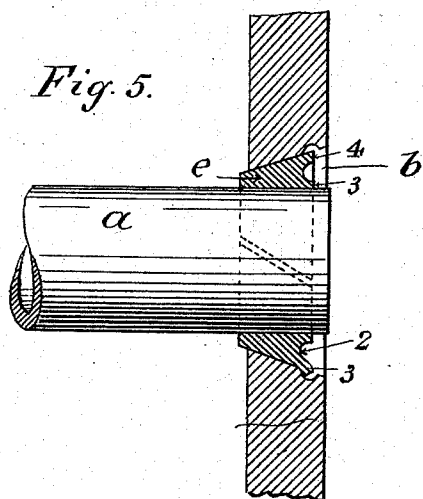
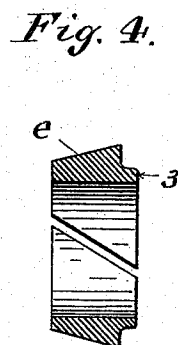
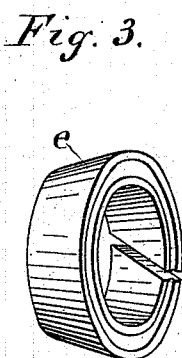
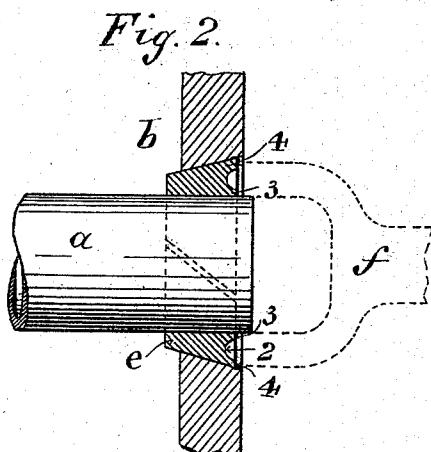
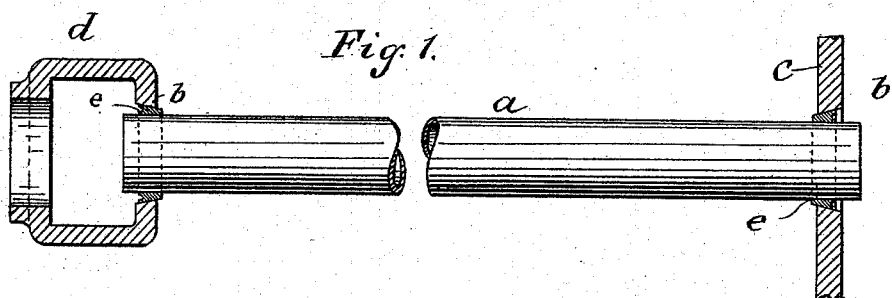


(No Model.)

N. W. PRATT.
TUBE JOINT FOR SECTIONAL BOILERS.

No. 527,883.

Patented Oct. 23, 1894.



Witnesses
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UNITED STATES PATENT OFFICE.

NAT. W. PRATT, OF BROOKLYN, NEW YORK.

TUBE-JOINT FOR SECTIONAL BOILERS.

SPECIFICATION forming part of Letters Patent No. 527,883, dated October 23, 1894.

Application filed March 28, 1891. Renewed February 24, 1894. Serial No. 501,374. (No model.)

To all whom it may concern:

Be it known that I, NAT. W. PRATT, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Tube-Joints for Sectional Boilers, &c., of which the following is a specification.

This invention relates generally to a means for securing tubes, flues or other conduits to their seats, whether the tubes be used in steam generators, radiators, or in other apparatus or devices. Many methods of securing such tubes to their seats have heretofore been proposed; and one of the means heretofore employed, as set forth in Letters Patent No. 265,234, dated October 3, 1882, consisted in tapering one end of the tube to fit a tapered opening in a tube header, while the opposite end of the tube was straight, but slightly reduced in diameter to fit an opening in the opposite header, which was also of taper form but larger than the greatest diameter of the tube to permit its withdrawal therethrough, the joint between the reduced end of the tube and its tapered seat being formed by a rigid annulus straight upon its inside to fit the tube end and tapered on its exterior to fit the tube seat opening and driven forcibly to such seat, to secure the tube therein and make a tight joint therebetween.

The present invention contemplates the use of tubes whether of wrought or cast iron as they are ordinarily found in the market, and their use as tubes, flues, or other conduits, without any previous shaping or preparation; and in connection therewith a split or divided annulus shaped on its inner side to fit the exterior of the tube and tapered on its exterior to fit a tapered opening in the tube sheet, header or other seat, whereby such annulus, capable of yielding diametrically, is adapted to conform to the inequalities of such ordinary tube and will thereby aid in insuring a tight joint. The annulus of soft metal and whether split or not, is formed on its large or outer end with a projecting neck immediately adjacent its inner surface to provide an annular body of metal adapted to be calked or upset into forcible contact with the surface of the tube and thereby tighten the joint between the annulus and the tube; and this

neck may be formed from the edge of both surfaces of the annulus by making a groove in its outer end whereby the metal of the projecting necks may be forced by the calking tool in opposite directions—against the walls of the tube seat opening and against the surface of the tube.

As a better understanding of the invention will be had by a detailed description thereof, such description will now be given, reference being made to the accompanying drawings, in which—

Figure 1 is a sectional elevation of so much of a tube and its connection with its front and rear seats as is necessary to an understanding of the invention. Fig. 2, is an enlarged sectional elevation of one end of the tube and its seat. Fig. 3, is a perspective view of the annulus. Figs. 4 and 5 are sectional views of modified forms of the annulus and the tube seat.

It is to be understood that so far as the particular means now to be described of securing the tubes to their seats is concerned, the tube or tubes may be employed as water tubes in sectional steam boilers as for instance of the well known Babcock & Wilcox type; as flues, as in ordinary boilers; as steam, water or air tubes in steam, hot water or air radiators; as tubes in refrigerating apparatus, and in fact in all situations, apparatus or devices in which tubes held in seats are employed, the particular connections of the tube shown being simply taken as illustrative of one of the many examples of its use.

The tube *a*, in said drawings, is a tube of suitable diameter and length, of wrought or cast iron and preferably taken as ordinarily found in the market without any fitting or dressing for use in connection with the improved means of connecting it to its seat or seats. The tube seats *b*, are shown as provided at one end in a plate of sheet metal *c*, and at the opposite end in a header *d*, of the form usually found in the Babcock & Wilcox type of generators. Each tube seat is formed by a tapered opening in the metal, header or the like, two openings when considered together being tapered from opposite directions, the larger diameter of each opening being outward to facilitate the insertion, driving-home, and calking of the securing annulus *e*.

The securing annulus in its preferred form is split or divided as shown in Fig. 3, having an interior diameter and straight surface adapting it to fit over the end of the tube *a*, and tapered on its exterior to fit the taper of the seat opening at either end of the tube. The annulus after being placed around the tube in position to enter or already entered in the seat opening is forcibly driven home by any suitable tool as for instance the annularly formed tool *f*, indicated by dotted lines in Fig. 2. In this operation the flexibility of the securing annulus, by reason of its being split, will allow the walls of the tapered seat opening to crowd the annulus around the tube in forcible and binding contact with its surface so that the joint between the two and with the seat opening will be absolutely tight. This operation also causes the opening of the split in the annulus to be also closed up tightly. The friction between the annulus, the tube, and the walls of the seat opening will be great enough to hold the annulus firmly in place, and in the example of the tube connection with the header *d*, in Fig. 1, the pressure in the header will materially aid in holding the annulus in position.

As an additional security against any leakage past the joint formed by the securing annulus, its larger end is formed with a continuous groove 2, which provides on the end of the annulus an inner and an outer annular neck of metal 3, 4, the former lying against the surface of the tube and the latter against the wall of the seat opening. Each of these annular necks of metal is calked by a proper calking tool against the tube and wall of the seat opening respectively, thereby completely closing all openings between the annulus and the tube which may have remained by reason of the irregular surface of the tube after driving the annulus home in the first operation; and also between the annulus and the wall of the seat opening.

Instead of providing both of the annular necks of metal 3, 4, on the end of the annulus one of them may be omitted as for instance the neck 4, as shown in Fig. 4, wherein the neck 3, may be similarly calked over against the surface of the tube.

The wall of the seat opening may be plain tapered as shown or as in Fig. 5, it may have an annular groove 5 formed in it into which the annular neck 4 may be calked as is shown partially in Fig. 5, whereby the neck and groove form a key securely locking the annulus in place.

From the foregoing it will be seen that an exceedingly simple mode of connecting the tube to its seat is provided, permitting the use of wrought or cast iron tubes as they are ordinarily found in the market without the necessity of shaping, dressing or fitting their ends for use; and by employing a split annulus as distinguished from a rigid one, the operation of driving it home effectually closes the annulus around the tube; and by the final operation of calking the closing of all openings in the connection is insured and a tight joint formed.

I am aware that tube joints have been made wherein a solid tapered annulus has been employed encircling the tube and bearing upon the tube sheet, and also wherein a divided annulus has been inserted within the tube and expanded by permanent internal devices to press and hold the tube in contact with the sheet and I do not claim such expedients.

What is claimed is—

1. As a means of securing a tube in its seat, a divided ring or collar of ductile material having its inner bearing surface conformed to the tube and its outer surface to a tapered seat in the sheet, plate, or header to which the tube is secured.

2. The herein described tube connection, consisting of a tube seat therefor of tapered form and having an annular groove therein, and a soft metal annulus adapted to the tube and its seat and having a projection for calking the annulus in place and adapted to interlock with said annular groove.

In testimony whereof I have hereunto set my hand, this 18th day of March, A. D. 1891, in the presence of two witnesses.

NAT. W. PRATT.

Witnesses:

FRANK L. WARD,
L. D. BURNHAM.