E. WALSH.

TUBE EXPANDER.

APPLICATION FILED APR. 14, 1919.

1,306,982. Patented June 17, 1919.

Fig.1.

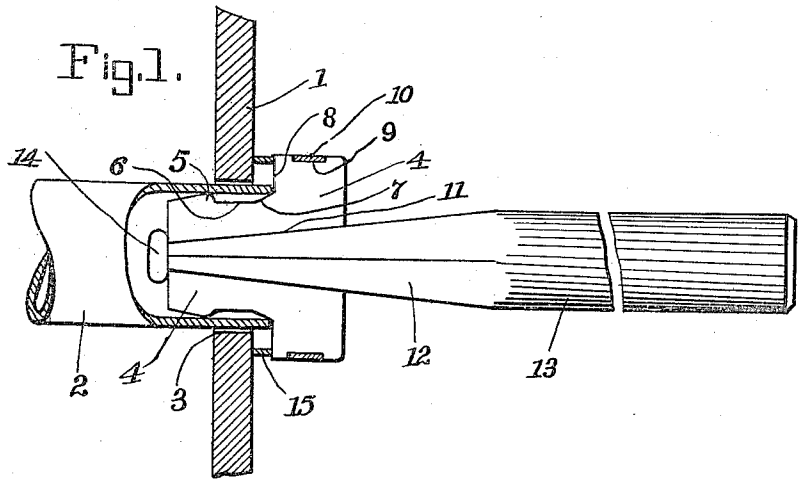


Fig.2.

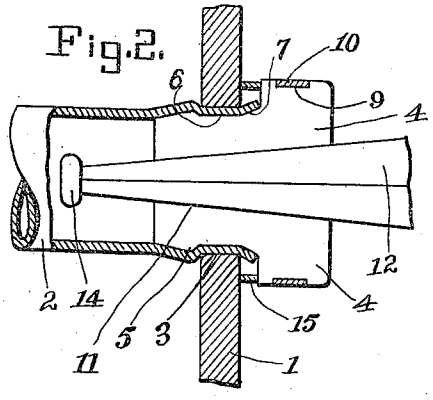


Fig.3.

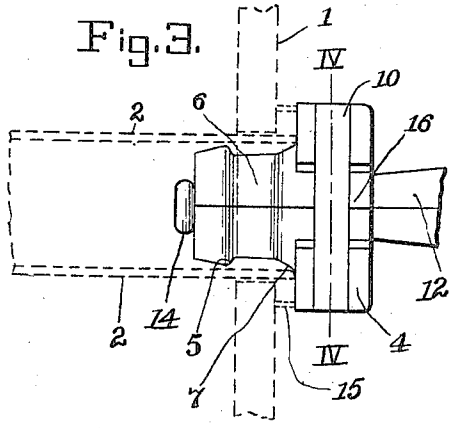


Fig.4.

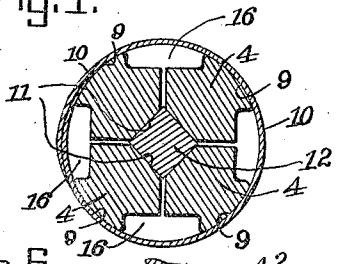


Fig.7.

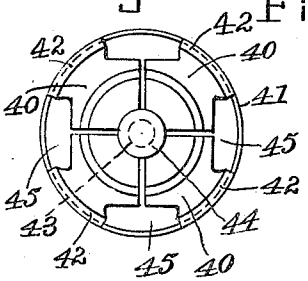


Fig.5.

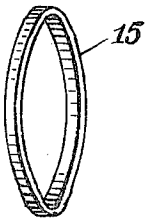
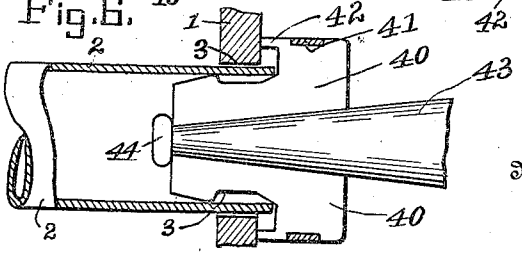


Fig.6.



Inventor

Emmet Walsh,

By Geo. A. Hutchinson

Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON.

UNITED STATES PATENT OFFICE.

EMMET WALSH, OF SAN ANTONIO, TEXAS.

TUBE-EXPANDER.

1,306,982. Specification of Letters Patent. Patented June 17, 1919.

Application filed April 14, 1919. Serial No. 289,862.

To all whom it may concern:

Be it known that I, EMMET WALSH, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Tube-Expanders, of which the following is a full, clear, and exact specification.

This invention relates to tube expanders for setting boiler tubes in the holes in the tube-sheet, and it has for its object to provide a tool of this kind which is of simplified and improved construction as compared with devices heretofore used.

One object is to retain the sections of the expanding head of the tool upon the tapered pin when the tool is not in use, thus avoiding the possibility of parts becoming lost or mislaid. Another object is to provide means for determining with certainty the width of bead or flange to be formed on the end of the tubes where they are overlapped upon the tube-sheet, so that all of the tubes may have beads or flanges of uniform width or the width of said beads or flanges on different tubes may be varied to suit requirements. Other objects will appear as the description proceeds.

The invention will be first hereinafter described in connection with the accompanying drawings, which constitute part of this specification, and then more specifically defined in the claims at the end of the description.

In the accompanying drawings, wherein similar references characters are used to designate corresponding parts throughout the several views:—

Figure 1 is a central longitudinal section of the tool in position for expanding a tube in a hole in a tube-sheet, said sheet and the end portion of the tube being also shown in section.

Fig. 2 is a similar view of the tool and tube as they appear when expanded.

Fig. 3 is an elevation of the head of the tool, the outer end portion of the tapered pin being broken away and the tube and tube-sheet shown in broken lines.

Fig. 4 is a section on the line IV—IV of Fig. 3.

Fig. 5 is a detailed perspective view of the separate gage ring.

Fig. 6 is a section similar to Fig. 1 of a modified form of tool, and

Fig. 7 is an end view of the tool shown in Fig. 6.

Referring first to Figs. 1 to 5, inclusive, of the drawings, 1 designates a tube-sheet, and 2 a tube having its end portion arranged in a hole 3 in said sheet preparatory to being expanded or set therein. The tool shown in these figures consists of a plurality of segments or sections 4 grouped about the tapered end portion 12 of a pin 13 and having portions 5 to extend entirely through the sheet, portions 6 to be positioned within the hole 3 in said sheet, and transversely extending shoulders 8 on the outside of the sheet. At the junction of the portions 6 and shoulders 8 of the segments 4 there may be formed inclined or sloping annular surfaces 7 for turning the end portions of the tube slightly outward when expanded, as shown in Fig. 2.

The inner faces of the segments 4 are flattened and inclined at 11 to fit the angular faces of the tapered portion 12 of the pin 13, and said segments are yieldingly held in place around said pin by a spring ring or band 10 seated in grooves 9 in the segments. The ends of the spring band have a considerable overlap to allow for the expansion of the segments when the pin is driven in from the position shown in Fig. 1 to that illustrated in Fig. 2. A button or knob 14 is formed on the small end of the pin to retain the segments of the expanding head thereon when the tool is not in use so that the parts cannot become misplaced but are always in assembled position ready for use.

In order to determine the width of the end portion of the tube which is to be turned over upon the tube-sheet in forming the bead which secures said tube to the sheet, a ring 15 is interposed between the sheet and shoulder 8 of the tool. In practice, the tool is held with its annular shoulder 8 against the ring 15 and the ring against the tube-sheet, as illustrated in Figs. 1 and 2, and the tube is pushed through the hole in said sheet until its extremity engages said shoulder 8, and the parts are in this position while the pin is driven in to expand the segments and end portion of the tube to fit the hole in the sheet. It will thus be seen that the width of the turned over flange or bead on the tube will be determined by the width of the gage ring 15, and that by using the same width of ring a uniform width of bead may be

assured on any number of tubes, while by using a ring of different width the bead may be varied in width to suit different conditions. A number of rings 15 of graduated widths may be kept on hand to adapt the tool to a wide scope of usefulness.

As shown in Fig. 2, the portions 5 of the segments 4 are formed with annular ribs to expand the portion of the tube adjacent the sheet to a somewhat greater extent or degree than the portion which is arranged inside the hole 3. This is to fasten the tube against longitudinal movement in one direction, while the annular inclined portions 7 by turning the extreme end portion of the tube slightly outward prevent longitudinal movement of the tube in the opposite direction. The radially extending portions of the segments having the shoulders 8 and grooves 9 for the spring band 10, have longitudinal ways 16 formed in their outer surfaces, as shown in Figs. 3 and 4, to permit a clear view of the work below the spring band from all sides.

The modified form of tool illustrated in Figs. 6 and 7 differs from the form already described only in having the tapered portion 43 of the pin round instead of angular in cross section, the inner faces of the segments 40 being formed to correspond, and in providing integral gage flanges 42 on the segments to take the place of the gage ring 15. The longitudinal ways 45 between the outer portions of the segments and below the spring band 41 also extend between the gage flanges 42. In other words, the gage flanges 42 are formed on the outer portions of the segments and extend between the ways 45. The operation of the modified form of tool is the same as the preferred form, but said modified form is limited to gaging a single width of bead to be formed on the end of the tubes, while the preferred form by reason of the separate gage ring is adapted to be used for forming various widths of beads on the tubes. The angular form of pin is also preferable to the round form because the flat faces of the former insure the uniform spacing of the segments as they are spread apart by the forcing of said pin inwardly between them.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a tube expander, the combination with a tapered pin, of a plurality of expanding segments grouped around said pin and having portions to enter the end of a tube to be expanded, and portions extending radially outward to engage the end of the tube, and means to be arranged between said radially extending portions and a tube-sheet to which the tube is to be set, for determining the width of the bead to be formed on the tube, said segments being capable of being moved radially while said spacing means remains stationary.

2. In a tube expander, the combination with a tapered pin, of a plurality of expanding segments grouped around said pin and having portions to enter the end of a tube to be expanded, and portions extending radially outward to engage the end of the tube, and a separate gage ring to be interposed between said radially extending portions and a tube-sheet to which the tube is to be set, said segments being capable of being moved radially while said gage ring remains stationary.

3. In a tube expander, the combination with a tapered pin, of a plurality of expanding segments grouped around said pin and having portions to enter the end of a tube to be expanded, and portions extending radially outward to engage the end of the tube, a spring band mounted around said radially extending portions of the segments, and means to be interposed between said radially extending portions and a tube-sheet to which the tube is to be set, for determining the width of the bead to be formed on the tube, there being ways extending longitudinally in the outer portions of the segments along their meeting edges and below said spring band for the purpose specified.

In testimony whereof I have signed my name to this specification.

EMMET WALSH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."