O. PAGAN.

Tube Expander and Beader.

No. 220,651. Patented Oct. 14, 1879.

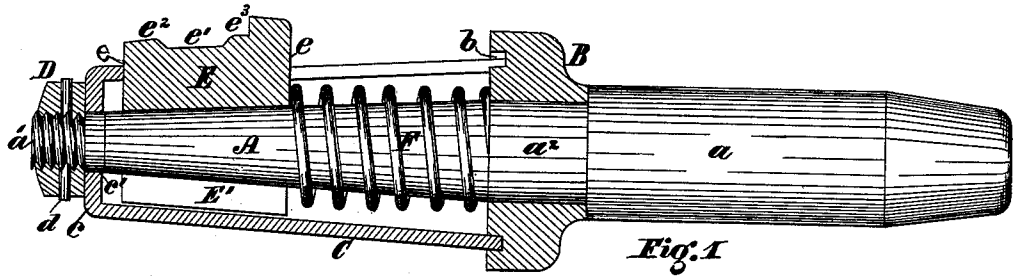


Fig. 1

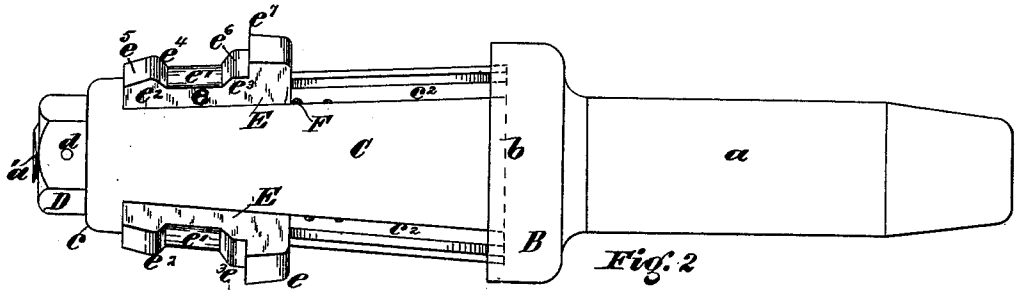


Fig. 2

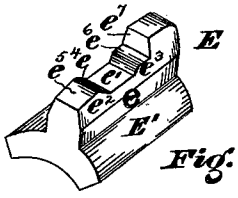


Fig. 5

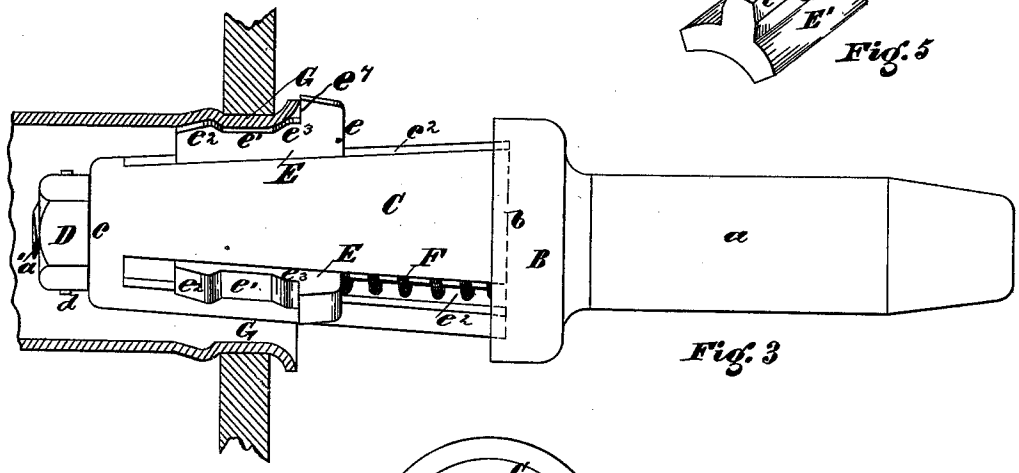


Fig. 3

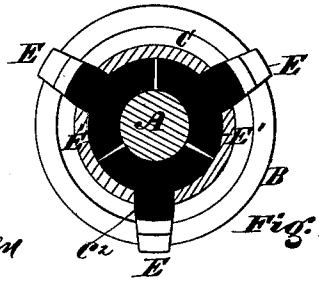


Fig. 4

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IMPROVEMENT IN TUBE EXPANDERS AND BEADERS.

Specification forming part of Letters Patent No. **220,651**, dated October 14, 1879; application filed August 7, 1879.

To all whom it may concern:

Be it known that I, ORESTES PAGAN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Tube Expanders and Beaders; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a longitudinal vertical section of my invention. Fig. 2 is a side elevation. Fig. 3 is a similar view, showing the tool inserted in the end of a tube, as is done in carrying my invention into practice. Fig. 4 is a vertical transverse section, and Fig. 5 perspective of one of the dies.

My invention has for its object to provide a tool for expanding and beading boiler-tubes which shall possess the following qualities or properties: first, simplicity of construction; second, capability of operating on two or more different sizes of tubes; third, competency to bead the tube both inside and outside the tube-sheet and complete the expansion at one operation; fourth, facility in changing the expanding and beading dies for different thicknesses of tube-sheets.

My invention consists in the novel construction, combination, and arrangement of parts, as hereinafter described and claimed.

Referring to the accompanying drawings, A designates a tapering mandrel having a handle, *a*, and threaded end a^1. B is a loose ring or collar surrounding the cylindrical portion a^2 of said mandrel, and formed with an annular groove, *b*. C is the die-cap, consisting of a conoidal shell having an open base which fits in the groove *b*, its apex being flattened to form an end, *c*, with central opening c^1, through which the end of the mandrel projects. D is a nut which screws on the end of the mandrel to hold the die-cap in place, a pin, *d*, being passed through said nut and mandrel to retain the former in position on the latter.

E E E represent the beading and expanding dies. Each die consists of a curved or segmental base-plate, E′, adapted to fit the mandrel A, with a radial rib or tongue, *e*, the ribs projecting, when the dies are in position, through longitudinal slots e^2 in the die-cap C. The ribs *e* are depressed at or about their middles, as shown at e^1, whereby shoulders or projections e^2 e^3 are formed on said ribs at either end thereof.

The upper surface of the shoulder e^2 consists of two inclines, e^4 and e^5, the former being straight and the latter curved. The surface of the shoulder e^3 has a curved incline, e^6, which terminates against an abrupt face, e^7.

F represents a spiral spring surrounding the mandrel A, between the collar B and dies E E E, the tendency of said spring being to force the dies outwardly or forwardly on said mandrel and to help to slacken the dies on the mandrel after each expansion.

The operation of the tool is as follows: The various parts being combined, as shown in the drawings, the tool is inserted into a tube sufficiently to bring the faces e^7 of the dies against the end of the tube. (Represented at G in Fig. 3.) Holding the tool in this position the butt or outer end of the handle *a* is struck by the workman with a hammer. The blow impels the mandrel inwardly, and, by reason of the taper of said mandrel, the dies E E E are spread radially, expanding and beading the tube, as plainly shown in Fig. 3, the expansion and beading, both inside and outside the tube-sheet, being accomplished at one and the same time.

To completely expand and bead a tube will, of course, require many successive strokes of the hammer, and between each stroke or at frequent intervals the tool should be turned, so as to cause the dies to act uniformly all around on the tubes.

For different thicknesses of tube-sheets the same tool may be used, new or different dies having the middle or expanding portion *e* of the required dimensions being employed.

It will be noted that the die-cap C is a mere shell, that it tapers correspondingly to the mandrel, and that the mandrel does not move through it lengthwise to expand the dies, as in other expanders. In this tool the mandrel and die-cap move together, the dies sliding on former and in slots of latter.

What I claim as my invention is—

1. The dies E E E, having segmental base.

plates E′, with radially-projecting longitudinal ribs *e*, substantially as shown and described.

2. The dies E, having segmental base-plates E′, with radial ribs *e*, depressed at their middles or expanding parts, and having beading-shoulders e^2 e^3, substantially as shown and described.

3. The combination of mandrel A, loose collar B, having groove *b*, and die-cap C with nut D and pin *d*, or equivalent fastening, substantially as shown and described.

4. The combination, with mandrel A, collar B, and radially-slotted die-cap C, of the segmental dies E, having the radially-projecting ribs *e*, substantially as shown and described.

5. The combination of mandrel A, having handle *a* and threaded end a^1, loose collar B, having groove *b*, die-cap C, fitted to said groove, having end *c* and longitudinal slots c^2 c^2 c^2, nut D, pin *d*, dies E E E, and spring F, substantially as shown and described.

6. The die-cap C, consisting of conoidal or tapering shell having end *c*, with opening c^1 and longitudinal slots c^2, substantially as shown and described.

7. The combination, with a mandrel, A, of a hollow shell, C, forming a die-cap, and fitted on said mandrel, substantially as described, whereby said mandrel and die-cap will move together when the mandrel is struck in operating the tool, as set forth.

8. The combination of a mandrel, A, a tapering slotted shell forming a die-cap, C, and dies E E E, to permit the shell and mandrel to slide, respectively, outside and inside of them, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of July, 1879.

ORESTES PAGAN.

Witnesses:

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