No. 720,622. PATENTED FEB. 17, 1903.

J. H. ROSENTHAL.

TUBE CONNECTION.

APPLICATION FILED MAR. 6, 1902.

NO MODEL.

Fig. 1.

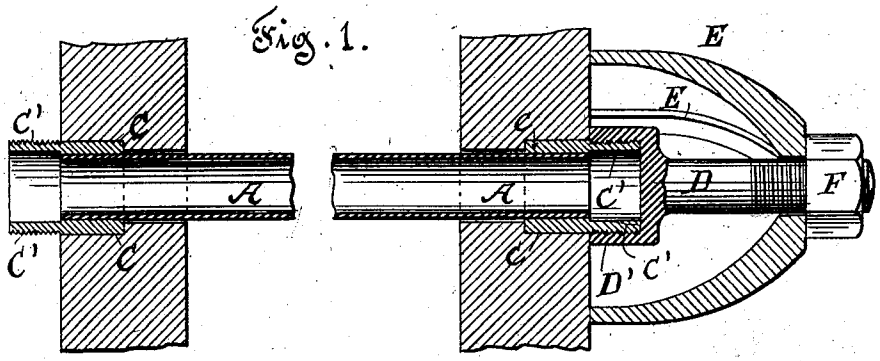


Fig. 3.

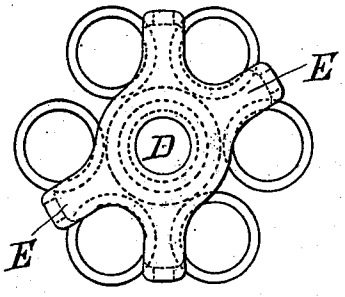
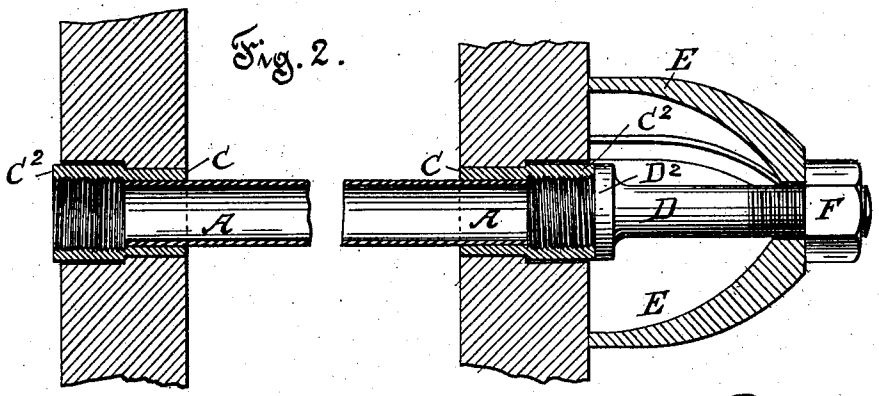


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

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TUBE CONNECTION.

SPECIFICATION forming part of Letters Patent No. 720,622, dated February 17, 1903.

Application filed March 6, 1902. Serial No. 96,944. (No model)

To all whom it may concern:

Be it known that I, JAMES H. ROSENTHAL, a subject of the King of Great Britain, residing at Oriel House, Farringdon street, London, England, have invented certain new and useful Improvements in Tube Connections, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention, which relates to ferruled joints for the tubes of surface condensers or like apparatus, has for its object the provision of improved means for fixing the tubes in the tube-plates of such apparatus to avoid leakage at the ferruled ends and to permit of the ready withdrawal of the ferrules and of the tubes without risk of injury to the latter.

According to the usual practice the tubes of condensers are secured in the tube-plates by means of screwed ferrules and cotton packing or by wooden ferrules, which swell by the action of the water, and leakage of salt water takes place through the ferrules or their packing, which cannot be kept tight owing to vibration of the engines and from other causes. This objection is overcome under my invention by expanding the tubes into and with metal ferrules in orifices in the tube-plates, from which the ferrules are adapted to be withdrawn when required by means of a socketed draw-bolt and bridge-piece without injuring the tubes, which may thus be used over and over again, and by giving the tubes a slight camber, which allows them to bend or yield to take up the difference of expansion consequent on steam being on one side of the tubes and the cooling-water on the other side.

The invention is illustrated by the accompanying drawings, in which—

Figure 1 is a section of the tube-plates of a surface condenser or feed-water heater, showing a single tube and one form of the ferrule and draw-bolt for withdrawing it. Fig. 2 is a similar view showing a modified construction, and Fig. 3 is an end elevation showing the bridge for the draw-bolt.

As shown by the drawings, each tube A of the condenser or like apparatus is secured at its ends in the tube-plates B by expanding said ends within and with ferrules C, fitting orifices in the tube-plates, which ferrules have a short plain tubular portion for the expansion of the tube ends, insuring that tight joints shall be formed between the tube ends and the ferrules and between the latter and the tube-plates, so that leakage may not take place. The series of tubes A have a slight camber, as shown at Figs. 1 and 2, which allows of their further bending or yielding under unequal expansion. Each ferrule is formed, as shown at Fig. 1, with a plain tubular portion C, which fits into the tube-plate and for expansion of the tube within it, and an externally-screw-threaded portion C′, or, as shown at Fig. 2, with an internally-screw-threaded portion C^2, the screw-thread in each case being toward the outer end of the ferrule to permit of its engagement with a draw-bolt for withdrawing the ferrule when the tubes A are to be removed for cleaning or renewal. When the screw-thread on the ferrule is an external one, the draw-bolt D has a correspondingly internally-screw-threaded socket D′, and when the ferrule has an internal screw-thread the draw-bolt employed has an externally-screw-threaded end D^2. In each case the stem of the draw-bolt D is carried through a bridge-piece E and is fitted outside with a nut F, by turning which the bolt is drawn out and withdraws the ferrule on or into which it has been screwed. In the example shown at Fig. 1 the end of the ferrule projects from the tube-plate, and in the other example it is or may be flush therewith. It will be seen that the ferrule into which the end of the tube is inserted, whether constructed with the internal or the external threaded portion with which the drawing-tool D is adapted to engage, is provided with interlocking projections arranged to be engaged by a pulling or drawing tool and disposed transversely to the axis of the ferrule or the tube with which it engages and that in this respect it differs from those forms of ferrules heretofore used and adapted to be screwed into the tube-plate and which are provided with longitudinally-disposed projections arranged to be engaged by a wrench or turning-tool.

Having now particularly described and ascertained the nature of my said invention and

in what manner the same is to be performed, I declare that what I claim is—

1. The combination with a tube and tube-plate, of a ferrule into which the end of the tube is fitted having an exterior surface adapted to tightly fit an aperture in the tube-plate, and a portion provided with transversely-disposed interlocking projections adapted to be engaged by a pulling or drawing tool arranged to withdraw the ferrule from the plate and the tube without injury to these parts, substantially as set forth.

2. The combination with a tube and a tube-plate, of a ferrule having a plain interior surface into which the end of the tube is fitted, and a plain exterior surface arranged to fit an aperture in the tube-plate, the said interior and exterior plain surfaces being arranged opposite to each other, and the ferrule being also provided with projections arranged to be engaged by a tool adapted to withdraw the ferrule bodily from the plate and the tube, substantially as set forth.

3. The combination with a tube and a tube-plate, of a ferrule having its inner end with a plain interior surface into which the tube is adapted to be expanded, and with a plain exterior surface adapted to fit an aperture in the plate, and having its outer portion provided with a screw-thread adapted to be engaged by a tool for withdrawing the ferrule bodily from the tube and plate, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES H. ROSENTHAL.

Witnesses:
H. P. SMITH,
J. B. SIRETT.