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TUBULAR FEED WATER HEATER

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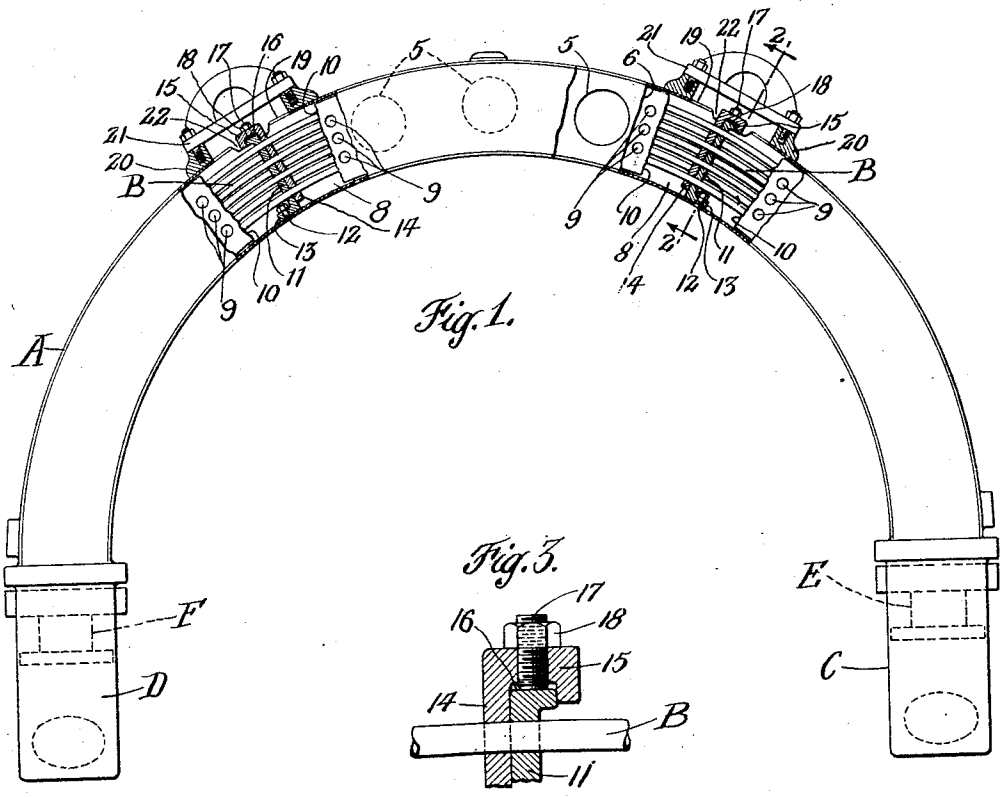


Fig. 1.

Fig. 3.

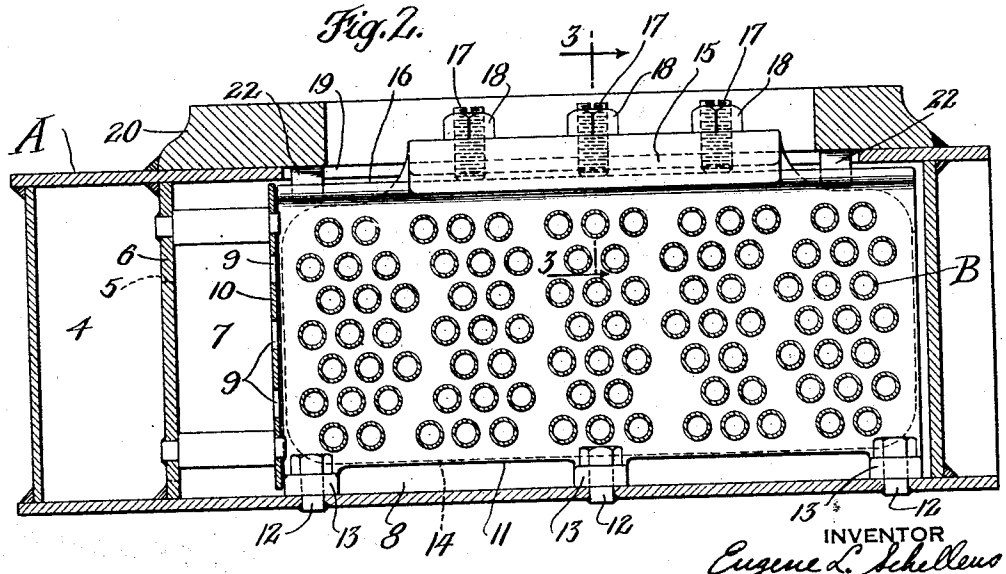


Fig. 2.

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UNITED STATES PATENT OFFICE

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TUBULAR FEED WATER HEATER

Application filed February 5, 1930. Serial No. 425,944.

This invention relates to tubular feed water heaters and particularly to improvements in the tube arrangements for tubular feed water heaters for locomotives.

I have here shown and described my invention as adapted and applied to a curved locomotive feed water heater of the type shown in a co-pending application of E. L. and C. A. Schellens, Serial No. 94,370, filed in the U. S. Patent Office on March 13, 1926, and in a co-pending application of J. S. Coffin, Jr., Serial No. 335,404 filed on January 28, 1929, and both assigned to the assignee of this application.

In such heaters tube spacers are employed at points intermediate of the ends of the tubes for the purpose of supporting and properly spacing the tubes. It has been found that in service the tubes, due to vibration, wear where they pass through the tube holes in the spacers thus causing clearance to develop between the tubes and spacer holes. Under such conditions the tubes begin to vibrate or rattle with the result that heavy wear occurs in both the tubes and the spacers. The vibration referred to may result from various causes incident to operation including, for example, locomotive vibration and the action of steam jets blowing against and across the tubes.

One of the primary objects of my invention is to obviate the liability of such wear.

Another object of my invention is the provision of means associated with the tube spacers of tubular feed water heaters for preventing vibration of the tubes.

A further object of my invention is the provision of a combined tube spacer and tube clamp for tubular feed water heaters.

Stated more specifically, it is an object of my invention to provide means cooperating with tube spacers of feed water heaters, to clamp the tubes against vibration whereby looseness of the tubes in the spacers may be taken up and wear of the tubes and spacers prevented.

Still another object of my invention is to provide simple and inexpensive means for preventing vibration in the tubes, which means is constructed and arranged to provide easily accessible adjustment.

How the foregoing, together with such other objects and advantages as may hereinafter appear, or are incident to my invention, are realized, is illustrated in preferred form in the accompanying drawings wherein—

Figure 1 is a front elevation of a tubular locomotive feed water heater of the curved type with portions of the casing broken away to clearly illustrate the tube arrangement and showing important parts of my invention in section.

Figure 2 is an enlarged cross section thru the heater taken substantially on the line 2—2 of Figure 1, with the closure for the opening in the casing removed; and

Figure 3 is a fragmentary section taken on the line 3—3 of Figure 2.

The heater illustrated is of semi-circular form and is adapted to be mounted at the front of the smoke box of a locomotive in any suitable manner and comprises in general a casing A, a nest of curved or arcuate water tubes B, steam headers C and D, and water headers E and F.

Water is fed to the water tubes thru the inlet header E, and passes thru the tubes to the outlet header F.

Steam, preferably exhaust steam from the locomotive, is led to the steam headers C and D, which communicate with the interior of the heater casing and the steam passes from the headers C and D into a passage or chamber 4, and then passes up to the center or top of the heater, where it passes thru apertures 5 in a partition 6 and into a chamber 7. The steam flows downwardly in the two legs of the chamber, 7, thus filling the whole chamber with steam. From this chamber the steam is directed into the main tube chamber, 8, of the casing in a plurality of jets provided by means of holes, 9, in a plate, 10.

The heater is provided with tube positioning plates or tube spacers, 11, which extend from side to side of the main tube chamber, 8, and which are secured to the heater casing by means of bolts, 12, passing thru bottom flanges, 13, of the spacers. The spacers are provided with apertures thru which the tubes are passed, the apertures being spaced and ar-

ranged to position the tubes in desired spacing.

The construction of the heater as thus far described is very similar to the construction of the heater disclosed in the above mentioned co-pending application of J. S. Coffin, Jr., Serial No. 335,404.

In order to prevent vibration of the tubes of the heater and to eliminate wear of the tubes and spacers due to vibration I associate means with the spacers, 11, adapted to clamp or hold the tubes against vibration. In preferred form this means comprises a plate-like member, 14, having a hooked or channeled portion, 15, at its upper edge which is adapted to hook over the top edge 16, of the tube spacer, 11, so that the member is supported from the spacer. The member 14, is provided with a plurality of holes thru which the tubes pass, the number and spacing of the holes corresponding to the number and spacing of the holes in the spacer, 11. It is to be noted that the member, 14, is applied to the radially or angularly disposed spacer, 11, so that it will tend to lie against the spacer due to gravity and thereby prevent possibility of its tipping away from the spacer. Furthermore, they are interlocked by the hook-like portion, 15, when the tubes are in place.

The member 14 is provided with means, preferably in the form of a plurality of screws, 17, for moving it relative to the spacer, 11, in a direction to grip and clamp the tubes firmly against vibration. More specifically stated, it will be seen that when the screws, 17, are turned downwardly they push down on the top edge, 16, of the spacer and cause a lifting action on the plate-like member, 14, with the effect that the tubes are clamped firmly to the spacer. Thus any looseness of the tubes in the tube holes is taken up and the tubes are firmly held against vibration. The tubes therefore, cannot rattle and rub in the tube holes to cause wear which is very objectionable in tubular heaters. After the member 14 has been adjusted to its clamping position the screw 17 may be locked in place as by means of nuts, 18. Should any future adjustments be needed it is only necessary to loosen the lock nuts, tighten up on the set screws, and relock them.

The heater casing A, is provided with openings, 19, in its top wall and above the spacer and clamping members thru which the adjusting and locking devices are readily accessible. Handhole frames, 20, may be provided for the openings, 19, and combined hand-hole covers and heater-lifting devices, 21, may be detachably secured to the hand-hole frames. Positioning lugs, 22, for the spacers, 11, may be provided on the hand-hole frames, 20.

Although I have shown and described my invention as applied to a curved tubular locomotive feed water heater it is to be understood that it is equally applicable to other types of tubular heaters.

It will be seen from the foregoing that I have provided very simple and effective anti-vibration means for the tubes of tubular heaters which may be termed a combined tube spacer and clamp.

I claim:—

1. In a locomotive feed water heater, a substantially arcuate casing having its ends extended downwardly and having a hand-hole spaced toward one leg from the top of the heater, a set of substantially arcuate tubes in the casing, jet means adjacent the top for projecting steam against the tubes transversely thereof, and adjustable tube clamping and positioning means disposed cross-sectionally of the casing adjacent said hand-hole, the adjustable means being disposed for access through said hand-hole and being cut away in a portion adjacent the bottom casing wall to provide for passage of condensate therealong to a condensate drain.

2. In a locomotive feed water heater, a substantially arcuate casing having its ends extended downwardly and having a hand-hole spaced toward one leg from the top of the heater, a set of substantially arcuate tubes in the casing, jet means adjacent the top for projecting steam against the tubes transversely thereof, and adjustable tube clamping and positioning means disposed cross-sectionally of the casing adjacent said hand-hole, the adjustable means including fixed and movable plates having apertures engaging the tubes and adjustable means arranged for access through the hand-hole and for reaction between the plates, both of said plates being cut away in portions adjacent the bottom casing wall to provide for passage of condensate therealong to a condensate drain.

In testimony whereof I have hereunto signed my name.

EUGENE L. SCHELLENS.