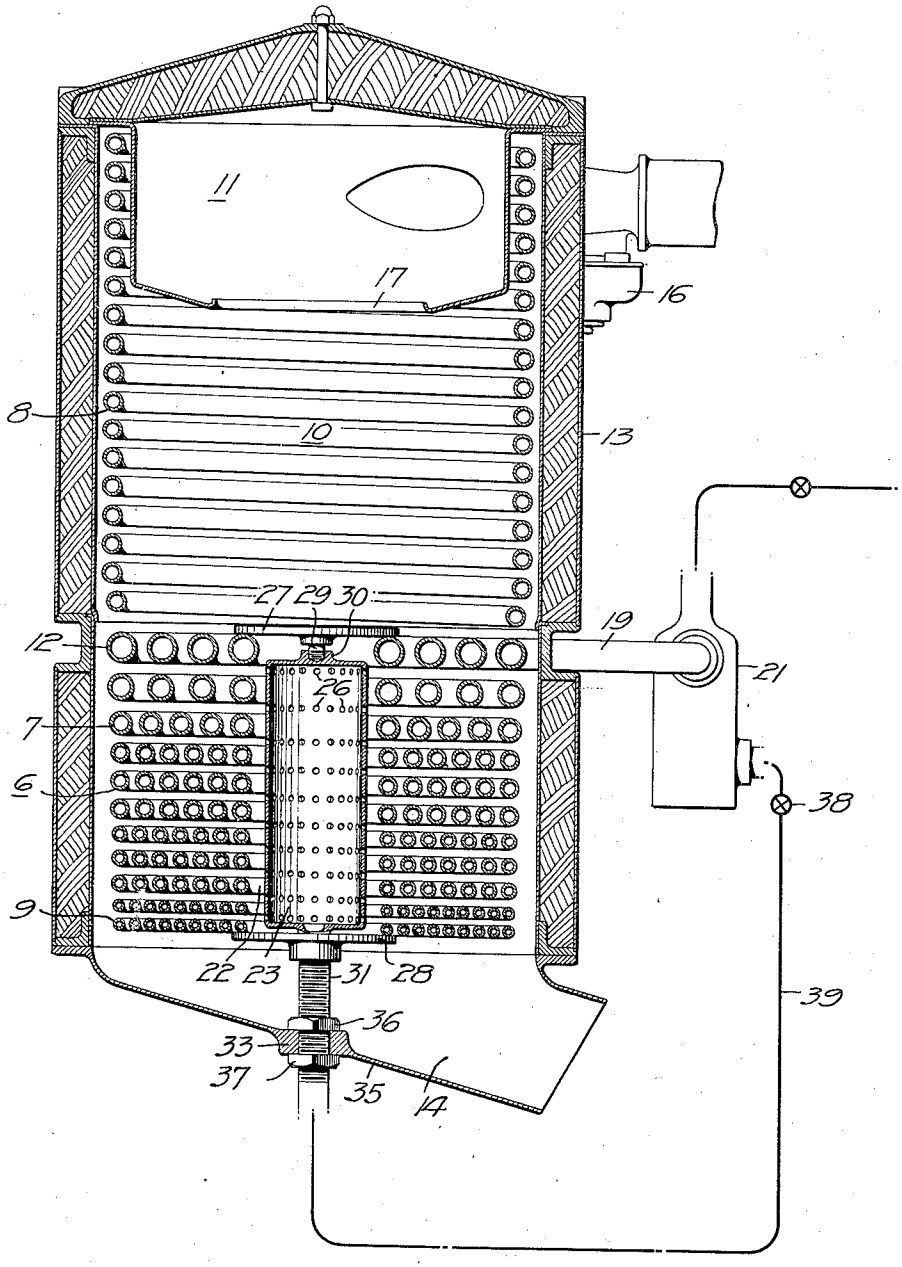
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BOILER CLEANER

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INVENTOR.
Abner Doble
BY
White, Frost, Tilney & Lothrop
ATTORNEYS.

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BOILER CLEANER

Abner Doble, Thames, New Zealand

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3 Claims. (Cl. 122—392)

This invention relates to a boiler cleaner for use in conjunction with a series tube type boiler and particularly with the boiler disclosed in the co-pending application of Warren Doble, Serial No. 415,997, filed December 23, 1929.

It is well known that upon the combustion of hydrocarbon fuels, whether gaseous, liquid or solid, soot is formed and collects, to some extent, upon the heating surfaces of the boiler. In this invention, provision is made for the ejection of steam to clean the soot from the heating surfaces in the boiler. The device of my invention enables boiler steam to be discharged, when desired, and, further, enables the heating surfaces of the boiler to be freed of collected soot at the time of such discharge.

Boilers of the type disclosed in the aforementioned application of Warren Doble, comprise a long tube wound into several flat pancake coils which are superimposed with respect to each other to provide a tube bank. Since the inner section of the tube in each of the pancake coils has a minimum bending radius, it follows that when the coils are arranged one above the other, a hollow central core is formed which extends through the tube bank. It has been found necessary to fill this core to force the products of combustion over the tubes instead of allowing them to pass out of the boiler through the hollow core and, to this end, asbestos has been packed into the space. While the asbestos served to force the hot gases over the tubes, it served additionally to collect water which condensed from the products of combustion. This water absorbed sulphur dioxide and sulphur trioxide to form various sulphur containing acids which etched the metal boiler tube, a very undesirable feature.

By means of the boiler cleaner of my invention, this hollow core has been filled in such a manner that the desired flame travel is secured while the etching of the tube is obviated. Further, the boiler cleaner enables a simplification in construction of such a boiler while providing a steam discharging means and a soot blower.

In general it is the object of the invention to devise a boiler cleaner which possesses the various features outlined and others which will appear upon consideration of the following.

In the drawing, the single view is an elevation, partly in cross section illustrating a series tube type of boiler embodying a boiler cleaner of my invention.

As is disclosed in the aforementioned co-pending application of Warren Doble, the boiler, in which I contemplate providing my boiler cleaner, comprises a long tube 6 disposed in the form of a series of coils to receive heat from a burning hydrocarbon fuel. The tube preferably increases in cross sectional area throughout its length so that initially it is of relatively small cross section while, at the point of final steam emission, it is relatively large. Thus, as is shown in the drawing, the tube is formed into a plurality of tiers of spiral pancake coils 7 arranged in bank and a helical coil 8, the tube generally increasing in cross sectional area through the bank from the water inlet end 9 of the boiler to the steam outlet 19.

The helical coil 8 surrounds a space 10 which is bounded on one side by a fire box 11 and, on the other side, by uppermost coil 12 which is the superheater coil. The fire box and various coils are enclosed in a suitable insulated shell, generally indicated at 13, which also includes a flue gas vent 14.

Heat is furnished by the combustion of a hydrocarbon fuel-air mixture formed by blowing an air stream through a carburetion device indicated generally at 16. The air-fuel mixture is ignited and is then discharged tangentially into the fire box from which the ignited mixture passes into the space 10 through an aperture 17. Since the tube has a minimum bending radius it follows that a hollow core, indicated at 22, is formed when the several spiral coils are superimposed with respect to each other to form a bank of tubes. As previously mentioned, it has been the practice heretofore to fill this core entirely with a suitable material as asbestos so that the products of combustion were forced to pass over the coils and could not escape without giving up their heat to the coils. However, in accordance with the present invention, I have been enabled to do away with this asbestos and the consequent disadvantage of having the sulphuric acid collecting in the asbestos come into contact with the tubes.

To secure this and other advantages, I provide a tubular member 23, usually in the form of a shell, which fills substantially entirely the core in the tube bank. This tubular member or shell includes a plurality of apertures 26 which are adapted to act as jets so that steam or other fluid can be forced between the several tiers of coils to remove soot which may collect upon them.

The shell 23 also serves as a means for holding the bank of tubes together and, to this end, a member 27, engaging the superheater coil 12, and another member 28, engaging the water inlet coil

9 at the opposite end of the bank, are provided. These members are adapted to be secured to the shell 23 to cooperate with the shell in holding the various coils of the boiler in position in the shell 13. Thus the member 27 is provided with a stud 29 which is screwed into a boss 30 provided on the shell. For convenience in construction the shell 23 is continued beyond the tube bank by a smaller nipple 31 upon which the plate 28 is screwed. The nipple extends through a boss 33 provided on the flue pan 35 and to which it is secured by nuts 36 and 37 screwed onto the nipple. When it is desired to discharge steam from the boiler, or clean the soot from the tubes to promote heat transference to the boiler tubes, steam is taken from the boiler outlet 19 through a separator 21 by opening a valve 38 so that the steam passes through pipe line 39 into the nipple 31. The steam passes through the orifices 26 in the shell and rapidly scours the soot from the tubes. It is to be noted that the steam is ejected transversely of each tier of coils so that soot is removed from between each of the successive coils. Ordinarily the rate of flame travel through the boiler is high so that soot collects largely on the upper and under surface of the coils 7. By transversely ejecting the steam the removal is rendered very thorough and complete.

From the foregoing it is believed to be apparent that I have provided a boiler cleaner that effects not only the removal of soot and discharge of steam from the boiler but, also, serves in simplifying the boiler construction. It is to be understood the form of the invention disclosed is the preferred form and that other forms can be employed within the scope of the claims.

I claim:

1. In a boiler cleaner for use with a tube bank having several tiers of spirally wound tubes superimposed to provide a hollow passage centrally through the bank, a shell member adapted to be inserted in the hollow passage to fill it substantially entirely, the shell having a plurality of apertures therein so positioned as to discharge fluid between the several tiers, a pipe for conducting fluid to the shell member from the boiler, a member adapted to engage a tier at one side of the bank, means for securing the member and shell together, another member adapted to engage a tier at the other side of the tube bank, and means for adjustably securing the shell to the other member to clamp said tube bank between said members.

2. In a boiler cleaner for use with a tube bank having several tiers of coils superimposed to provide a hollow passage through the tube bank, a casing about the tube bank, a member for engaging a tier on one side of the bank, another member for engagement with another tier of the bank, a shell member adapted to fill substantially the hollow passage, the shell member having a plurality of apertures so positioned as to eject fluid between the tubes, means for joining the shell member to one of the tier engaging members, a nipple joined to the shell, means for securing the nipple to the other member, and means for positioning the nipple on the casing.

3. In a boiler including a long tube wound into several coils and positioned in a casing, a tubular member extending through said coils, the tubular member being apertured to permit fluid ejection over the coils, means at opposite ends of the tubular member for clamping the tubular member to the coils, and means for positioning the tubular member relative to the casing.

ABNER DOBLE.