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SAFETY DEVICE FOR OIL BURNERS

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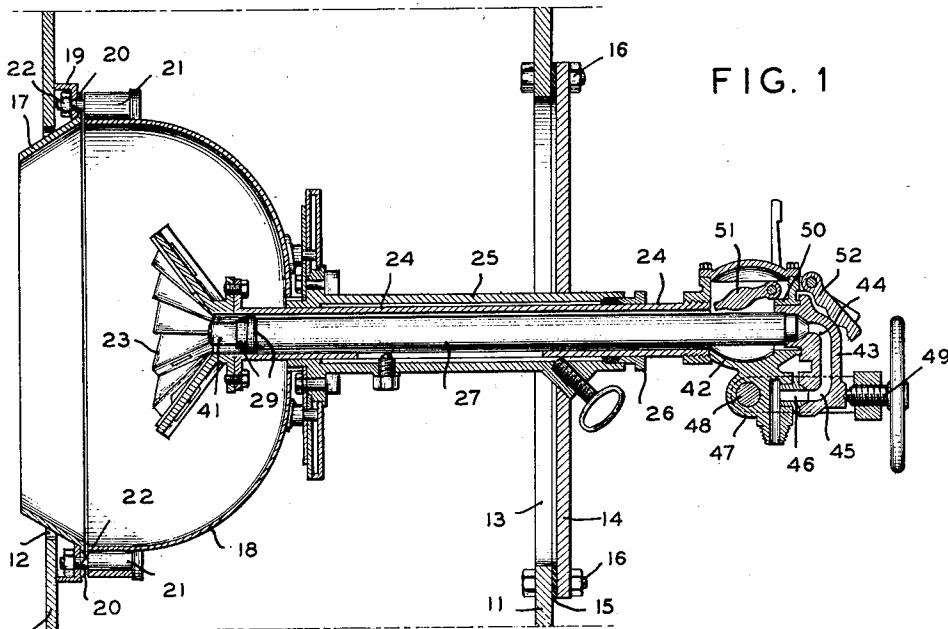


FIG. 1

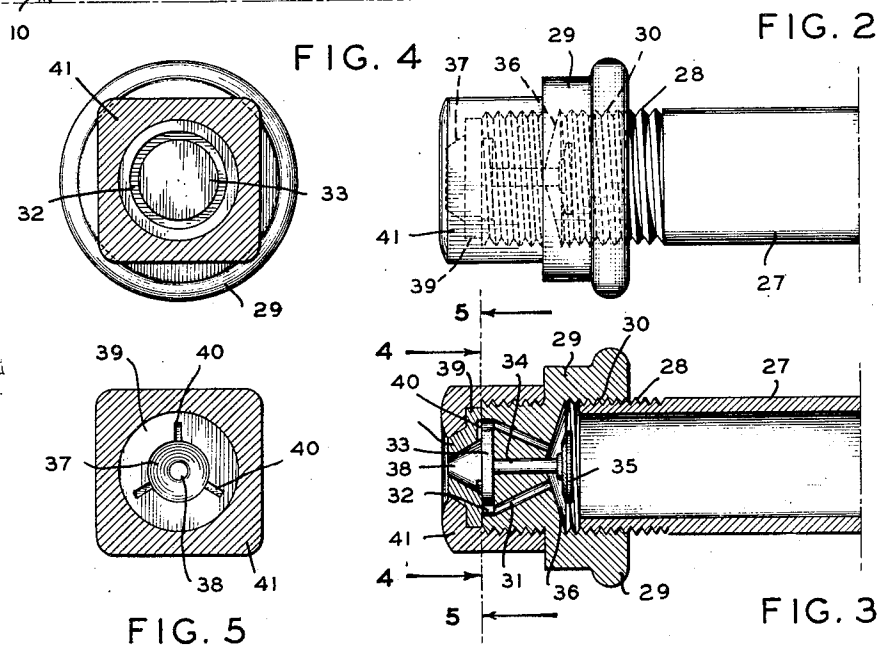


FIG. 4

FIG. 2

FIG. 3

FIG. 5

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SAFETY DEVICE FOR OIL BURNERS

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4 Claims. (Cl. 299—150)

This invention relates to the conversion or transformation of energy such as by the heating of water to produce steam in a boiler or the like for operating a power device such as a steam engine and to the utilization of liquid as a fuel for supplying and maintaining the necessary heat.

The invention relates specifically to the consumption or combustion of liquid fuel for supplying heat in the generation of steam for doing work such as propelling a ship or the like and to a safety device for automatically preventing the flow of fuel when the burner mechanism is not in proper operating condition for combustion of the same and which, due to such faulty condition, would constitute a hazard including an explosive mixture.

Burners employed in the combustion of fluid for creating heat and generating steam in boilers in marine installations have removable atomizer tips, and such burners are located in burner tube casings from which they are periodically removed for cleaning during which time the tips are detached and have to be replaced. Before the replacement of the burners, it is necessary to attach the atomizer tips to the burners. Sometimes these atomizer tips are forgotten, and the burners are installed without them. When this occurs, excess oil is admitted beyond that which can be consumed with the result that pressure builds up and an explosion occurs which not only wrecks the burners and the boilers in which they are installed; but sometimes when the boilers are on shipboard, the damage is so great that the vessel is sunk. Sometimes the fact that the tips have not been installed is discovered before an explosion occurs, but in such cases ordinarily the pressure has increased to such an extent that vibration causes damage to the brick work so that the boiler is loosened from its moorings.

It is an object of the invention to overcome the above difficulties and to provide a safety device for oil burners employed in heating steam boilers to produce steam, which safety device includes valve or other means in the burners so that when the tips are not installed, the flow of oil automatically will be interrupted but will be immediately restored when the tips are properly applied, the very act of applying the tips serving to provide open passage for the flow of oil.

Another object of the invention is to provide a simple, inexpensive, and easily applicable safety unit which can be easily and quickly substituted for an element of the burner against which the tip is applied.

Other objects and advantages of the invention will be apparent from the accompanying drawings wherein:

Fig. 1 is a longitudinal section illustrating one application of the invention and disclosing the inner and outer walls of a boiler with an oil burner applied thereto;

Fig. 2, an enlarged fragmentary side elevation of the burner tube with the burner and safety device applied thereto;

Fig. 3, a longitudinal section through the structure of Fig. 2;

Fig. 4, a section viewed in the direction of the arrows on line 4—4 of Fig. 3; and

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Fig. 5, a section on the same line but viewed in the direction of the arrows 5—5.

Briefly stated, the present invention includes a boiler and oil burning equipment for supplying oil to be consumed for raising the temperature of the water in the boiler. Oil is supplied through a tube and is discharged through a burner and atomizer tip where combustion takes place. The supply of oil to the tip is in sufficient quantity that if the tip were omitted, the supply would be generally in excess of that which could be consumed. Accordingly, a safety device in the form of a valve is provided for interrupting the flow of the oil to the tip, and this valve is unseated by the application of the tip or the action of coupling the tip to the burner tube.

With continued reference to the drawings, the boiler includes a wall formed of spaced plates 10 and 11, the wall 10 having an opening 12 and the wall 11 having an opening 13 closed by plate 14, which closure is sealed by a gasket 15 held in position by bolts and nuts 16.

Within the opening 12 of the wall 10 is disposed a frustoconical deflector ring 17 which is secured to the front of a housing 18 which with the ring forms the combustion chamber. The wall 10 is provided with an annular perforated ring 19 to which the deflector ring 17 and the housing 18 are attached, the ring 17 being provided with an annular perforated flange 20 and the housing 18 having lugs 21 and bolts 22 being employed for fastening the ring 19 and lugs 21 together with the flange 20 therebetween.

Within the housing 18 is mounted a burner cone 23 secured by a bolted flange connection to a burner tube casing 24 mounted in a hollow casting 25, such burner tube casing and casting extending through the closure member 14, and the joint between them being sealed by means of a packing gland 26 on the outside of the plate 14, one embodiment of such oil burning equipment being disclosed in Patent 2,125,020.

A removable burner tube 27 is adapted to be received within the burner tube casing 24 and is provided on its forward end with external threads 28 for the reception of a burner 29 having an internally threaded chamber 30 for engagement with the threads 28 of the tube 27. The burner 29 is provided with channels 31 which lead from the chamber 30 to the opposite or forward portion of the burner and terminate in a recess 32 in which is located a disk 33 attached to a valve stem 34 having a valve 35 on its opposite end, the valve 35 being adapted to seat against the complementarily flared valve seat 36 forming the end of the chamber 30. The supply of fluid through the tube 27 will engage the valve 35 and ordinarily cause it to seat closing flow through the channels 31.

The burner includes an atomizing nozzle 37 having a central aperture 38 and an annular flange 39 with axial oil directing channels 40, such atomizing nozzle 37 being held in place by means of a cap nut 41.

When the parts are in assembled relation the disk 33 will be maintained against the end of the burner 29 with the valve 35 unseated. Thus oil can flow from the tube 27 around the valve 35 and through the channels 31 into the recess 32 around the member 33 and through the channels 40 and out through the central passage 38 where it is consumed into the air chamber where combustion occurs.

In order to permit the burner tube 27 to be removed, a housing 42 is threaded on the outer end of the tube casing 24. To the outer end of the tube is secured a coupling 43 having a bore 44 which communicates with bores 45 and 46 of the housing and into which oil is adapted to be supplied from a suitable source. The coupling 43 is removable to permit the tube 27 to be withdrawn, and in order to hold it in position the clamping

yoke 47 is mounted on a pivot 48, a hand screw 49 being provided for tightening the parts in assembled relation. Where the tube 27 and coupling 43 join within, a sleeve 50 and a pair of pivoted closure members 51 and 52 are employed for closing each end of the sleeve 50 when the coupling 43 and burner tube 27 are removed, thus preventing flow of air into or from the combustion chamber.

The burner tube casing may be secured in its housing in a conventional manner, and such housing may be fastened in a conventional manner to the combustion chamber.

From the foregoing it will be apparent that applicant has provided a boiler with a burner including a burner tip and a safety device by means of which when the burner tube and burner are removed from the combustion chamber of a burner, the flow of oil into the burner will be interrupted and not permitted to accumulate with resultant build-up of gas pressure and ignition thereof to produce a combustion which would wreck the installation and perhaps the ship or other device on which it is mounted, that such safety device includes a valve which is normally opened by the application of the atomizer tip of the burner and when the burner is installed, if the tip is omitted, no harm can occur, and which safety device can be applied to conventional equipment at minimum expense and with minimum effort.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. An oil burner tip for mounting on a burner tube comprising a body having means at one end for attachment to a burner tube, said body having external threads at its other end and a conically recessed seat in said one end, said body further having a central bore extending axially and a plurality of fuel passages arranged around said central bore and extending from said other end of said body to said recessed seat, a conical valve for cooperation with said seat, a stem secured at one end to said valve and extending through said central bore, said stem having a disk at its opposite end, said stem being longer than said bore in order that force on said disk will unseat said valve allowing fuel to enter said passages, a fuel nozzle on the other end of said body, said fuel nozzle having an aperture and a plurality of fuel channels extending radially from said central aperture at the end of said nozzle adjacent said body, an internally threaded collar threaded on to said external threads of said body holding said nozzle in position thereby holding said disk against said body and holding said valve open to allow fuel to flow from said burner tube through said body and said nozzle.

2. An oil burner tip for mounting on a burner tube comprising a body having means at one end for mounting on said burner tube, said body further having a central bore extending axially and a plurality of fuel passages arranged around said central bore and extending from said one end of said body to the other end, said one end of said body having a conically recessed seat therein, a conical valve for cooperation with said seat, a stem connected by one of its ends to said valve, said

stem extending through said central bore, said stem having an enlargement on its opposite end, said stem being longer than said bore in order that force on said enlargement will unseat said valve allowing fuel to enter said passages, a fuel nozzle supported on the other end of said body and having a central aperture and a plurality of radial channels extending from said central aperture at the end of said nozzle adjacent said body, and a collar connected to said body holding said nozzle in position thereby holding said enlargement against said body and holding said valve open.

3. An oil burner tip for mounting on a burner tube comprising a body having means at one end for mounting said body on said burner tube, said body having a central bore extending axially and a plurality of fuel passages arranged around said central bore and extending from said one end of said body to the other end, said one end of said body having a seat thereon, a valve adapted to rest on said seat, a stem extending through said central bore and connected at one end to said valve, said stem being longer than said bore in order that force on said stem will unseat said valve allowing fuel to enter said passages, a fuel nozzle supported on the other end of said body and having a central aperture and a plurality of radial channels extending from said central aperture at the end of said nozzle adjacent said body, and a collar connected to said body and holding said nozzle in position thereby forcing said stem into said bore holding said valve open.

4. An oil burner tip for mounting on a burner tube comprising a body, means to secure one end of said body to said burner tube, said body having a valve stem receiving bore extending from said one end thereof to said other end, a valve stem in said bore of sufficient length to project from one end through said other end of said body, a valve head secured to the end of said stem adjacent said one end of said body, said body having a valve seat cooperable with said valve head and said body being provided with at least one passage extending from said valve seat at one end of said body to said other end, said passage being controlled by said valve head, a fuel nozzle on said valve body having an opening in communication with the passage in said body to provide for the passage of oil from the burner tube through said body and nozzle, means on the other end of said valve stem for engagement with said valve nozzle whereby said valve head will be held out of contact with said seat at the said one end of said passage permitting oil to pass therethrough when the nozzle is in position and permitting said valve head to close said passage when the nozzle is out of its operative position, and means to removably retain said nozzle on said body whereby the nozzle may be removed for cleaning and replacement and the flow of oil will be stopped when the nozzle is removed.

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