O. PAGAN.

TUBE-EXPANDER FOR BOILERS.

No. 193,275. Patented July 17, 1877.

Fig. 1

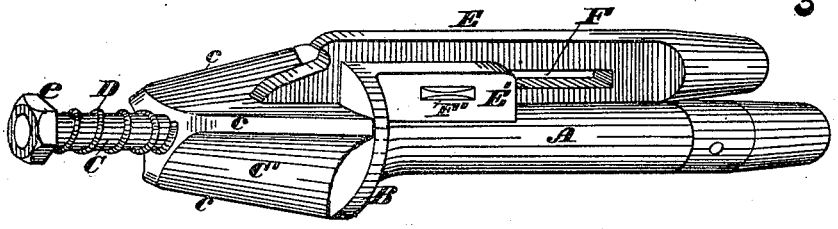


Fig. 2

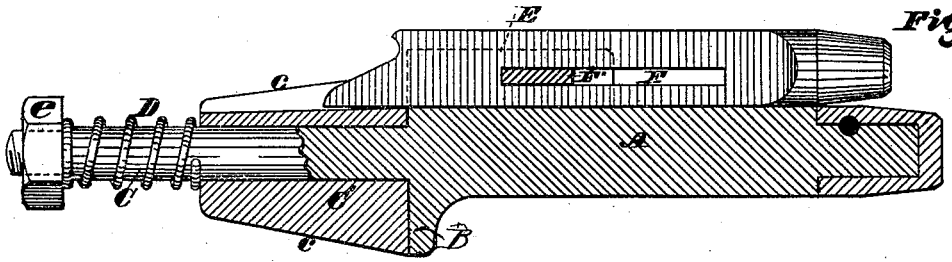


Fig. 3

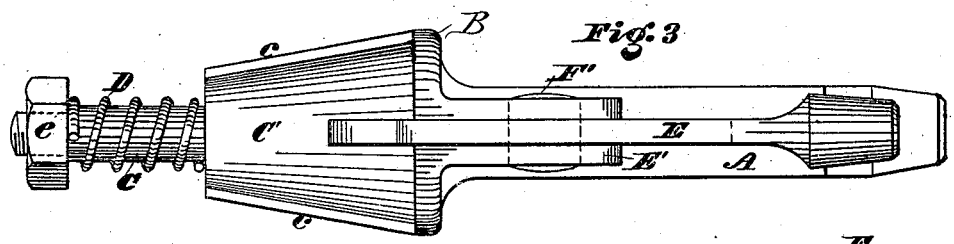
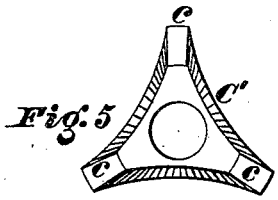


Fig. 5



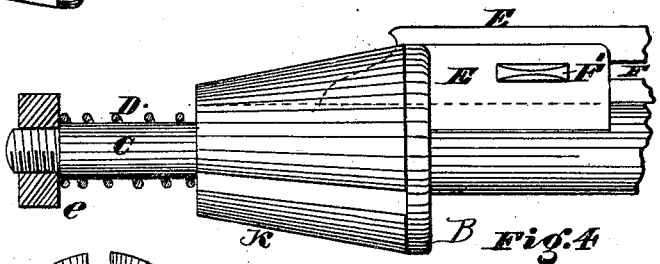


Fig. 4

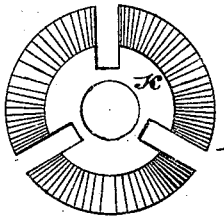


Fig. 6

Witnesses

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ORESTES PAGAN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN TUBE-EXPANDERS FOR BOILERS.

Specification forming part of Letters Patent No. **193,275**, dated July 17, 1877; application filed May 15, 1877.

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 Boiler-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 perspective of my invention. Fig. 2 is a longitudinal vertical section. Fig. 3 is a plan view. Fig. 4 is a broken side elevation. Figs. 5 and 6 are detail views.

In the operation of expanding and beading or flanging the ends of boiler-tubes it is a difficult matter, with the tools now in use, to give the bead or flange that uniformity of curvature and expansion which is essential to the production of a regular and complete flare and a strong and close seam.

The object of my invention is to overcome this difficulty; and to that intent it consists in the combination, with a tube-expander of novel construction, of a beading-chisel, by means of which the end of the tube may be properly struck and turned at points diametrically opposite those at which the expansion is effected, and while the expanding-head is tight within the tube.

My invention consists, furthermore, in having the expanding-head and the stock to which the beader is attached relatively adjustable, so as to admit of the requisite changes of position to effect the full expansion of the tube, as well as to allow the beading-chisel to be adjusted to several different points, while the head remains in the one position.

Referring to the accompanying drawings, A designates the stock of the combined expander and beader, having a shoulder at B, from the center of which extends the mandrel C.

C′ is the expanding-head, swiveled on the mandrel, and of a tapering prismoidal shape, having three or more radial wings, *c c*, &c. The edges of these wings are designed to come in contact with the inner surface of the tube, for the purpose of obtaining the requisite purchase and effecting the expansion, which is accomplished by striking on the end of the stock, in the usual way.

The end of the mandrel is threaded, and holds a nut, *e*, between which and the head C′ lies a coiled spring, D, for a purpose hereinafter explained.

The expanding-head is made tapering to enable it to operate as an expander, no other form being suitable, and to adapt it to tubes of different diameters.

E designates the beading-chisel, consisting of a bar of metal, located within the channel formed in a lateral enlargement, E′, of the stock A, below or behind the shoulder B. The chisel is adapted to move lengthwise through said channel, and is held in place by being longitudinally slotted at F, and having a key, F′, passed through said slot and through the enlargement E′. The shoulder B is radially recessed to allow the chisel to move.

The beading end of the chisel is scroll-shaped, as shown, to adapt it to its requirements, and to render it applicable in beading tubes of various diameters. The other end is enlarged to receive the blows of the hammer.

The operation of the tool is as follows: The head, being inserted in the end of the tube, is driven home by a blow on the end of the stock. The chisel prevents the stock from turning, its inner edge being in contact with the side of the head between two of the wings and diametrically opposite the third. A blow now upon the end of the beading-chisel drives its beading end against the edge of the tubes and starts the bead. The stock is then drawn outward, letting the head remain until the former may be turned and the chisel brought around to the next face of the head. After this a second blow of the beading-chisel is produced, and it is again turned, and the stroke a third time repeated. The head is now withdrawn, turned a little, and then driven back into the tube, causing a new expansion, after which the beading-chisel is again brought into requisition, and so on until the expanding and beading is completed. The spring serves to hold the stock up against the head.

K designates a modification of the expanding-head, in which the wings are made with wide faces, as shown, to adapt the head to the purposes of finishing off the work. This head

is to be substituted for the head first described, and after the same has been used.

Having described my invention, I claim—

1. The winged removable tube-expanding head, having a central aperture for the passage of the mandrel, substantially as described.

2. The combination of the stock A, having mandrel C and shoulder B, the spring D, with nut *e*, tube-expanding head C′, and beading-chisel E, substantially as described, and for the purpose set forth.

3. The combination of the stock A, having the shoulder B and lateral enlargement, with the mandrel C, substantially as described.

4. The slotted beading-chisel, adapted to a stock, A, having a lateral enlargement, E′, and key F′, substantially as described.

In testimony that I claim the foregoing have hereunto set my hand this 14th day of April, 1877.

ORESTES PAGAN.

Witnesses:

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SAML. J. VAN STAVOREN.