July 7, 1931. K. A. STENNER 1,813,096

TUBE EXPANDER AND METHOD OF EXPANDING TUBES

Filed Aug. 14, 1929

Fig. 1.

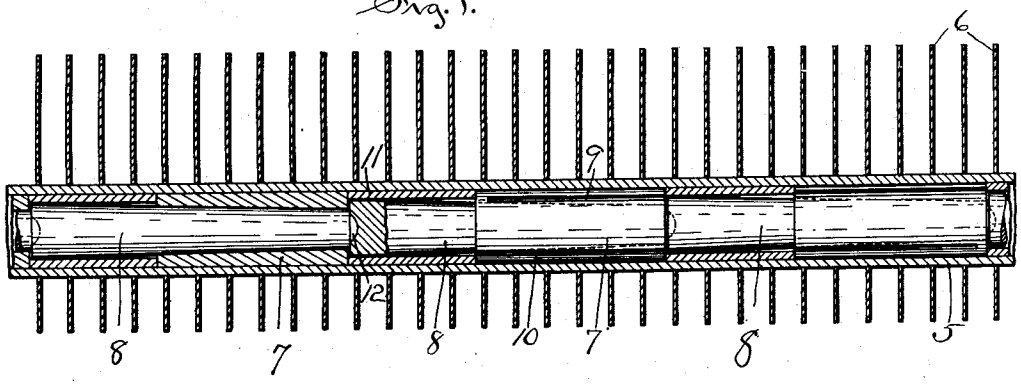


Fig. 2.

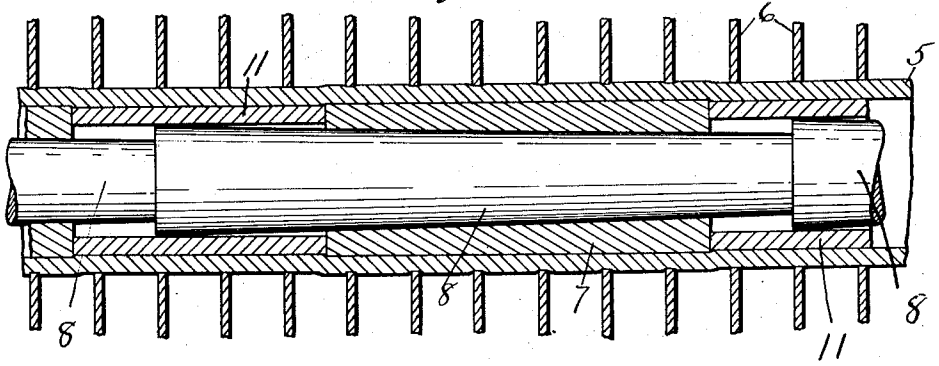
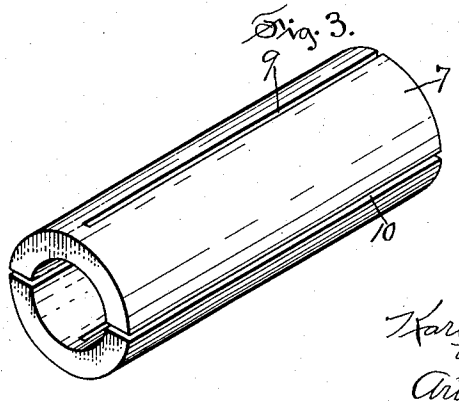


Fig. 3.



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UNITED STATES PATENT OFFICE

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TUBE EXPANDER AND METHOD OF EXPANDING TUBES

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My invention relates to the class of devices used for the purpose of enlarging tubes, and an object of my invention, among others, is the production of a device that shall be particularly efficient for the purpose for which it is designed.

One form of my improved expander in the use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings, in which—

Figure 1 is a view in lengthwise section through a tube with my improved expander therein shown preparatory to the operation of securing fins or plates in spaced relation along said tube, parts being broken away to show construction.

Figure 2 is a similar view, scale enlarged, showing the operation of the device.

Figure 3 is an isometric view of the expanding sleeve.

My improved expander, while not limited in its use for expanding tubes for any particular purpose, yet, as it is particularly adapted for use in the construction of radiators, they have been employed herein for the purpose of disclosing the invention, in the accompanying drawings the numeral 5 indicating a tube and 6 radiating fins or plates commonly employed for conduction purposes in connection with said tube, a number of the latter being usual embodied in a single structure. It has heretofore been common practice to swell such tubes for the purpose of securing the fins in place and my improved implement forming the subject-matter of this application is peculiarly adapted for this purpose, this implement or tool comprising an expanding bushing 7 and a tapered expanding mandrel 8 adapted to fit within the bushing. The hole through the bushing is tapered to correspond with the taper of the mandrel and the bushing is split, in the preferred form slots 9 being extended inwardly from one end nearly to the opposite end and alternate slots being extended from opposite ends of the bushing. In a preferred construction I prefer to extend one slot, as 10, from end to end of the bushing.

It may here be remarked that while in some cases a single mandrel and a single bushing may be employed, yet, in many cases a plurality of such members will be required. With this arrangement it will be found of advantage to have each mandrel longer than its companion bushing and to employ spacers 11 to separate the bushings to the required extent, these spacers having central openings therein large enough to receive the larger end of the mandrel.

In the use of the device the fins having been placed upon a tube or tubes and retained suitably spaced thereon in any desired manner, and the expanding devices being within the tube or tubes, the mandrel or mandrels are forced lengthwise into the bushings, the mandrels abutting each against another, and to facilitate the relative positioning of the mandrels each is provided, preferably at its larger end, with a recess and at its opposite end with a projection 12 shaped to fit the recess in the end of the adjacent mandrel.

When the mandrels have been forced inwardly to a sufficient extent by applying force to the larger end of the outer mandrel the tube 5 will have been expanded at the points engaged by the bushings to secure the fins or plates tightly in place, and as shown in Figure 2 in which this expansion is shown to an exaggerated degree. With the parts arranged as shown in Figure 2, one expanding operation having been effected, the mandrels are loosened by forcing them backwardly and the bushings and spacers are shifted to place the bushings in the locations before occupied by the spacers and a second operation is performed to expand the unexpanded portions of the tube.

In accordance with the provisions of the patent statutes I have described the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative, and the invention may be carried out by other means and applied to uses other than those above set out.

I claim:—

1. A tube expander including a tapered mandrel, a plurality of bushings outwardly shaped to fit a tube and inwardly shaped to

fit a mandrel, and a spacer located between said bushings.

2. A tube expander including a plurality of tapered mandrels, a plurality of tapered bushings outwardly shaped to fit a tube and inwardly shaped to fit a mandrel, said bushings being shorter in length than said mandrels, and a spacer located between each two adjacent bushings.

3. A tube expander including a tapered mandrel provided at its ends with means to receive and position an abutting mandrel, a plurality of bushings outwardly shaped to fit a tube and inwardly shaped to fit a mandrel, and a spacer interposed between each two adjacent bushings.

4. The process of expanding a tube into tight contact with surrounding fins, that consists in placing within said tube a number of expansible bushings outwardly shaped to fit said tube, locating a spacer between each two adjacent bushings, placing a number of tapered mandrels fitted to holes within said bushings and applying force to the larger end of the outer mandrel.

5. A tube expander including a tapered mandrel, a plurality of bushings outwardly shaped to fit a tube and inwardly shaped to fit a mandrel, and a spacer located between said bushings and having an opening therein large enough to receive the larger end of the mandrel.

6. A tube expander including a tapered mandrel, and a tubular structure extending to the end of a tube to be operated upon, said tubular structure including a plurality of bushings outwardly shaped to fit a tube and inwardly shaped to fit a mandrel.

7. A tube expander including a tapered mandrel, provided at its ends with means to receive and position an abutting mandrel, and a plurality of bushings outwardly shaped to fit a tube and inwardly shaped to fit a mandrel.

8. The process of expanding a tube into tight contact with surrounding fins, that consists in placing within said tube a number of expansible bushings outwardly shaped to fit said tube, placing a spacer between each two adjacent bushings, placing a number of tapered mandrels fitted to holes within said bushings, applying force to the larger end of the outer mandrel, loosening the mandrels, moving the mandrels and bushings endwise within the tube to new positions, and again applying force to the larger end of the outer mandrel.

KARL A. STENNER.