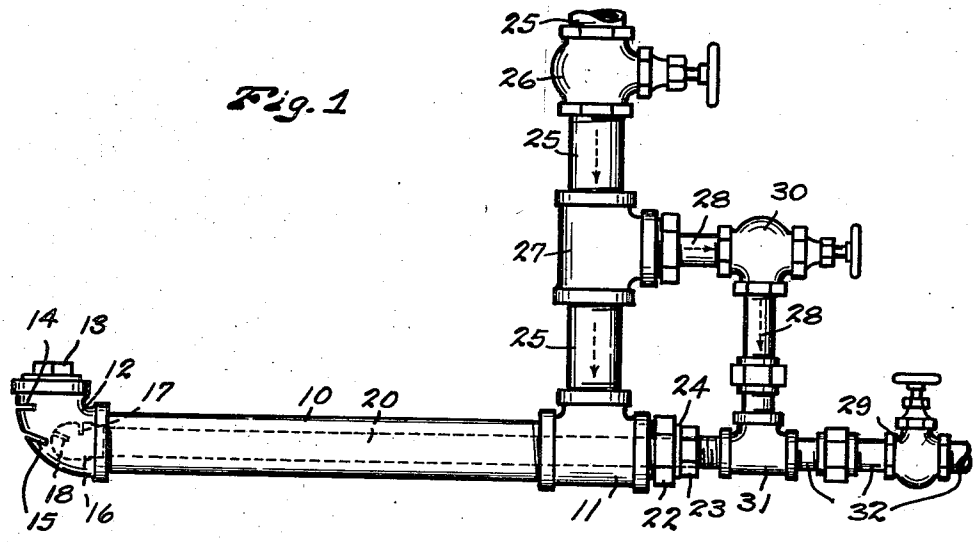
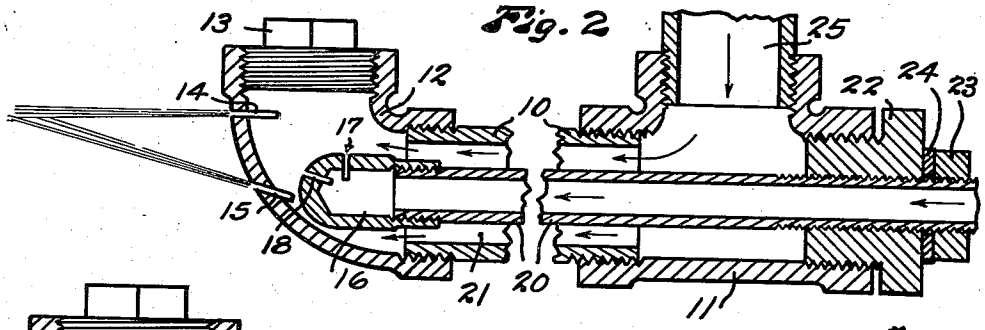


Fig. 2



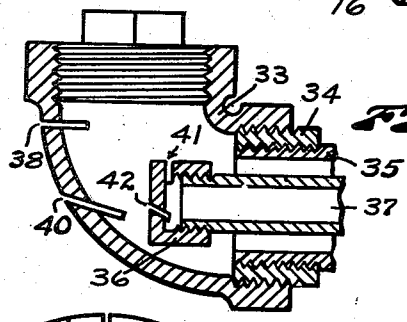


Fig. 3

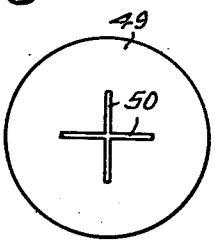


Fig. 5

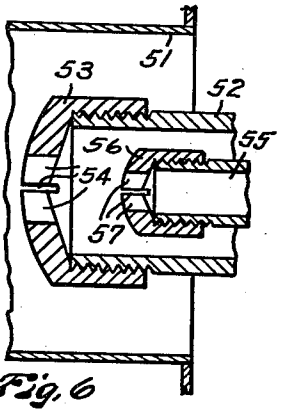


Fig. 6

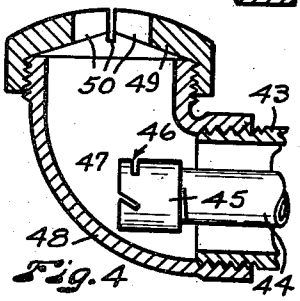


Fig. 4

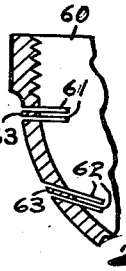


Fig. 7

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Patented Sept. 1, 1936 2,052,747

UNITED STATES PATENT OFFICE

2,052,747

OIL BURNER

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Application May 13, 1935, Serial No. 21,200

2 Claims. (Cl. 299—140)

My invention relates to improvements in oil burners of the type in which steam is used with the oil to help vaporize and atomize the oil in such a manner as to provide more efficient combustion.

A general object of my invention is to increase the efficiency and simplify the construction of oil burners of this type.

Another object of the invention is to provide an oil burner of this type which is built up almost entirely of standard pipe fittings thus making for an inexpensive construction.

Another object of the invention is to provide a particularly efficient and advantageous arrangement of slotted oil discharge members arranged to efficiently break up and atomize the oil and to discharge the atomized oil in thin fan like jets which ignite freely and burn with great efficiency.

Further objects are to provide an oil burner in which the oil is heated by steam in its travel to the oil atomizing nozzle and in which provision is made for admitting some steam directly into the oil conduit pipe before the oil enters the heated part of the burner.

Other and more specific objects will be apparent from the following description taken in connection with the accompanying drawing.

In the drawing Fig. 1 is a side elevation of an oil burner constructed in accordance with my invention.

Fig. 2 is a fragmentary sectional view of the same on a larger scale than Fig. 1.

Fig. 3 is a fragmentary sectional view of a modified form of the invention.

Fig. 4 is a fragmentary sectional view of another modified form of the invention adapted for use with a special type of boiler.

Fig. 5 is a plan view looking down onto the atomizer nozzle shown in Fig. 4.

Fig. 6 is a fragmentary sectional view of another modified form of the invention adapted for use in another special type boiler.

Fig. 7 is a fragmentary sectional view showing a modified form of duplex or split slot discharge means.

Like reference numerals designate like parts throughout the several views.

Referring to Figs. 1 and 2, I show an oil burner constructed almost entirely of pipe and pipe fittings. This oil burner comprises a main horizontal burner pipe 10 connected at one end with a T member 11 and provided at the other end with an elbow fitting 12. The elbow fitting 12 is disposed in an upright position and the upper end thereof is closed by a plug 13. A substantially horizontal slot 14 for the discharge of oil and steam is provided in the curved wall of the elbow 12 just below the plug 13. An inclined oil discharge slot 15 is provided below the slot 14. The two slots 14 and 15 are inclined toward each other at such an angle as to cause the discharging oil and steam from these two slots to meet or intersect at a few inches from the elbow 12, as shown in Fig. 2.

Positioned within the elbow 12 is an oil atomizer tip 16 having one slot 17 directed upwardly toward the plug 13 and another inclined slot 18 positioned so as to direct oil against the curved wall of the elbow 12 between the two discharge slots 14 and 15. The oil atomizer tip 16 is shaped somewhat like an elongated pipe cap and is screwed onto the end of an oil conduit pipe 20. The oil conduit pipe 20 is of substantially smaller diameter than the pipe 10 and is positioned substantially coaxially within the pipe 10 so as to leave an annular space 21 for steam between the inner wall of the pipe 10 and the outer wall of the oil conduit pipe 20. In practice, for burners of one popular size, I find it satisfactory to use three quarter inch standard pipe for the main burner pipe 10 and three eighths inch standard pipe for the oil conduit pipe 20. The member 12 may be a three quarter inch elbow.

The oil conduit pipe 20 extends through the T fitting 11 and is threaded through a reducer 22. A lock nut 23 is threaded onto the pipe 20 and a gasket washer 24 is provided between the nut 23 and reducer 22. By threading the oil conduit pipe 20 through the reducer 22 and using the washer 24 and lock nut 23 I provide means for positioning and holding the pipe 20 centrally within the pipe 10 and further provide means for adjusting the position of the oil atomizer tip 16 within the elbow fitting 10. The washer 24 prevents leakage of steam around the pipe 20 when the nut 23 is tightened against said washer.

The T 11 is connected with a steam supply pipe 25. A valve 26 controls the flow of steam through the steam supply pipe 25. Another T 27 connects steam supply pipe 25 with a steam by-pass pipe 28. The steam by-pass pipe 28 is provided with a valve 30 and is connected with a T 31 in the oil supply line. The T 31 connects the end of the oil conduit pipe 20 with an oil supply pipe 32. A suitable control valve 29 is provided in the oil supply pipe 32.

The oil burner nozzle shown in Fig. 3 is similar to the nozzle shown in Figs. 1 and 2 except that a larger elbow 33 is connected by a bushing 34

with a pipe 35 of the same size as the pipe 10 and a standard pipe cap 36 is used as an oil atomizing tip on the end of an oil conduit pipe 37 which corresponds to the pipe 20. Slots 38 and 40 in the elbow 33 and slots 41 and 42 in the tip member 36 correspond in positioning and function to the similar slots shown in Figs. 1 and 2.

Figs. 4 and 5 show a modified form of burner nozzle adapted for use in a special type of vertical flue boiler in which the atomized oil is directed upwardly toward and into the flues. One boiler of this type in common use is known as the "Ward" boiler. In this modified form, shown in Figs. 4 and 5, 43 is a main burner pipe. 44 is an oil conduit pipe. 45 is an oil atomizer tip having oil discharge slots 46 and 47. 48 is an elbow member having a cap 49 on its upper end. A slot 50 in the form of a cross is provided centrally of the cap 49 through which oil may discharge. This slot 50 directs the atomized oil upwardly and distributes the same evenly in the area above the nozzle.

In Fig. 6 I have shown still another modified form of oil burner nozzle especially adapted for use in a Scotch Marine type of boiler in which large cylindrical flues 51 are used and in which one burner nozzle is provided in each flue. This nozzle comprises a main burner steam pipe 52, on the end of which is a cap 53 provided with a cross slot 54. An oil conduit pipe 55 disposed coaxially of the pipe 52 is provided with a cap 56 having a cross slot 57. The cap 57 is spaced from the cap 53 and serves as an oil atomizing tip from which oil discharges into the chamber formed by the pipe 52 and cap 53. In this chamber the oil is further atomized and is mixed with steam before being discharged from the cross slot 54.

In the installation of the burner disclosed in Figs. 1 and 2, the nozzle is positioned within a fire box with the remaining mechanism preferably external to the fire box. The pipes 10 and 20 and any of the other pipes may be varied as to length to suit the particular conditions of the installation. When the burner is in use, oil under pressure is supplied through the pipe 32 and flows through the pipe 20 to the burner nozzle. At the same time steam is admitted through pipe 25 and travels through the space 21 to the nozzle. The oil, in its travel through the pipe 20, is thus subjected to the heat of the steam and is heated to a high temperature thinning the oil and conditioning the same for better and more efficient combustion. This heated oil is discharged in two thin sheets from the slots 17 and 18 into the atomizing chamber formed within the elbow member 12. In this atomizing chamber the oil is mixed with the steam and thoroughly atomized and is discharged from the slots 14 and 15 in the form of a finely divided spray which is properly conditioned for efficient burning. The positioning of the slots 17 and 18 in the tip 16 is important in securing a proper atomization of the oil. The slot 17 discharges upwardly against the plug 13 and the slot 18 is positioned so as to discharge against the curved wall of the elbow member 12 between the slots 14 and 15. This breaks up the oil and provides for a swirling and eddying of the atomized oil within the elbow member before said oil is discharged from the slots 14 and 15. The steam traveling toward the slots 14 and 15 is moving at right angles to the oil issuing from the slot 17 and is very efficient in breaking up the oil from this source. The oil issues from the slots 17 and 18 into the atomizing chamber provided within the elbow member 12 in very thin fan like jets which are easily broken up by the steam. The atomized oil issues from the convergent slots 14 and 15 in thin fan like jets which intersect each other at a distance of a few inches from the burner nozzle and burn very efficiently. These fan like jets draw air along with them as they issue from the elbow member 12. This air, mixing with the oil and steam, helps to provide the necessary oxygen at precisely the right time and location to secure the most efficient combustion. I find that converging these discharging jets of atomized fuel draws the air more efficiently and provides better combustion than is provided if the jets are not converged.

The operation of the burner nozzle shown in Fig. 3, is the same as the previously described operation of the burner shown in Figs. 1 and 2.

The operation of the burners shown in Figs. 4, 5 and 6 is similar to the operation of the previously described burner except that these burners do not have the same oil discharge arrangement and do not provide the convergent jets and may be less efficient in operation than the burners shown in Figs. 1 to 3.

The steam by-pass pipe 28 provides a means for admitting some steam into the oil line before the oil enters the oil conduit pipe 20 in which it is heated. I find that this helps to condition the oil and promotes better atomization and combustion. This by-pass pipe is also useful as a means of admitting steam under pressure to the oil line to blow out and clean out the oil line in case it becomes obstructed.

I also find that this burner will operate in a satisfactory manner and with good efficiency if air under pressure is admitted through the pipe 25 and supplied to the atomizing nozzle for the purpose of atomizing the oil and furnishing necessary oxygen for combustion. When air is used in this manner it may require a higher pressure than when steam is used as the air lacks heat, which is useful in thinning the oil.

In Fig. 7 I show a fragment of an elbow member 60, which is similar to the previously described elbow members 12 and 33 except that the oil discharge slots 61 and 62 are each of duplex construction or are split so that they will divide the jet of oil. These slots 61 and 62 are positioned and inclined similarly to the slots 14 and 15 of Figs. 1 and 2 but each slot 61 and 62 is divided by a thin partition member 63 which splits the jet of vaporized fuel as it issues from the slot and helps to secure better atomization and more efficient combustion.

The foregoing description and accompanying drawing clearly disclose a preferred embodiment of my invention but it will be clearly understood that this disclosure is merely illustrative and that such changes in the invention may be made as are within the scope and spirit of the following claims.

I claim:

1. In an oil burner, a steam conduit pipe; an oil conduit pipe of smaller diameter than said steam conduit pipe extending lengthwise within said steam conduit pipe providing an annular steam passageway between the walls of said two pipes; oil supply means connected with said oil conduit pipe; an elbow member on an end of said steam conduit pipe, one end of said elbow being directed upwardly and having a closure member, said elbow member having two spaced apart transverse slots in the curved wall thereof for the discharge of atomized oil; and a cap on the end

of said oil conduit pipe positioned within said elbow member and having a transverse slot positioned to discharge oil against the curved wall of said elbow member between said two spaced apart transverse slots.

2. In an oil burner, a steam conduit pipe; an oil conduit pipe of smaller diameter than said steam conduit pipe extending lengthwise within said steam conduit pipe providing an annular steam passageway between the walls of said two pipes; oil supply means connected with said oil conduit pipe; an elbow member on an end of said steam conduit pipe, one end of said elbow being directed upwardly and having a closure member, said elbow member having a horizontal transverse slot adjacent said closure member and an inclined transverse slot positioned below said horizontal transverse slot and inclined toward said horizontal transverse slot, whereby fan shaped jets of atomized oil discharging from said two slots will intersect at a distance from said elbow member; and a cap on the end of said oil conduit pipe provided with an upright slot positioned to direct a fan shaped jet of oil upwardly against the closure means of said elbow member and with an inclined slot positioned to direct a fan shaped jet of oil against the wall of said elbow member between the two slots in said elbow member.

FREDERICK J. BISHOP.