Aug. 16, 1949. S. M. JENKINS, JR 2,479,166

OIL BURNER WITH STEAM CLEANING MEANS

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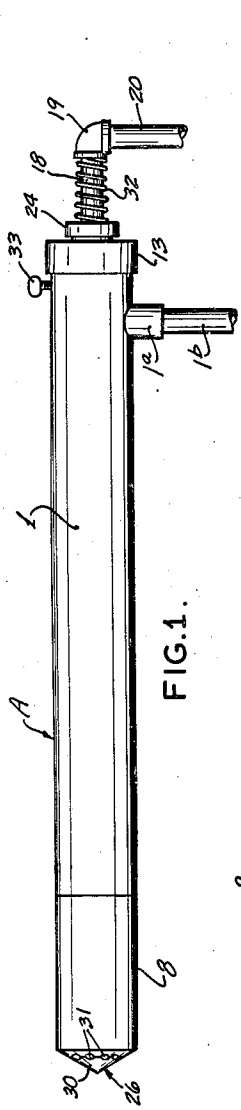


FIG. 1.

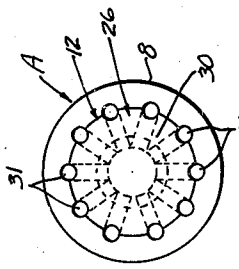


FIG. 2.

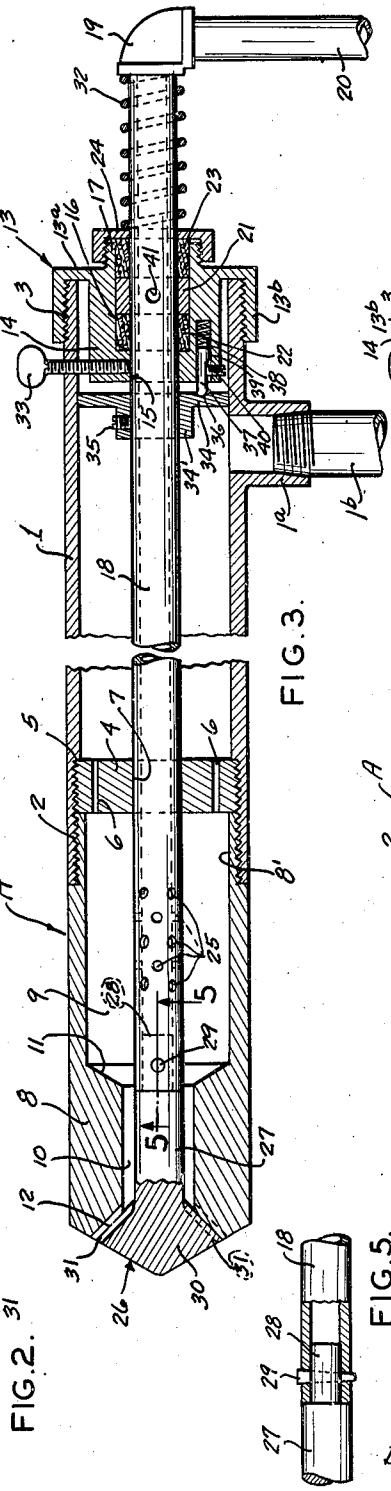


FIG. 3.

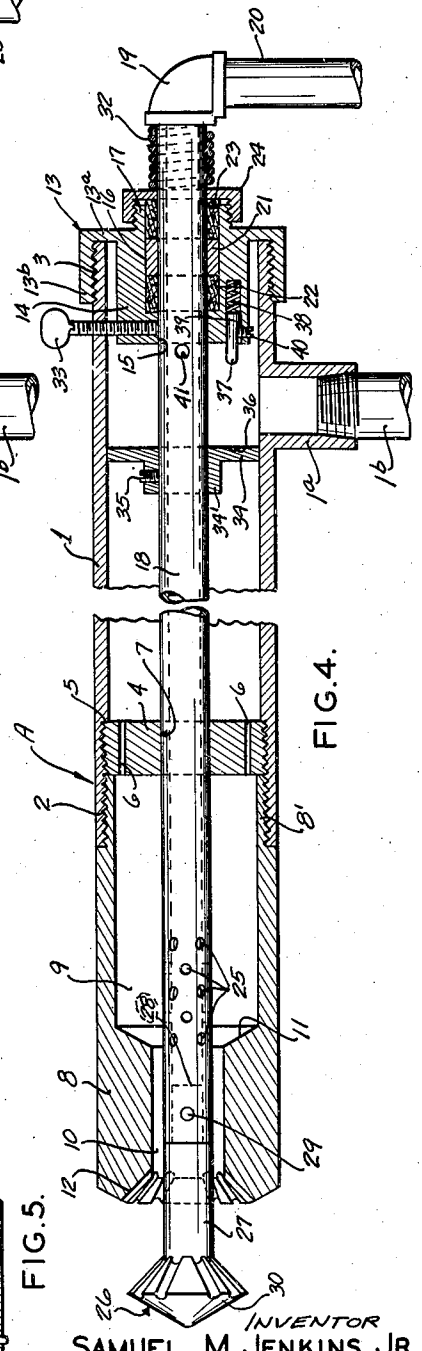


FIG. 4.

FIG. 5.

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OIL BURNER WITH STEAM CLEANING MEANS

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6 Claims. (Cl. 299—59)

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This invention relates generally to oil burners, and more specifically to oil burners of the type adapted for use in projecting atomized oil and accompanying atomized steam into the fire boxes of furnaces for combustion therein of the oil for supplying heat to the furnaces, the predominant object of the invention being to provide an oil burner of this type which is of relatively simple construction and arrangement and is capable of performing its intended function in a highly efficient manner, and which includes in its structure means for blowing out the burner with steam in a simple and expeditious manner so as to maintain the oil atomizer of the burner in a clean condition at all times during use of the burner.

Fig. 1 is a side elevational view of the improved oil burner of the present invention, the conductors which supply oil and steam to the oil burner being broken away.

Fig. 2 is an enlarged elevational view of the forward end of the oil burner illustrated in Fig. 1.

Fig. 3 is an enlarged, fragmentary longitudinal section of the oil burner shown in Fig. 1, a portion of the length of the burner being broken away to permit of Fig. 3 being drawn to a larger scale.

Fig. 4 is a longitudinal sectional view similar to Fig. 3 but showing the burner as it appears when it is being blown out by steam.

Fig. 5 is a fragmentary sectional view taken on line 5—5 of Fig. 3.

In the drawing, wherein is shown for purposes of illustration, merely, one embodiment of the invention, A designates the improved oil burner generally. The oil burner A includes an outer, elongated, cylindrical housing portion 1 which is provided with an internally screwthreaded forward wall portion, as is indicated at 2 in Figs. 3 and 4, and is provided with an externally screwthreaded rear wall portion, as is indicated at 3 in the same views. The outer housing portion 1 is provided wtih a steam inlet element 1a into which a steam supply pipe 1b is connected, and said outer housing portion 1 has arranged therein a steam atomizer 4 which is in the form of an externally screwthreaded disk, said disk being screwthreadedly seated in the rear portion of the internally screwthreaded portion 2 of the wall of the outer housing portion 1 where an outer portion of its rear face abuts against an annular shoulder 5 at the inner end of said screwthreaded portion 2. The disk which provides the steam atomizer 4 has formed therethrough a plurality of spaced steam passageways 6, which preferably, though not necessarily, are arranged in circular formation. Also, the steam atomizer 4 has

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formed centrally therethrough an opening 7 which serves a purpose to be hereinafter set forth.

Extended forwardly from the forward end of the outer housing portion 1 is a member 8 which constitutes a part of the outer housing of the burner and includes an externally screwthreaded rear portion 8' which screwthreadedly engages the internally screwthreaded forward wall portion of the outer housing portion 1, as is shown in Figs. 3 and 4, the rear face of said rear portion 8' of said member 8 abutting against the forward face of the steam atomizer 4, and the outer surface of said member 8 being substantially flush, longitudinally of the burner A, with the outer surface of the outer housing portion 1. The member 8 has formed therein a cavity 9, which preferably is of circular cross-section, said cavity 9 being open at the rear end of said member and communicating at its forward end with a passageway 10 which is of substantially less diameter than the cavity 9, there being a forwardly and inwardly inclined wall 11 at the junction of the cavity 9 and the passageway 10, as is shown in Figs. 3 and 4. At its forward end the member 8 is provided with a conical seat 12 which communicates at its smaller, rear end with the forward end of the passageway 10, the larger forward end of said conical seat being open at the forward end of said member 8.

At the rear end of the outer housing portion 1 a cap 13 is provided which closes said rear end of said outer housing portion, said cap including a rear wall 13a and an annular, internally screwthreaded flange 13b which extends forwardly from said rear wall and screwthreadedly engages the screwthreaded portion 3 of the outer housing portion 1 (see Figs. 3 and 4). The cap 13 is provided with an annular portion 14 which extends forwardly from the rear wall 13a of said cap, the forward part of said portion 14 having an opening 15 formed centrally therethrough. Also, the annular portion 14 of the cap 13 has formed therein an annular cavity 16 whose forward end terminates short of the forward end of the annular portion 14, the rear portion of said annular cavity 16 being formed in an annular, externally screwthreaded extension 17 which forms a part of the cap 13 and is extended rearwardly of the end wall of said cap.

Extended longitudinally of the portion of the oil burner A produced by the outer housing portion 1 and the member 8 is a tubular element 18 which serves as a conductor through which oil flows to the forward portion of the burner. The rear portion of the tubular element 18 extends

rearwardly beyond the rear end of the outer housing portion 1 of the burner, as is shown in Figs. 3 and 4, a suitable fitting 19 being attached to the rear end portion of said tubular element 18 which serves to connect to said tubular element an oil supply conductor 20. The tubular element 18 is supported in the opening 7 of the steam atomizer 4 and the opening 15 of the cap 13, and arranged in the cavity 16 of the cap 13 at the approximate longitudinal center thereof is a spacing ring 21 which is formed of metal, or other suitable material. The inner face of the spacing ring 21 closely embraces a portion of the tubular element 18, while the outer face of said spacing ring contacts closely with the annular wall of the cavity 16. Arranged within the cavity 16 of the cap 13 at opposite sides of the spacing ring 21 are bodies of packing material 22 and 23, the body of packing material 22 being interposed between the forward edge of the spacing ring 21 and the forward wall of the cavity 16, while the body of packing material 23 is interposed between the rear edge of the spacing ring and a portion of a nut 24 which embraces the tubular element 18 and is screwthreadedly mounted on the externally screwthreaded extension 17 of the cap 13.

The wall of the tubular element 18 has formed therethrough a plurality of apertures 25 which are spaced longitudinally and circumferentially of a portion of said tubular element that is located in the cavity 9 of the member 8, and these apertures 25 provide the tubular element 18 with an oil atomizing portion by which oil is atomized as it passes through said apertures toward the forward end of the burner. The tubular element 18 has mounted at its forward end a head portion 26 which includes a stem portion 27 which is provided with an extension 28 of reduced diameter that projects rearwardly from the rear end of the stem portion 27. This extension 28 fits closely within the forward portion of the opening through the tubular element 18 with the rear face of the stem portion 27 of the head portion 26 abutting against the forward edge of said tubular element, and a tapered pin 29 (Fig. 5) is disposed in alined and appropriately dimensioned and shaped openings formed through the wall of said tubular element and through the extension 28 so as to securely fix the head portion 26 to the tubular element 18. It is to be noted that the stem portion 27 of the head portion 26 is normally disposed in the passageway 10 formed in the forward portion of the member 8, and that the diameter of said stem portion is substantially less than the diameter of said passageway so that an annular space is provided between the outer surface of the stem portion and the wall of the passageway 10 (see Fig. 3).

At the forward end of the stem portion 27 thereof the head portion 26 is provided with a head 30 which is provided with a rear, conical portion having an annular face whose angularity corresponds with the angularity of the face of the conical seat 12 formed at the forward end of the member 8. Portions of the annular face of the rear conical portion of the head 30 contact closely with the related portions of the annular face of the conical seat 12, and formed between these contacting portions of said faces is a plurality of passageways 31 through which oil and steam may pass from within the burner structure. The passageways 31 are arranged in circular formation, as is shown to good advantage in Fig. 2, and it is important to note that one-half of each of said passageways 31 is formed in the conical face 12 of the member 8, while the related half of each of said passageways is formed in the annular face of the conical, rear portion of the head 30, the related portions of the various passageways combining to provide passageways which are substantially circular in cross-section that communicate at their rear ends with the passageway 10 within the forward portion of the member 8 and which are open at their outer ends at the forward end of said member 8. The forward portion of the head 30, which preferably is formed integral with the rear conical portion thereof, is tapered as is shown in Figs. 3 and 4.

In order to maintain portions of the conical face of the rear portion of the head 30 in contact with portions of the face of the conical seat 12 of the member 8, a coil spring 32 is arranged about a rear portion of the tubular element 18, said coil spring being interposed under compression between the forward portion of the fitting 19 and a portion of the nut 24, whereby it tends to move the tubular element 18 and the head portion 26 associated therewith rearwardly. Also, to lock the head 30 in position where the face of its rear, conical portion contacts with the face of the conical seat 12, a set screw 33 is provided. The shank portion of this set screw is extended through an opening formed through the wall of the outer housing portion 1 of the burner and is screwthreadedly seated in a screwthreaded opening formed in the portion 14 of the cap 13, the lower end face of the shank portion of said set screw being caused to frictionally grip a surface portion of the tubular element 18 to obtain the desired locking action.

The tubular element 18 has fixedly mounted thereon a piston 34 whose circumferential edge contacts closely with the inner face of the wall of the outer, cylindrical housing portion 1, said piston including a hub portion 34' through which a set screw 35 is extended so that its inner end frictionally engages a surface portion of said tubular element for securing said piston with respect to said tubular element. The piston is normally located in a position slightly to the rear of the steam inlet element 1a, as is shown in Fig. 3, so that steam entering the outer housing portion 1 may pass forwardly thereof. The piston has formed in its rear face a depression 36 which receives the forward face of a finger 37, said finger being slidably mounted in an opening formed in the portion 14 of the cap 13 and being urged forwardly by a coil spring 38. The finger 37 is provided with a shoulder 39 which abuts against a set screw 40 so as to limit outward movement of said finger in response to force exerted thereagainst by the coil spring 38. The function of the finger 37 and the depression 36 is to insure alinement of the portions of the passageways 31 which are formed in the head 30 with the related portions of said passageways which are formed in the conical seat 12 of the member 8, the depression 36 being so located that when the forward end portion of the finger 37 is seated in said depression the passageway portions referred to are properly related to provide passageways of circular cross-section. The wall of the tubular element 18 has formed therethrough an opening 41, as is shown in Figs. 3 and 4, said opening being closed by the spacing ring 21 when said tubular element is in its normal position, as shown in Fig. 3, and serving a function to be hereinafter set forth.

In the operation of the improved oil burner disclosed herein fuel oil is delivered to the tubu-

lar element 18 by way of the supply conductor 20 at a pressure of approximately forty pounds per square inch, and steam is delivered to the interior of the outer housing portion 1 by the steam conductor 1b at a pressure of approximately sixty pounds per square inch. The steam moves forwardly of the outer housing of the burner and passes through the apertures 6 of the steam atomizer 4 whereby said steam is atomized, the atomized steam moving forwardly through the cavity 9 and passageway 10 of the member 8, and through the passageways 31 at the forward end of the burner. The projection of steam through the burner as described produces a suction effect which draws fuel oil through the apertures 25 of the tubular element 18 whereby said oil is atomized, and the commingled steam and fuel oil are discharged forcibly through the passageways 31 at the forward end of the burner A to produce the desired hot flame at said forward end of said burner.

It is to be noted that because the steam passes forwardly within the burner and around the tubular element 18 through which the fuel moves, the outer housing of the burner and the tubular element 18 are given moisture protection by said steam. Also, because of the location of the oil atomizer produced by the apertures 25 of the tubular element 18, and the presence of steam, said oil atomizer is protected from direct heat radiating from the fire box of the furnace with which the burner is used. Likewise, the head 30 of the burner may be adjusted forwardly with respect to the conical seat 12 of the member 8, if this should be desired, and said head 30 may be rotated relative to and in contact with the conical seat 12 for the purpose of grinding or rubbing away carbon or other deposits at the related seats of said head and said conical seat, the set screw 33 being backed up to permit movement of the tubular element which will produce the results described, and said set screw thereafter being reset to retain the tubular element in position.

When it is desired to blow out the burner with steam to clean out the apertures 25 of the oil atomizer, the set screw 33 is backed up to release its grip against the surface of the tubular element 18, and the tubular element is moved forwardly, as is shown in Fig. 4 to compress the coil spring 32, a flexible conductor (not shown) being connected to the oil supply conductor 20 to permit such movement of the tubular element 18. The described forward movement of the tubular element 18 will move the head 30 forwardly of the forward end of the member 8, and the piston 34, which is fixed to the tubular element 18, will move with said tubular element to the position in which it is shown in Fig. 4 where it is disposed forwardly of the steam inlet element 1a. Also, on such forward movement of the tubular element 18, the opening 41 thereof will be positioned a slight distance forwardly of the forward end of the portion 14 of the cap 13, as is also shown in Fig. 4.

Steam will then be directed into the burner housing and said steam will be diverted rearwardly by the piston 34, said steam passing through the opening 41 into the interior of the tubular element 18, wherein said steam moves forwardly to the apertures 25 through which the steam is directed forcibly to free from the walls of said apertures any carbon or other obstructions which may be present. When the blowing out of the burner has been completed the coil spring 32 is permitted to return the tubular element 18 to its normal, rearward position, as shown in Fig. 3, whereupon the set screw 33 will be reset to secure the tubular element in place, and the burner is ready for further use.

I claim:

1. An oil burner comprising an outer housing having a discharge end, means associated with said outer housing for discharging steam into the interior thereof, a steam atomizer within said outer housing, a hollow oil conductor supported within said outer housing and extended longitudinally thereof and adapted for movement longitudinally of said outer housing, said oil conductor being provided with a portion having apertures formed through the wall thereof through which oil passes from the interior of said oil conductor to the interior of said outer housing so as to effect atomization of said oil, means for supplying oil to said oil conductor, and a piston fixedly mounted on said oil conductor whose circumferential edge contacts closely with the inner face of said outer housing and which normally directs steam entering said outer housing toward the discharge end of said outer housing, said oil conductor having an opening formed through the wall thereof at a point adjacent to the location of said piston, and said oil conductor being adapted to be moved longitudinally of said outer housing to so position said piston that steam discharged into said outer housing will be diverted through said opening into the interior of said oil conductor and will pass from the interior of said oil conductors through the atomizing apertures thereof for cleaning said apertures.

2. An oil burner comprising an outer housing having a discharge end, means associated with said outer housing for discharging steam into the interior thereof, a steam atomizer within said outer housing, a hollow oil conductor supported within said outer housing and extended longitudinally thereof and adapted for movement longitudinally of said outer housing, said oil conductor being provided with a portion having apertures formed through the wall thereof through which oil passes from the interior of said oil conductor to the interior of said outer housing so as to effect atomization of said oil, means for supplying oil to said oil conductor, a piston fixedly mounted on said oil conductor whose circumferential edge contacts closely with the inner face of said outer housing and which normally directs steam entering said outer housing toward the discharge end of said outer housing, said oil conductor having an opening formed through the wall thereof at a point adjacent to the location of said piston, and said oil conductor being adapted to be moved longitudinally of said outer housing to so position said piston that steam discharged into said outer housing will be diverted through said opening into the interior of said oil conductor and will pass from the interior of said oil conductors through the atomizing apertures thereof for cleaning said apertures, and means for sealing said opening of said oil conductor when the oil conductor is in its normal position.

3. An oil burner comprising an outer housing having a discharge end, means associated with said outer housing for discharging steam into the interior thereof, a steam atomizer within said outer housing, a hollow oil conductor supported within said outer housing and extended longitudinally thereof and adapted for movement longitudinally of said outer housing, said oil conductor being provided with a portion having aper-

tures formed through the wall thereof through which oil passes from the interior of said oil conductor to the interior of said outer housing so as to effect atomization of said oil, means for supplying oil to said oil conductor, a piston fixedly mounted on said oil conductor whose circumferential edge contacts closely with the inner face of said outer housing and which normally directs steam entering said outer housing toward the discharge end of said outer housing, said oil conductor having an opening formed through the wall thereof at a point adjacent to the location of said piston, and said oil conductor being adapted to be moved longitudinally of said outer housing to so position said piston that steam discharged into said outer housing will be diverted through said opening into the interior of said oil conductor and will pass from the interior of said oil conductors through the atomizing apertures thereof for cleaning said apertures, means for sealing said opening of said oil conductor when the oil conductor is in its normal position, and spring means for urging said oil conductor toward its normal operative position.

4. An oil burner comprising an outer housing having a discharge end, means associated with said outer housing for discharging steam into the interior thereof, a steam atomizer within said outer housing, a hollow oil conductor supported within said outer housing and extended longitudinally thereof and adapted for movement longitudinally of said outer housing, said oil conductor being provided with a portion having apertures formed through the wall thereof through which oil passes from the interior of said oil conductor to the interior of said outer housing so as to effect atomization of said oil, means for supplying oil to said oil conductor, a piston fixedly mounted on said oil conductor whose circumferential edge contacts closely with the inner face of said outer housing and which normally directs steam entering said outer housing toward the discharge end of said outer housing, said oil conductor having an opening formed through the wall thereof at a point adjacent to the location of said piston, and said oil conductor being adapted to be moved longitudinally of said outer housing to so position said piston that steam discharged into said outer housing will be diverted through said opening into the interior of said oil conductor and will pass from the interior of said oil conductors through the atomizing apertures thereof for cleaning said apertures, means for sealing said opening of said oil conductor when the oil conductor is in its normal position, spring means for urging said oil conductor toward its normal operative position, and means for securing said oil conductor in its normal operative position.

5. An oil burner comprising an outer housing having a discharge end, means associated with said outer housing for discharging steam into the interior thereof, a steam atomizer within said outer housing, a hollow oil conductor supported within said outer housing and extended longitudinally thereof and adapted for movement longitudinally of said outer housing, said oil conductor being provided with a portion having apertures formed through the wall thereof through which oil passes from the interior of said oil conductor to the interior of said outer housing so as to effect atomization of said oil, means for supplying oil to said oil conductor, a piston fixedly mounted on said oil conductor whose circumferential edge contacts closely with the inner face of said outer housing and which normally directs steam entering said outer housing toward the discharge end of said outer housing, said oil conductor having an opening formed through the wall thereof at a point adjacent to the location of said piston, and said oil conductor being adapted to be moved longitudinally of said outer housing to so position said piston that steam discharged into said outer housing will be diverted through said opening into the interior of said oil conductor and will pass from the interior of said oil conductors through the atomizing apertures thereof for cleaning said apertures, and means comprising a ring for sealing said opening of said oil conductor when the oil conductor is in its normal position.

6. An oil burner comprising an outer housing having a discharge end, means associated with said outer housing for discharging steam into the interior thereof, a hollow oil conductor supported within said outer housing and extended longitudinally thereof and adapted for movement longitudinally of said outer housing, said oil conductor being provided with a portion having apertures formed through the wall thereof through which oil passes from the interior of said oil conductor to the interior of said outer housing so as to effect atomization of said oil, means for supplying oil to said oil conductor, and a piston mounted on said oil conductor whose circumferential edge contacts closely with the inner face of said outer housing and which normally directs steam entering said outer housing toward the discharge end of said outer housing, said oil conductor having an opening formed through the wall thereof at a point adjacent to the location of said piston, and said oil conductor being adapted to be moved longitudinally of said outer housing to so position said piston that steam discharged into said outer housing will be diverted through said opening into the interior of said oil conductor and will pass from the interior of said oil conductor through the atomizing apertures thereof for cleaning said apertures.

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