Aug. 4, 1936. J. McDONALD 2,049,509

LIQUID FUEL BURNER

Original Filed Sept. 17, 1935

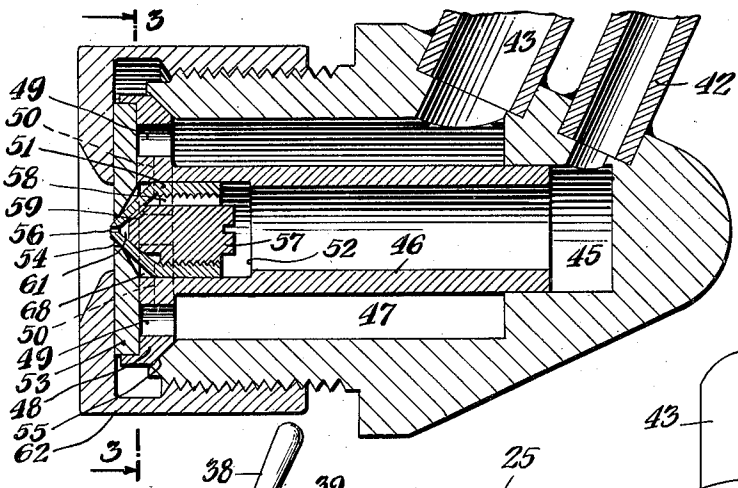


Fig. 2

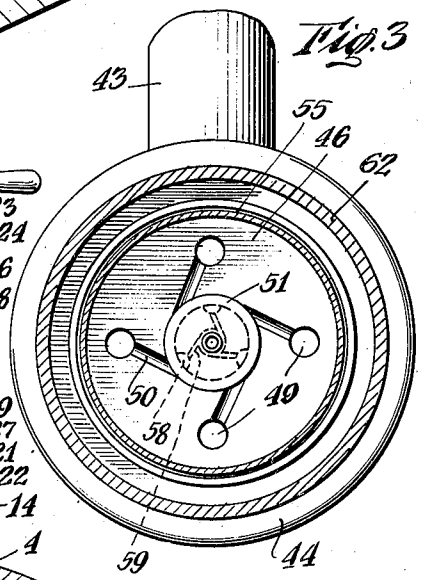


Fig. 3

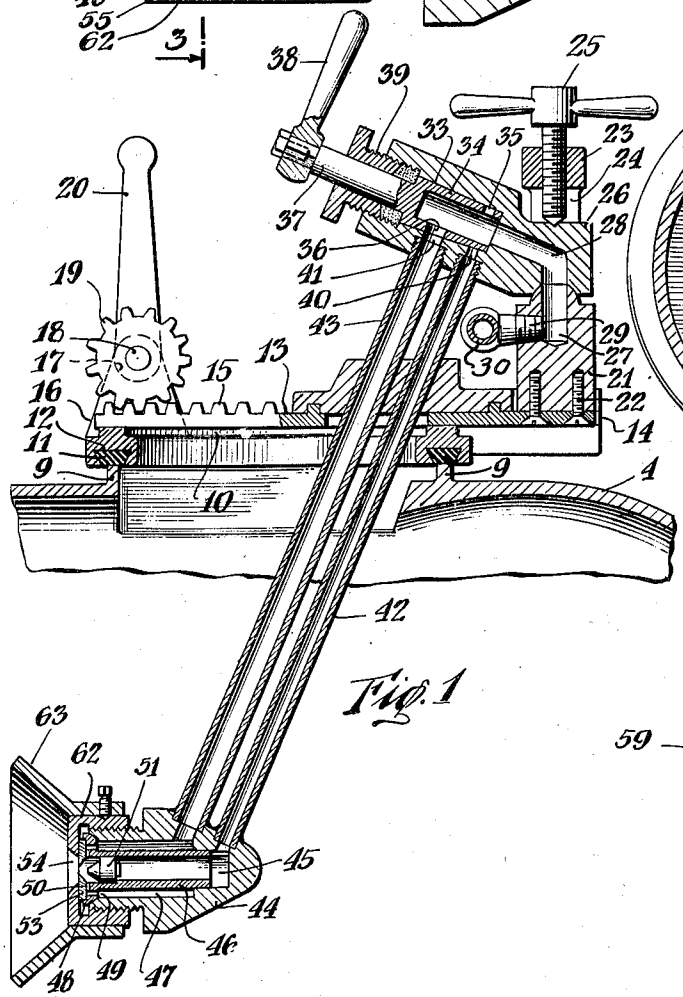


Fig. 1

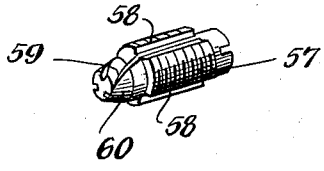


Fig. 4

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LIQUID FUEL BURNER

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Original application September 17, 1935, Serial No. 40,906. Divided and this application November 26, 1935, Serial No. 51,596

3 Claims. (Cl. 299—140)

This invention relates to oil burning equipment, particularly for use with locomotive boilers, although also applicable with marine and other boilers, and my improvements, embodied in the present application, which is a division of my application Serial No. 40,906, filed September 17, 1935, are directed in the main to certain novel features wherein the burner employed is of dual capacity, it being capable of functioning efficiently both in atomizing the maximum quantity of oil per hour and for operation as a pilot flame up to any capacity required for stand-by purposes, these separate functions being controlled by a single valve.

Other features and advantages of my invention will hereinafter appear.

In the drawing:—

Figure 1 is a view in side sectional elevation, showing the burner assembly and its means of adjustment.

Fig. 2 is an enlarged sectional detail of the dual atomizing device.

Fig. 3 is a section on the line 3—3 of Fig. 2, and

Fig. 4 is a perspective detail view of the atomizing plug.

The relation of the burner assembly to a furnace front is disclosed in my said earlier application, Serial No. 40,906, and is made no part of the present application. There is shown herein however the upper portion of an air register housing, indicated at 4, which is provided with an opening in its upper portion, said opening having a surrounding, upstanding ledge or wall 9, and a cover plate 10 for said opening is recessed as at 11 to fit over and engage wall 9, suitable packing 12 being employed to effect a tight joint.

A panel 13 is slidably mounted at its sides in guideways 14 that are provided in the cover plate 10, said panel bearing a rack 15 on its upper surface and being capable of sliding movement to and from the furnace mouth. This panel 13 carries the burner assembly and enables the fuel atomizer to be adjusted axially with relation to the furnace mouth, (not shown).

A bracket 16, carried by the cover plate 10, has a bearing 17 in which is journalled a shaft 18 that carries a gear 19 which is in mesh with rack 15, said shaft being operable by a hand crank 20 for rotating gear 19 and thus causing the panel 13 bearing the burner assembly to be shifted in either direction.

The support for the burner assembly comprises a lower block 21 which is secured upon panel 13 as by screws 22, and an upper block 23 which has yoke arms 24 that straddle block 21, also a hand screw 25, threaded through block 23 and adapted to bear against an intermediate block 26 to bind it and block 21 together. Blocks 21 and 26 have respective concave and convex meeting surfaces to provide liquid tight seats, and they have the aligned passageways 27, 28 for the flow of fuel which enters passageway 27 through a hollow plug 29 that is screwed into block 21 to effect a junction with said passageway 27. Liquid fuel enters plug 29 through a pipe 30 leading from a source of fuel oil supply (not shown).

The block 26 is provided with a tapered opening 33, which constitutes a valve chamber, in which is revolubly fitted a hollow tapered valve 34, said valve having the ports 35, 36, and being open at its restricted end for communication with the passageway 28. The stem 37 of valve 34 has an operating handle 38, and a stuffing box 39, around stem 37, engages the outer portion of opening 33 to render the valve chamber liquid tight.

The wall of the valve chamber in block 29 is pierced with longitudinally aligned orifices 40, 41, in which are fitted, as by screw threads, the like ends of respective tubes 42, 43, which are respectively of different interior diameters.

The opposite ends of tubes 42, 43 are fitted respectively in a block-like, hollow member 44 which constitutes the delivery portion of the burner assembly, said member including a recessed chamber 45 in which is fitted a tube 46, and a larger, annular chamber 47 that surrounds tube 46.

The fuel supply tube 42 communicates with a chamber 45 and the tube 43 communicates with chamber 47.

Tube 46 is provided, at its outer end, with a radial flange 48, whose inner perimeter is bevelled in order that it may find a seat upon the correspondingly bevelled outer perimeter of member 44, said flange forming the outward boundary of chamber 47, and being pierced with a series of orifices 49 for liquid passage.

Also the outward face of flange 48 (including the end of tube 46) is provided with tangential grooves 50 which communicate from the orifices 49 to the end interior of tube 46.

An interiorly threaded, sleeve-like member 51 is slidably fitted in the outer end portion of tube 46, and is permitted limited movement therein, its extent of sliding motion being limited inwardly by a shoulder 52 formed in tube 46 at the junction of the larger and smaller interior diameters of said tube, and being limited outward-

ly by an atomizer plate **53** that has a central orifice **54** and which lies against the inner face of flange **48**, which inner face is recessed to leave a wall **55** that encircles the periphery of flange **48**.

The inward end of sleeve **51** is of conoidal form and has an atomizing orifice **56** at its apex. It will be noted in the drawing, Fig. 2, that atomizer plate **53**, which is of suitable thickness, is provided on its inward surface with a dished or concave clearance of which orifice **54** forms the centre, and that when the conoidal portion of sleeve **51** centers in and closes orifice **54**, which it is intended to do in certain uses of the device, as will be pointed out hereinafter, then a clearance **68**, that is wedge-shaped in cross-section, is left between the sleeve cone and the concave clearance in plate **53**.

Into the threaded portion of sleeve **51** is screwed an atomizer plug **57** (see Fig. 4) having the longitudinal grooves **58** along its surface which lead into tangential grooves **59** in its conoidal nose portion **60**, said nose portion lying against the inner surface of the conoidal portion of sleeve **51**, excepting that the conoidal nose portion of plug **57** is truncated, leaving a whirling chamber **61** for liquid fuel prior to its issuance through atomizing orifice **56**.

A clamping nut **62** is shown as screwed upon member **44** and extended over the plate **53**, and a flame cone **63** may be fitted upon and secured to said clamping nut.

In this dual burner system it will be noted that for providing a pilot flame fuel is supplied to the burner by way of the smaller tube **42**, whilst for heavy duty purposes fuel is supplied by way of the larger tube **43**. The flow from the valve chamber in member **26** to tube **42** is through valve port **35** and the flow through the tube **43** is from port **36**. These ports **35**, **36** are differently disposed in valve **34** in order that one of them may be closed while the other is open, and also so that in certain rotated positions of the valve both ports may be closed.

When using the pilot supply liquid fuel enters chamber **45** in member **44** and the pressure of fuel in tube **46** forces the unit comprising sleeve **51** and plug **57** to slide into the position shown in Fig. 2, where the conoidal portion of sleeve **51** is forced into contact with the orifice **54** in the plate **53**, so that the fuel may issue in atomized form from orifice **56**.

But, when valve **34** is turned to shut off fuel supply through port **35** and to open port **36**, then fuel is supplied through tube **43** to chamber **47**, and, passing under pressure through orifices **49** and grooves **50** to the conoidal portion of sleeve **51**, thereby forces the unit of sleeve **51** and plug **57** outwardly against its seat **52**, in this manner providing a clearance in which the fuel issuing from tangential grooves **50** may whirl prior to issuance in atomized form from orifice **54**.

Variations within the spirit and scope of my invention are equally comprehended by the foregoing disclosure.

I claim:—

1. Burner assembly means including a member having separate chambers, separate tubes which are adapted to convey liquid fuel respectively to said chambers, separate atomizing means in communication with said chambers respectively, and movable means in one of said chambers and operable in one direction under pressure from one of said tubes to permit the delivery of fuel from said tube to its atomizing means, and operable under pressure from the other of said tubes to permit the delivery of fuel to the other atomizing means.

2. Burner assembly means including a block member having separate chambers, the outer end of one of the chambers being enlarged, separate tubes of different interior diameters which are adapted to convey liquid fuel respectively to said chambers, separate atomizing means in communication with said chambers respectively, and movable means slidably mounted in the enlarged portion of one of the chambers and operable in one direction under pressure from one of the tubes to permit the delivery of fuel from said tube to its atomizing means and operable under pressure from the other of said tubes to permit the delivery of fuel to the other atomizing means.

3. Burner assembly means including a block member having an inner chamber, and an outer chamber surrounding said inner chamber, separate tubes of different interior diameters which are adapted to convey liquid fuel respectively to said chambers, an atomizer plate having an orifice communicating with said outer chamber, movable means slidably mounted in said inner chamber and normally closing the orifice in said plate, and atomizing means borne by said movable means and being in communication with said inner chamber, said means being operable in one direction under pressure from one of the tubes to open said orifice to permit the delivery of fuel to said atomizing plate, and being operable in the other direction under pressure from the other of said tubes to close said orifice to permit the delivery of fuel from said tube to the atomizing means borne by said movable means.

JAMES McDONALD.