(No Model.)

A. LANGTON.

STEAM GENERATOR.

No. 491,217. Patented Feb. 7, 1893.

Fig: 2.

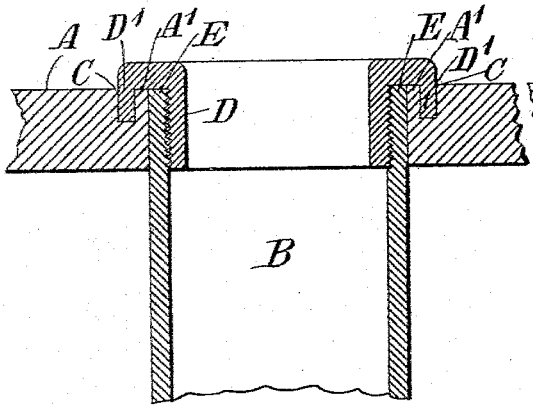


Fig: 1.

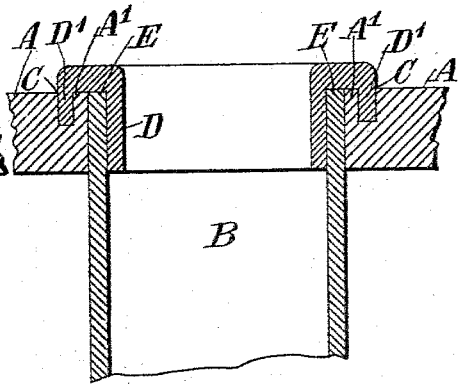
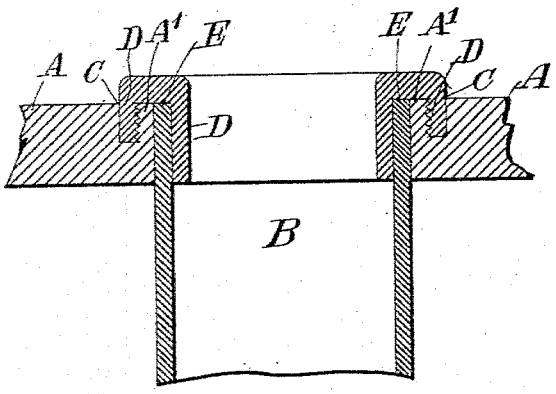


Fig: 3.



Witnesses:-
George Barry
O. L. Sundgren

Inventor:-
Alfred Langton
by attorneys
Brown & Ewart

UNITED STATES PATENT OFFICE.

ALFRED LANGTON, OF DEPTFORD PIER, ENGLAND.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 491,217, dated February 7, 1893.

Application filed July 19, 1892. Serial No. 440,453. (No model.)

To all whom it may concern:

Be it known that I, ALFRED LANGTON, engineer, residing at Deptford Pier, in the county of Kent, England, have invented certain new and useful Improvements Relating to Steam-Generators, of which the following is a specification.

The leakage of the flue tubes in the boilers of steam engines, and more particularly of marine engines, is well known to be a source of much trouble and danger, and many attempts have been made to overcome the difficulty.

In constructing tubular boilers, it is well known that the tubes are inserted in holes in the tube plates, the ends being generally tightened up in the holes by enlarging or expanding them with a suitable tool known as a tube expander. Notwithstanding the utmost care in the manufacture, leakage takes place, due to the unequal expansion and contraction of the tubes and plate, and this is more especially the case when forced draft is employed, as thereby the heat of the fire is much increased, and the amount of expansion and contraction is also increased. In order, to some extent, to protect the ends of the tubes from the great heat, and thereby to reduce the risk of leakage ferrules have been used, which have been inserted in the end of the tubes, the projecting portions being turned back on the plate. Every engineer will admit that any plan to effectually overcome this ever present and serious objection and difficulty, must necessarily be of the greatest practical importance, and it will be equally obvious that the practical value of such an invention must depend upon its simplicity.

Now the object of the present invention is to overcome the difficulty above mentioned in a simple and practical manner, and the invention consists in the means hereinafter described and claimed of connecting the ends of the tubes to the tube plates so that the greater the amount of expansion or contraction, the tighter the connection between the tubes and the plates will become.

In the accompanying drawings, I have shown three arrangements for obtaining the end in view, to which end I use a modified form of ferrule having a return flange with a cylindrical interior which will fit onto a cylindrical portion formed by turning a groove in the tube plate concentric with the tube hole and which thus forms a cylindrical metal to metal joint.

Figure 1 is a section showing the attaching ferrule secured to the tube by expansion only. Fig. 2 is a section of the improved tube attachment, the ferrule in this case being threaded to screw into the tube; and Fig. 3 is a section showing the ferrule flange screwed to the tube plate.

In all the figures, A is the tube plate and B the tube.

A′ is the cylindrical portion of the tube plate A, formed by cutting an annular groove C in the outer face thereof.

The ferrule consists of a short tube D, with a return external flange D′, which together form an annular recess E. This return flange, the inner face of which is cylindrical, enters into the annular groove C formed in the tube plate A, and its inner cylindrical face fits the cylindrical exterior of the portion A′ of the tube plate. The tube end, and the cylindrical portion A′ of the plate, are inclosed in the annular recess E, and the ferrule is fitted into the tube by means of an expanding tool in the usual way. The ferrule may, in addition, be threaded, and screwed into the tube, as shown at Fig. 2, which arrangement I prefer to employ. Or I may connect the ferrule to the tube plate by threading the flange D′ of the ferrule, and one side of the cylindrical portion A′ of the tube plate, as shown at Fig. 3.

Should the tube B (by a reduction in its diameter, due to the alteration in temperature, or from any other cause) shrink away from the tube plate A, it will only grip more tightly on the tubular part D of the ferrule. At the same time, and under similar conditions, the cylindrical return flange D′, which fits into the annular groove in the tube plate, will shrink onto the cylindrical portion A′ of the tube plate. Under the effect of expansion, the parts will be caused to grip or bind in the reverse sense. Thus, the egress of the water from the boiler will in both cases be effectually barred.

I may apply my invention to one or both ends of the tubes, but in general it will be applied to the fire box end only; the smoke-box end of the tubes may be fitted in the usual way.

What I claim is:—

1. The means above described for securing a water-tight connection between the tube plates and the tubes of steam generators and consisting in the combination with a tube having an externally cylindrical end and a tube plate having in its outer face around the tube hole a groove inside of which is an externally cylindrical portion, of a ferrule entering the tube and having an internally cylindrical return flange which fits the said externally cylindrical portion of the plate and forms a cylindrical metal to metal joint between the ferrule and the plate, as herein set forth.

2. The combination with the tube and a tube plate having in its outer face around the tube hole a groove forming a cylindrical portion, of a ferrule which enters the tube and has an internally cylindrical return flange fitting the said cylindrical portion and which is screw-threaded to engage with a screw-thread in the tube or tube plate, substantially as herein set forth.

ALFRED LANGTON.

Witnesses:
H. K. WHITE,
H. F. C. GOLTZ.