

O. WIEDEKE.
TUBE EXPANDER.
APPLICATION FILED MAY 14, 1914.

1,124,568.

Patented Jan. 12, 1915.

Fig. 1.

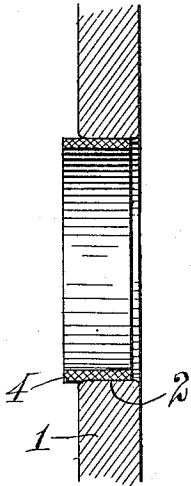


Fig. 2.

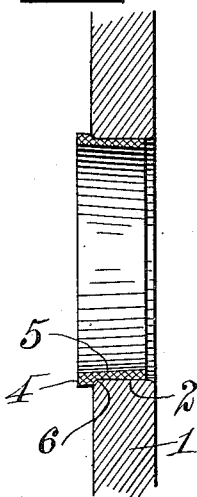


Fig. 3.

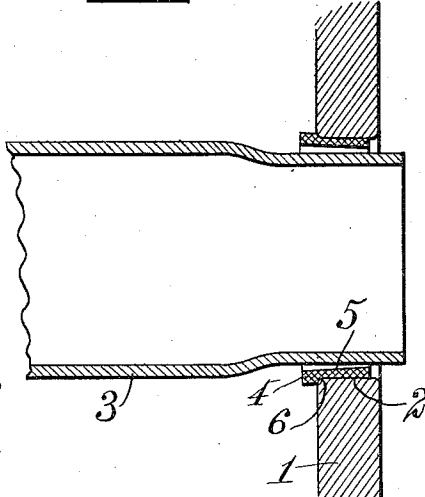


Fig. 4.

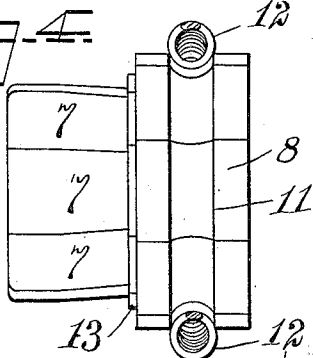


Fig. 5.

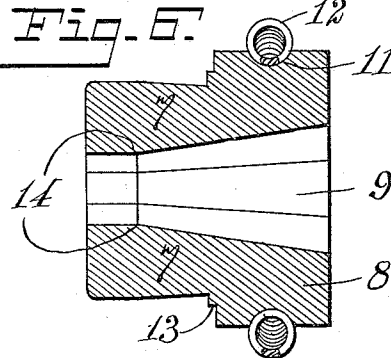


Fig. 7.

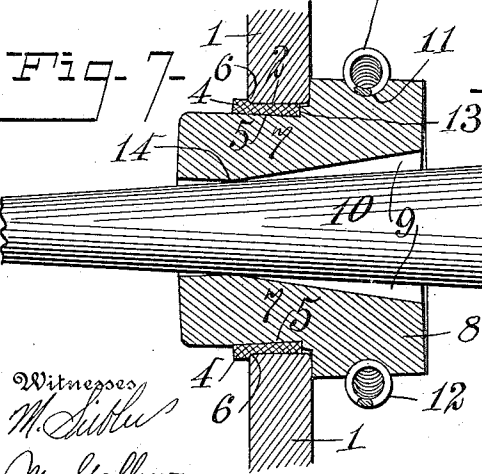
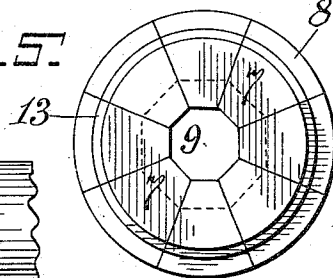


Fig. 8.



Witnesses
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UNITED STATES PATENT OFFICE.

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TUBE-EXPANDER.

1,124,568.

Specification of Letters Patent.

Patented Jan. 12, 1915.

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To all whom it may concern:

Be it known that I, OTTO WIEDEKE, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Tube-Expanders; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in tube expanders of the sectional type, and is particularly adapted to expand the copper ferrules in the fire box tube sheet of locomotive boilers.

The object of the invention is to provide a device of this type by means of which the ferrule is given an inner taper the extent of which depends upon the extent in which the mandrel is driven into the expander. When the operation of the expander upon the ferrule is completed, the end thereof of greater diameter is provided with an exterior annular shoulder which locks with the surrounding edge of the opening in the tube sheet in which the ferrule is placed so that the insertion of the end of the boiler tube cannot dislodge the ferrule.

Referring to the accompanying drawings which illustrate my improved tube expander, Figure 1 is a sectional view of a portion of a tube sheet showing an unexpanded ferrule in position in the opening therein ready for the operation of the expander; Fig. 2 is a similar view showing the operation completed and the ferrule expanded; Fig. 3 is a similar view showing the unexpanded end of a boiler tube placed within the ferrule; Fig. 4 is a side elevation of the expander with the mandrel removed; Fig. 5 is an end elevation of the same; Fig. 6 is a longitudinal sectional view of the expander with mandrel removed; and Fig. 7 is a sectional view showing a ferrule in the act of being expanded in the tube sheet.

In the specification and drawings, similar reference characters indicate corresponding parts.

Referring more particularly to the drawings, 1 represents a portion of a fire box tube sheet provided with tube openings 2

only one of which is shown. The opening 2 is adapted to receive one end of a boiler tube 3 which is expanded within the opening in a well known manner. However, in locomotive boiler practice, it is customary to interpose a copper ferrule 4 which lies between the boiler tube 3 and the sheet 1. This ferrule 4 is instrumental in maintaining a tight joint in the presence of the intense heat of the fire box. It is customary to expand these ferrules before the tube is inserted but, it has been found in practice, that even when the ferrules are expanded in the tube sheet, the tubes are liable to displace the ferrules when said tubes are being placed in position. To give the ferrules an inner taper 5 and to thus enable said tubes to easily enter said ferrules, and to give the ferrules an annular shoulder 6 on the tube side of the sheet and thereby prevent said tubes displacing the ferrules when being inserted, a special form of expander is provided. The said expander is circular in form and consists of a plurality of independently movable segments 7 which have enlargements that provide a head 8. The segments 7 when assembled have a tapered opening 9 which extends from one end and terminates inwardly from the opposite end and extends thence in a bore of uniform diameter to the end opposite that in which the tapered opening begins. The point where the taper bore terminates and the bore of uniform diameter begins is one and the same and such shoulder forms an annular pivot 14 forming a shoulder for the expander to swing upon when the mandrel 10 is driven therein, and the necessary taper is given the copper ferrule by such unequal movement of the expander. The head 8 of the expander is provided with a circumferential groove 11 which receives an endless elastic band 12, which, in the present case, is shown as a coil spring, which is instrumental in holding the segments 7 together thus forming the complete expander. The segments 7 are tilted outwardly to expand the ferrule and thus give it the desired taper and shoulder by exerting force on the end of the mandrel 10. The mandrel engaging the annular shoulder 14 of the bore 9 causes the end of the expander having the bore of uniform diameter to spread outwardly and to thus form the desired taper and shoulder to the ferrule. In order to prevent the outer edge

of the ferrule 4 overlapping the edge of the tube sheet, when the ferrule is expanded, and to thereby prevent the improper "beading" of the end of the tube 3, the expander is provided with a shoulder 13 which holds the end of the ferrule away from the face of the tube sheet as will be seen from Fig. 7. To give the ferrule the inner taper bore referred to, the end of the expander, opposite the head 8, is given a greater amount of movement than the head portion when the mandrel is driven into the expander. This is clear from Fig. 7 of the drawings. This is accomplished by making the opening 9 tapered a portion only of its length and providing the inner pivotal part 14. The segments forming the expander are, therefore, swung or tilted outwardly at one end. By thus constructing the expander, the ferrule is given the shoulder 6 which, in operation, prevents the ferrule being displaced in the opening 2 when the tube is inserted, as before stated. The tapered surface 5 of the ferrule may be partially imparted to the expander by making the outer surface of the end of the expander, opposite the head, conical, as is shown in the drawings, but it has been found in practice, impracticable to give the expander, on its outer surface, sufficient taper to accomplish the result. The tapered opening 9, therefore, terminates at a point inwardly from the spreading end of the expander in order to provide the annular shoulder 14.

Having described my invention, I claim—

1. A tube expander, comprising an expanding member having a bore extending on a taper from one end thereof and terminating short of the other end in an opening of uniform diameter, said tapered opening and the part of uniform diameter providing an annular shoulder forming a fulcrum beyond the work face of the sections upon which the expander is adapted to swing in its operation, whereby a greater expanding movement is imparted thereto forward of such fulcrum, and a mandrel insertible in said opening and engaging the fulcrum of said expanding member to impart thereto said swinging movement.

2. In a tube expander, the combination of

a sectional expanding member having a tapered opening extending inwardly from one end thereof, said tapered bore terminating inwardly from the other end of said expanding member from which point it extends in a bore of uniform diameter thereby providing an internal annular fulcrum beyond the working face of said expanding member and upon which said expanding member is adapted to swing in the operation thereof, and a mandrel insertible in the bore of said expanding member, said mandrel engaging said annular fulcrum whereby the expanding member is given a greater expanding movement at one end thereof.

3. A tube expander, comprising a sectional expanding member having a tapered bore extending from one end thereof and terminating in an opening of uniform diameter at the other end thereof, the inner terminal of the tapered portion of said bore providing an annular fulcrum beyond the working face of said member and upon which said expanding member swings in the operation thereof and whereby a tapered surface is imparted to the article operated upon thereby, and a tapered mandrel insertible in said bore and forming a bearing upon which said expanding member swings.

4. A tube expander, comprising a sectional expanding member enlarged in diameter at one end and having an annular shoulder between the peripheral surfaces thereof, and a tapered bore extending from one end thereof and terminating short of the other end thence terminating in a bore of uniform diameter whereby the terminal of said tapered bore provides an annular fulcrum beyond the working face of said member for the expanding member to swing upon in the operation thereof, and a tapered mandrel insertible in the bore of said expanding member and imparting thereto said swinging movement.

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

OTTO WIEDEKE.

Witnesses:

BERTHA WIEDEKE,
MATTHEW SIEBLER.