March 19, 1929. E. A. AVERILL ET AL 1,706,131

PIPE CONNECTION

Filed Jan. 28, 1926

Fig. 1

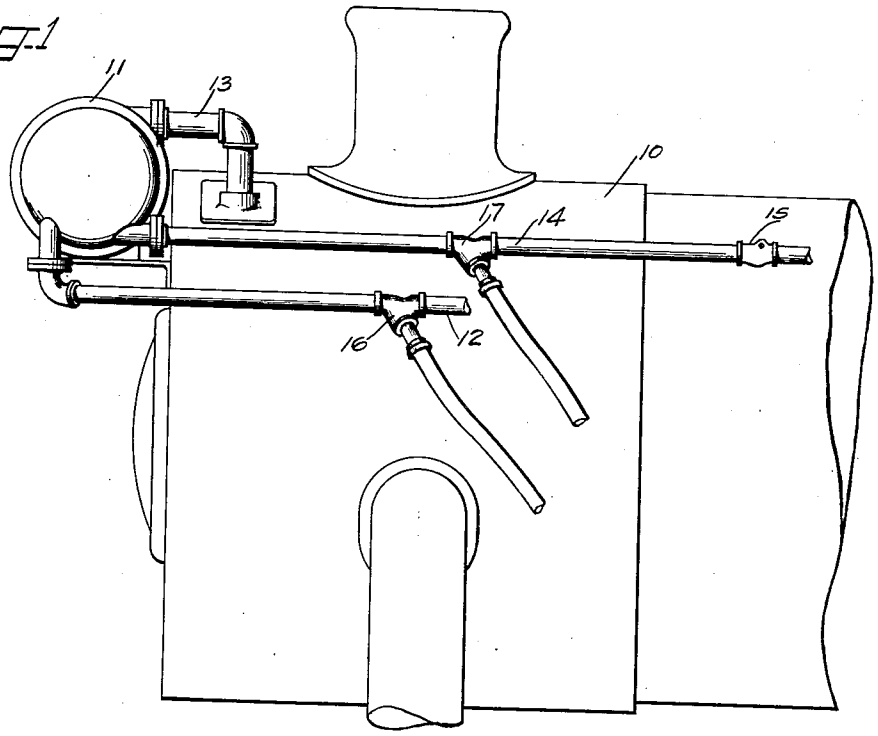


Fig. 2

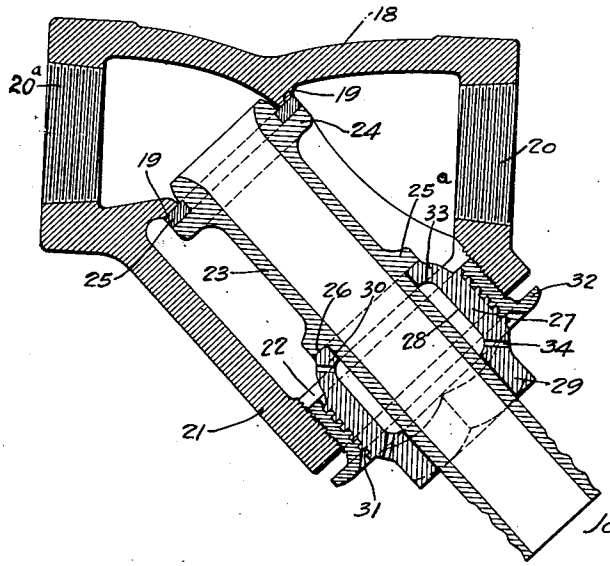
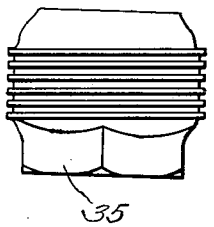


Fig. 3



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UNITED STATES PATENT OFFICE.

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PIPE CONNECTION.

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The present invention relates to pipe connections and has particular reference to that form of connection which provides an opening or outlet in an existing pipe line adapted to receive a temporary supplementary connection.

The invention is particularly applicable for use as a washout connection for piping systems which require periodic cleaning, such as feed water heaters as applied to locomotives, and it is in connection with such an application that it will be described, although it is to be understood that the invention is not limited to the application herein described, but is to be limited only by the scope of the appended claims.

In feed water heaters of the closed type, in which the water is passed through a number of small tubes, and in apparatus of a similar character where fluids are passed through tubular apparatus for heating or other purposes, the deposit of impurities on the inner walls of the tubes usually makes necessary the periodic cleaning of the latter. This cleaning is ordinarily accomplished by a washing operation in which an acid, caustic or other cleaning fluid is passed through the tubes and the encrustation on the interior surfaces thereof removed by the action of the solution circulated therethrough. As such systems ordinarily include pumps and other mechanisms which would be damaged by the strong cleaning solution used it is usually necessary to disconnect the inlet and outlet pipes of the apparatus which it is desired to clean, and circulate the cleaning solution through the apparatus to be cleaned from the points where these pipes have been disconnected. This procedure, involving a partial disassembling of the apparatus to be cleaned, is undesirable because of the time consumed in the completion of the cleaning operation and the restoration of the apparatus to service, and this is particularly true in the case of locomotive feed water heater systems, where it is important that the locomotive be kept out of service for the minimum length of time.

It is the general object of the invention therefore to provide a connection which may be permanently placed in the piping of such a system and which will provide means whereby a supplementary connection may be attached which will direct a cleaning or other auxiliary fluid through the portion of the system which is to be cleaned and which will at the same time prevent its entrance into the other parts of the system. It is a further object of the invention to provide means within the connection whereby the entrance of the fluid into the portions of the system which are not to be cleaned is positively prevented, and which will also give immediate warning to the operator in case defective packing or other cause allows the cleaning fluid to enter that portion of the system where it is not desired. Other and further objects of the invention will appear in connection with the following detailed description of the illustrative embodiment of the invention.

In the accompanying drawings the invention is illustrated as applied to a locomotive feed water heater, Figure 1 being a view in elevation of the forward end of a locomotive showing the manner in which the invention is applied to a feed water heater installed thereon, Figure 2 is a central longitudinal section on a larger scale, taken through a connection embodying the invention, and Figure 3 is a view in elevation of a closing member to be used with the structure shown in Figure 2.

Referring to Figure 1, the locomotive boiler shell is indicated generally at 10 and has mounted thereon in the usual manner a feed water heater of the ordinary closed type indicated at 11. In this form of heater, the details of which form no part of the present invention, feed water is supplied through a feed pipe 12 leading from the boiler feed pump (not shown), and after having passed through the tube bundle within the heater, where it is heated by exhaust steam entering through the conduit 13, it passes to the boiler through pipe 14 and boiler check valve 15. In the pipe 12 intermediate the boiler feed pump

and the heater and in the pipe 14 intermediate the heater and boiler check valve are placed the connections 16 and 17 embodying the present invention.

Each of the connections 16 and 17 comprises a main Y-shaped body fitting 18 which may be either cast or forged and which is adapted to be connected at its ends into the desired pipe line by means of suitable screwed or flanged joints. Intermediate its ends the fitting 18 has therein a flange forming a circular seat 19 disposed at an angle to the longitudinal axis of the fitting. The main body of the fitting 18 is made in the form of a Y conection having an inlet opening 20 and outlet 20^a, which as previously noted are adapted to connect into the pipe line to which the fitting is to be applied. The branch 21 of the Y-shaped fitting is provided with an opening 22, the bore of which is in alignment with the seat 19 formed in the interior of the fitting.

It will be obvious, however, that openings 20 and 20^a need not be in line, with the third opening 22 offset therefrom, as the fitting may be in the form of an elbow instead of a straight conection, in which case the openings 20 and 20^a will be angularly disposed with respect to each other, and the opening 22 may be at an angle to both the other openings, or in line with either of them. In any case, however, the opening 22 should be located so that the member 23 can be inserted therethrough and brought into engagement with the seat provided intermediate the inlet and outlet openings.

A tubular member 23, adapted to be inserted through the opening 22, is formed with an external flange 24 adjacent to one end thereof which serves as a backing and support for a packing ring 25, which may be of any suitable material and which is adapted to form a tight joint between flange 24 and seat 19. A second flange 25^a, the purpose of which will be described later, is formed on the member 23, with a bearing face 26 on the side of the flange opposite flange 24, and the member 23 is made of sufficient length so that when the gasket or packing 25^a bears against the seat 19 the end of the member 23 farthest from the gasket extends through the opening 22 for a substantial distance outside the fitting. An annular plug 27 is provided having ends which are bored to a diameter permitting the plug to slide freely over the outer end of 23, and having a recess 28 counterbored between the ends to a diameter substantially greater than the outer diameter of member 23. The end 29 of the plug 27 is extended and its exterior face is made square or hexagonal to form a wrench receiving nut while the opposite end 30 of the plug is formed with a face adapted to engage the face 26 of the flange 25^a. The exterior of the plug intermediate its ends is threaded, preferably with a coarse square thread 31 adapted to be received by a corresponding thread formed on the inner surface of a second annular plug 32 which is threaded on its outer surface with a standard thread engaging a corresponding thread in the opening 22. The end of member 23 extending outside of the fitting is formed in any manner desired for connection to a fluid supply pipe and in the form shown has been illustrated as corrugated for the reception of a flexible hose. It is to be understood however, that any equivalent form of connection may be used to attach the member 23 to the source of fluid supply.

When it is desired to clean the heater the member 23, attached to some suitable source of cleaning fluid, is inserted through the opening 22 and the plug 27 screwed into the plug 32 until the inner end of the plug 27 bears against the face 26 of the flange 25^a, to force member 23 into the fitting 18 until a tight joint is secured between the seat 19 and the flange 24 by the packing 25. Inlet and outlet pipes for the cleaning fluid are respectively secured in this manner in the connections 16 and 17, after which the cleaning fluid is circulated through that portion of the system between these connections until the cleaning operation, which may include a flushing to remove all traces of cleaning solution, is completed.

As is readily apparent from Figure 2, member 23, when screwed into position as indicated in the figure, forms a direct connection between the exterior of the fitting and the portion of the fitting communicating with the opening 20^a, which is connected to the heater side of the pipe line, and at the same time closes off from the cleaning fluid the portion of the fitting in communication with the opening 20, connecting either to the boiler or to the feed pump.

The fitting 18 is installed with the branch 21 extending downward to form a pocket into which any leakage past packing 25 may drain, in case the latter does not make a perfect seat. In order to prevent any leakage from entering the pipe leading either to the boiler or back to the feed pump, the plug 27 is provided with small holes 33 and 34, which form, together with the counterbored portion 28, an open passage leading from that portion of the fitting which communicates with end 20 to the exterior of the fitting. Any leakage passing out through these drain holes will be immediately apparent to the operator, and in case the amount is excessive, indicating a bad joint at 25, this condition may be remedied before any damage has been done by excessive leakage of the cleaning fluid into the portions of the system where it is not desired.

Upon the completion of the cleaning operation the member 23 is withdrawn by unscrewing the plug 27, and the opening 22 is

closed by inserting in place of the plug 27 the blank plug 35, illustrated in Figure 3. With the plug 35 in place the piping in the system allows an unobstructed flow therethrough until such time as the system must again be cleaned and the cleaning operation may be performed by merely removing the plugs 35 from connections 16 and 17 and inserting members 23, without disassembling any of the units in the system.

The plug 27 has been shown as entering an intermediate plug 32, as this permits the use of a coarse square thread not easily damaged by repeated insertion and removal of the member 23 and in case this thread is damaged the fitting may be restored to its original condition by the insertion of a new plug 32. It is to be understood however that plug 27 may be made to screw directly into the fitting, although this form of construction is not so desirable, not only because of the reason just mentioned, but also because the material of which the fittings is usually made is not suitable for the type of thread which it is desirable to use in this connection.

We claim:

1. The combination of a fluid utilizing apparatus, an inlet pipe leading to said apparatus from a normal source of fluid supply, said pipe having an auxiliary opening therein, and an outlet pipe leading from said apparatus to a normal point of discharge, said outlet pipe having an auxiliary opening therein, of fluid conveying members removably inserted through the auxiliary openings in said pipes to provide auxiliary inlet and outlet conduits in communication with said apparatus, and means disposed in said pipes and on said members coacting when in engagement to close communication between said apparatus and said normal supply and discharge.

2. In apparatus of the class described, the combination with a boiler, a feed water heater, an inlet pipe leading to said heater from a normal source of fluid supply, and a discharge pipe connecting said heater with said boiler, of means forming auxiliary openings in said pipes, fluid conveying members removably inserted through the auxiliary openings in said pipes to provide auxiliary inlet and outlet conduits in communication with said heater, and means disposed in said pipes and on said members coacting when in engagement to close communication between said heater and said normal supply and discharge.

3. In apparatus of the class described, the combination with a fitting having a passage therethrough connecting inlet and outlet openings, an annular seat located within said fitting and obliquely of said passage intermediate its ends, and an auxiliary opening in alignment with said seat; of a tubular member removably secured in said fitting and extending through said auxiliary opening to abut against said seat, said member acting to close communication between said inlet and outlet openings.

4. In apparatus of the class described, the combination with a fitting having a passage therethrough connecting inlet and outlet openings, an annular seat located obliquely of said passage, and an auxiliary opening in alignment with said seat; of a tubular member extending through said last named opening, and means engaging the wall of said auxiliary opening and said member to force the latter into fluid tight engagement with said seat.

5. In apparatus of the class described, the combination with a fitting having a passage therethrough connecting inlet and outlet openings, an annular seat located transversely of said passage, and an auxiliary opening in alignment with said seat; of a tubular member extending through said auxiliary openings, means engaging the walls of said auxiliary opening and said member to force the latter into fluid tight engagement with said seat, said means having passages therethrough forming a communication between the interior and exterior of said fitting.

6. In apparatus of the class described, the combination with a fitting having a passage therethrough connecting inlet and outlet openings, an annular seat located transversely of said passage, and a threaded auxiliary opening in alignment with said seat; of a tubular member extending through said opening and having an annular face adapted to engage said seat, an exterior circumferential shoulder on said member, and an annular exteriorly threaded plug around said member, said plug being screwed into said opening and engaging said shoulder to force said face against said seat.

7. In apparatus of the class described, the combination with a fitting having a passage therethrough connecting inlet and outlet openings, an annular seat located transversely of said passage, and an auxiliary opening in alignment with said seat; of a tubular member extending through said auxiliary opening and having an annular face adapted to engage said seat, an exterior circumferential shoulder on said member, an annular plug around said member engaging the walls of said auxiliary opening and said shoulder to secure said member in said fitting and force said face against said seat, said plug being provided with passages therethrough forming a communication between the interior and exterior of said fitting.

8. In apparatus of the class described, the combination with a fitting having a passage therethrough connecting aligned inlet and outlet openings, an annular seat located transversely of said passage and at an angle to said openings, and an auxiliary opening

located below said first named opening in alignment with said seat; of a tubular member extended through said auxiliary opening and having an annular face engaging said seat, an exterior circumferential shoulder on said member, an annular plug around said member, said plug engaging the walls of said auxiliary opening and said shoulder and having passages therethrough for draining the interior of said fitting around said member.

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