Aug. 18, 1931. K. MUHLEISEN 1,819,785

FEED WATER HEATER

Filed Aug. 28, 1930

Fig. 1.

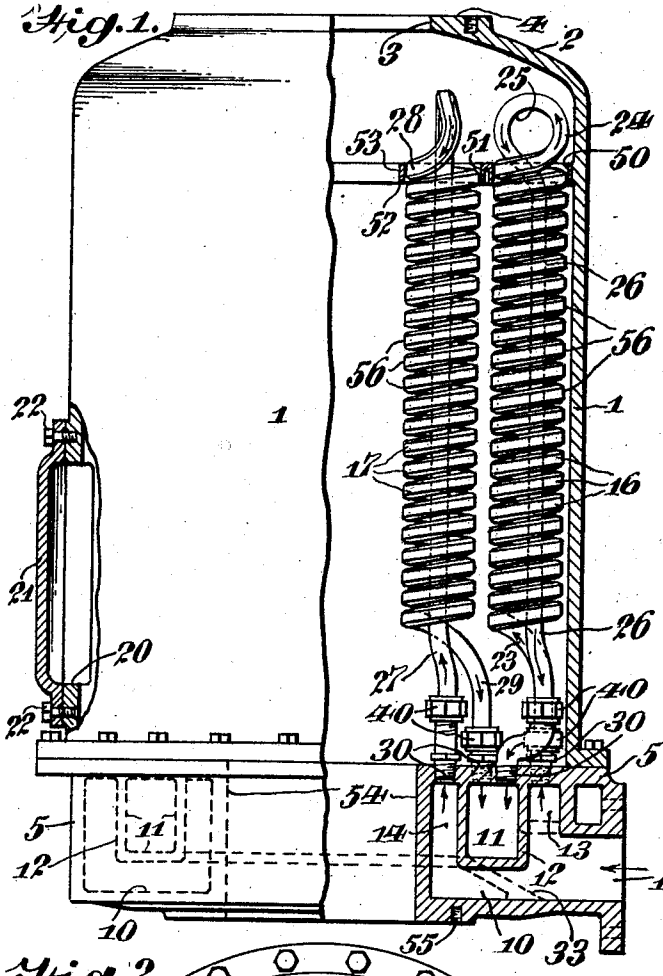


Fig. 3.

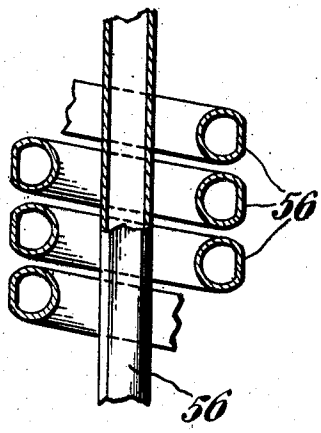


Fig. 2.

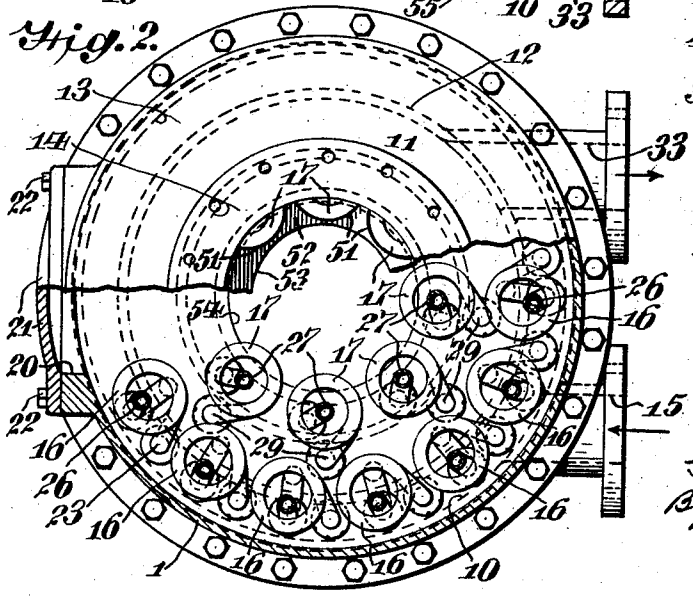
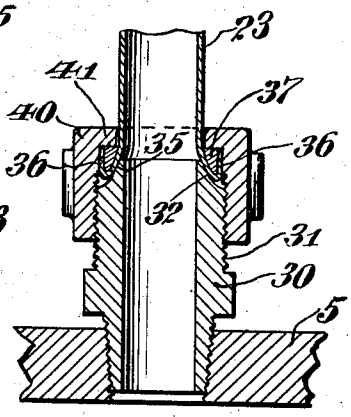


Fig. 4.



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UNITED STATES PATENT OFFICE

KARL MUHLEISEN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SCHUTTE AND KOERTING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

FEED WATER HEATER

Application filed August 28, 1930. Serial No. 478,471.

My invention relates broadly to means or apparatus for the heating of water or other fluid. More especially it has relation to means or apparatus for heating water for use in steam boilers and the like.

The invention has for its general object to provide a fluid heating means of novel character including features of construction the presence of which facilitates repair and also the assembly of the parts in the original construction of the said means.

It also has for its object to provide means of the character indicated including a header and tubular heater coils, the opposite ends of the tubes of the coils terminating in the header in adjoining or side by side relation to each other.

A further object of the invention is to provide a fluid heater of the character indicated comprising a header having fluid supply and discharge chambers therein in adjoining relation to each other and heating coils the opposite ends of the pipes of the respective coils being located in adjoining or side by side relation to each other and communicating respectively with the fluid supply and discharge chambers.

A still further object of the invention is to provide a water or other fluid heating apparatus comprising coils the opposite ends of the tubes of which terminate in adjoining relation to each other, which ends are fixedly anchored within a header of the said apparatus and the opposite end of each of the said coils being detachably supported to prevent lateral or swinging movement thereof.

Another object of the invention is to provide a water heating apparatus comprising tubular heating elements each of which embodies means whereby variations of pressure therein result in the removal from the interior surfaces thereof of any scale or other deposit which may be formed thereon.

A still further object of the invention is to provide an improved construction of means for connecting the ends of the pipes which embody the heating coils with a header of the apparatus.

I shall not undertake to set forth in this part of the specification of my application for Letters Patent the further objects and advantages of my invention but such further objects and advantages will be referred to in the detailed description of the invention which follows or else will be apparent therein.

In order that the invention may be readily understood and its practical advantages fully appreciated reference should be had to the accompanying drawings, wherein I have illustrated an embodiment of the invention in the form which at present is preferred by me. However, it is to be understood that the invention may be embodied in other forms of construction than that shown and that changes in the details of construction may be made within the scope of the claims without departing from the invention or the principle thereof.

In the drawings:

Fig. 1 is a view partly in side elevation and partly in vertical section;

Fig. 2 is a view partly in top plan and partly in transverse sectional plan;

Fig. 3 is a view in longitudinal section of a portion of a coil and in longitudinal section and elevation of a portion of the tube extended from the coil, the said view showing more clearly one novel feature of the construction than the same is shown in the other figures of the drawings; and

Fig. 4 is a view in longitudinal section showing the improved joint or coupling by which the ends of the pipes which embody the heating coils are connected to the outer projecting ends of short tubular sections which are mounted in one side of the header containing inlet and discharge chambers.

In the drawings I have shown at 1 a shell or casing of suitable material such as iron, steel, or the like. It may be formed by casting or by the employment of a plate or plates riveted together in known manner. The upper end portion of the shell is extended inwardly as indicated at 2 and is provided with a central opening 3 surrounded by a flat surface 4 to which one end of a pipe is adapted to be secured, from which pipe, steam or other heated fluid may be dis-

charged into the interior of the shell or casing 1. The opposite end of the casing is closed by means of a header 5 consisting of suitable material such as cast iron, cast steel, bronze, or the like. The said header has inlet and discharge chambers 10 and 11. The latter chamber is provided by an annular hollow casing 12 which may be of any desired shape in cross section, as for example rectangular, as shown in the drawings. The casing 12 projects downwardly from the top of the header 5 toward the bottom thereof and in so doing divides the upper portion of the chamber 10 into two annular parts 13 and 14.

The fluid, usually water, is supplied to the inlet or supply chamber 10 through a port 15 to which an end of a supply pipe is connected in obvious manner. Such pipe is connected to a source of fluid (usually water) supply. The water or other fluid which enters the chamber 10 fills the said chamber including the portions 13 and 14 and flows therefrom through the coils 16 and 17 and from the latter into the discharge chamber 11.

The coils 16 and 17 are arranged in two circular series, the said two series being in concentric relation to each other, as is clearly shown in Fig. 2 of the drawings. Both series are interrupted opposite an opening 20 provided in the shell or casing 1 near the lower end thereof. The said opening is closed by means of a covering or closing plate 21 secured to the shell by means of fastening screw bolts 22.

The water or other fluid is conducted from the portion 13 of the chamber 10 to each of the coils 16 through an extension 23 which merges into the lower end of said coil. The upper end of each coil 16 is extended upwardly as indicated at 24 and is then bent laterally and downwardly as indicated at 25 and extends as a straight section 26 downwardly through the coil and thence to the discharge chamber 11.

The water or other fluid is conducted from the portion 14 of the inlet chamber 10 to each of the coils 17 through an extension 27 which extends upwardly through the said coil and at its upper end is bent laterally and downwardly and merges into the upper end of the coil 17 as indicated at 28. The lower end of the coil is continued by an extension 29 which discharges into the discharge chamber 11.

It will be noted that the fluid, usually water, which is supplied to and flows through the respective coils 16 and 17 of the outer and inner series of coils is discharged into the single discharge chamber 11. From said chamber the fluid passes through the outlet 33 and thence through a pipe (not shown) to a boiler or other destination. By the location of the inlet and outlet connections in the header 5 side by side and in near relation to each other the bypassing of the heater to avoid the passing of the fluid through the coils may be readily effected by means of valves (not shown) without the use of connecting pipes such as are necessary if, for example, the inlet connection is located at one end of the heater and the outlet connection at the opposite end thereof.

For the purpose of connecting the tubular portions or sections 23, 26, 27 and 29 to the respective chambers, as described, I employ in each case a short tubular section 30 the lower end of which has screw-threaded engagement with an opening through the top of the header leading either into the inlet or supply chamber or into the outlet or discharge chamber. The upper end portion of each tubular section is screw-threaded as shown at 31 and the extreme upper end thereof is beveled or tapered inwardly as indicated at 32. The tapered end of each tubular section 30 projects into the flared end portion 35 of a pipe connection, as depicted in Fig. 4. The angle of the taper upon the outer end of the tubular section 30 should not be sufficient to cause a bending and stretching of the flared end 35 to such an extent as to split or fracture the same. The extreme end portions of the pipe connection are bent back or reversely as indicated at 36 in a direction substantially parallel with the length of the said pipe connection. An annular filler member 37 of practically triangular cross section occupies the annular practically triangular space between the portion 36 and the flared portion 35.

Prior to the bending and flaring of the end of a pipe connection, as shown in Fig. 4, a tapped coupling nut 40 is inserted over the end of the said pipe connection so that when it is desired to connect a pipe connection with the outer upper end of a tubular section 30 it is only necessary to screw the coupling nut 40 down upon the screw-threaded portion 31. The shoulder 41 of the coupling nut 40 engages the outer square edge of the filler 37 and forces the same downwardly toward the tapered surface at the outer end of the tubular section 30 and causes the inner surface of the flared portion 35 to contact with the surface of the tapered end portion of the said tubular section 30.

It will be apparent that by this means a water tight joint may be provided. The contacting surface of the flared end of the pipe connection being located on the inside thereof it is not apt to become scratched or roughened by the contact therewith of external objects, in consequence of which there is little chance but that the joint between the contacting surface of the flared end por-

tion 35 and the surface of the tapered end portion 32 of the tubular section 30 will not constitute a hermetic seal.

The upper portions of the coils 16 and 17 are located or positioned in openings 50 and 51 provided in an annular plate 52 fastened within the inside of the shell or casing 1 near the upper end thereof. The plate 52 has a central opening 53 therein which is in opposed relation to a similar opening 54 provided in the header 5. The heated fluid which may be supplied to the casing 1 through the opening or port 3 leaves the casing through the opening 54 and is conducted therefrom by a pipe, not shown, connected to the portion of the bottom of the casing surrounding the opening 54, the said pipe being connected to the bottom of the said header by fastening bolts which engage screw-threaded openings 55.

It will be apparent that each coil is supported at its lower end by the opposite ends of the pipe or tube of which it is formed, the said ends having connection to the top of the header 5 at points in adjoining relation to each other, as clearly shown in Fig. 1 of the drawings; and also that the upper end of each coil is steadied and held against lateral movement or vibration by its contact with the edge of the opening in the plate 52 within which it may be located.

The opening 20 is of a size to permit access to the coils or any one of them and to the fastening means by which they are connected to the top of the header 5 so that any one of said coils may be removed without the removal of the header 5 or any other portion, except the closing plate 21, of the structure. It is necessary to remove at least one coil 17 before a coil 16 can be removed. In the removal of a coil 17 the coupling nuts 40 by which the opposite ends thereof are secured to two of the tubular sections 30 are unscrewed from the said sections after which the said coil may be moved laterally and slightly downwardly to release the upper end thereof from the opening 50 or 51 in which it may be supported. By this means the repair of any coil or its connections may be readily effected.

For the purpose of automatically causing a detachment of any scale or other deposit which may form upon the inner surfaces of the pipes of which the coils are constructed each of the said pipes is provided with a flattened portion 56. The presence of such flattened portion causes a distortion of the cross sectional profile of the pipe upon variation of the internal pressure therein. These pressures may vary but at the present time in standard designs the working pressure of the fluid in the tubes is about three hundred pounds per square inch, while the working pressure of the heating fluid, as for example steam, is about fifty pounds per square inch. The difference in these pressures causes a slight expansion of the pipes or tubes and such expansion, due to the presence of the flat portions 56, causes a change in the cross sectional shape thereof. Upon release of the pressure the said pipes return to their normal or original shape and when this happens the scale or other deposit is loosened from the interior surfaces of the pipes or tubes.

It will be seen that by my invention I have provided a fluid heating means, which, when employed for heating the water supplied to a boiler or the like is known as a feed water heater, which is of simple construction and which embodies various practical features which cheapen the cost of construction, facilitate the making of repairs and render the same more efficient. The construction also, without the loss of ruggedness and strength, is lighter than such constructions usually are because it permits of the use of a single header at one end of the shell or casing instead of two, one at each end of the shell or casing, as is usually the case.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In fluid heating means the combination of a hollow casing, a header having connection with one end of said casing, said header comprising inlet and outlet chambers, said chambers being located below the inner side of the said header and one of the said chambers being inclosed by the other, coils located within the said casing, the opposite ends of which have connection with the inner end of the said header, one end of each coil being in communication with the inlet chamber and the other end thereof in communication with the outlet chamber and the said ends constituting supports for the said coils, and a plate secured in the said casing in spaced relation to the said header, said plate having openings therein within which are located the upper ends of the said coils.

2. In fluid heating means the combination of a casing, a header secured to one end of the said casing, said header including annular chambers one of which is located within the other, tubular coils located within the said casing, the opposite ends of each of which are extended in the same direction and terminate in adjoining relation to each other, means for securing said ends to the top of the said header, one end of each coil being in communication with the inlet chamber and the other end thereof being in communication with the outlet chamber, the said coils extending away from the said header lengthwise of the said casing, and a plate secured in said casing in spaced relation to the said header, said plate having

openings therethrough within which the adjoining ends of the said coils are located.

3. In fluid heating means the combination of a casing, a header secured to one end of said casing, said header comprising annular inlet and outlet chambers, said chambers being concentrically related to each other, a plurality of series of pipe coils located within said casing, the said plurality of series being concentrically related to each other, the opposite ends of each coil of each series being extended and connected with and supported by the said header, and an annular plate member secured in the said casing in spaced relation to the said header, said plate having a series of concentrically related openings therein in which the ends of the said coils furthest from the said header are located.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 23rd day of August, A. D. 1930.

KARL MUHLEISEN.