(No Model.)

A. L. HENDERER.

TOOL FOR EXPANDING THE ENDS OF BOILER TUBES.

No. 483,920. Patented Oct. 4, 1892.

FIG. I.

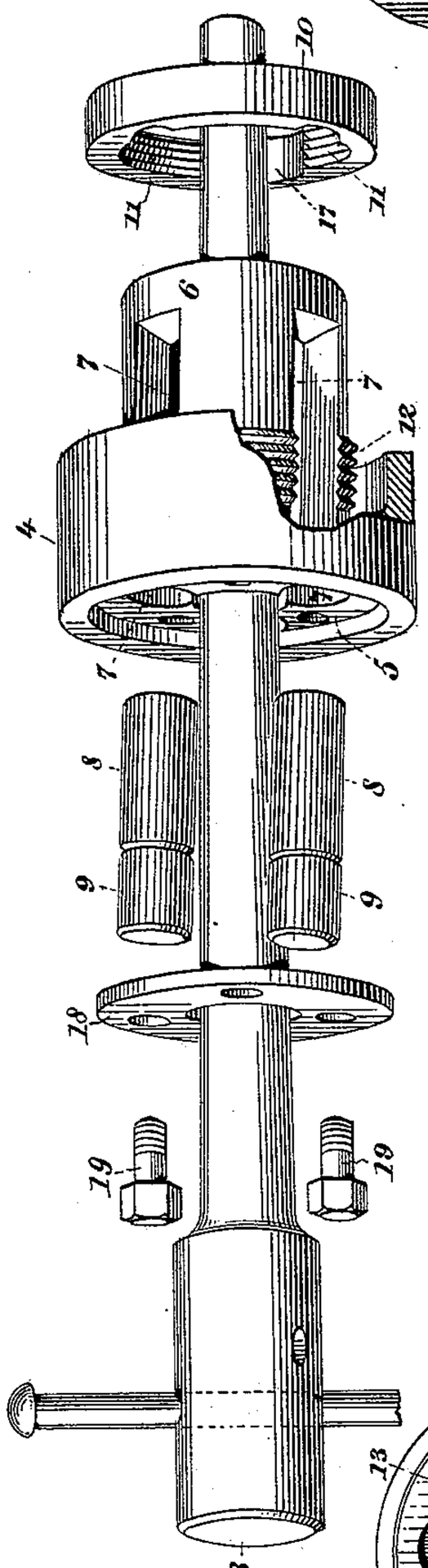


FIG. II.

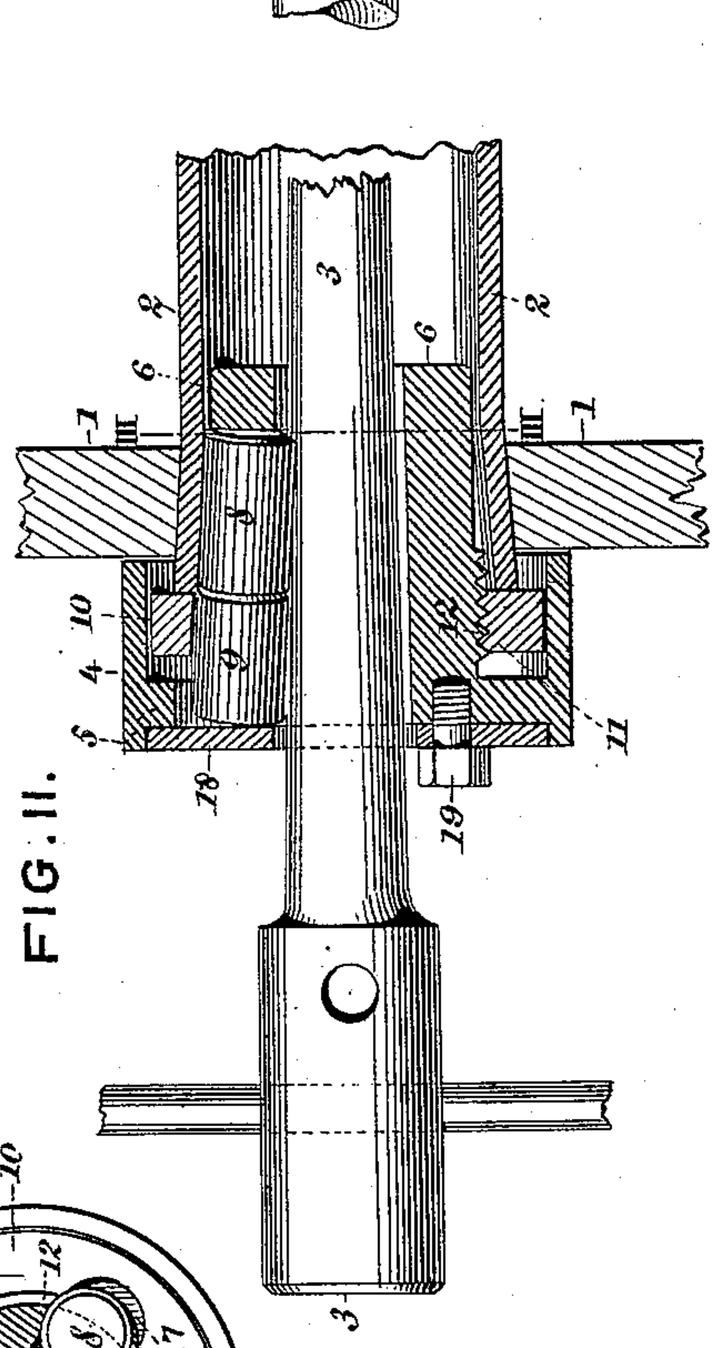


FIG. III.

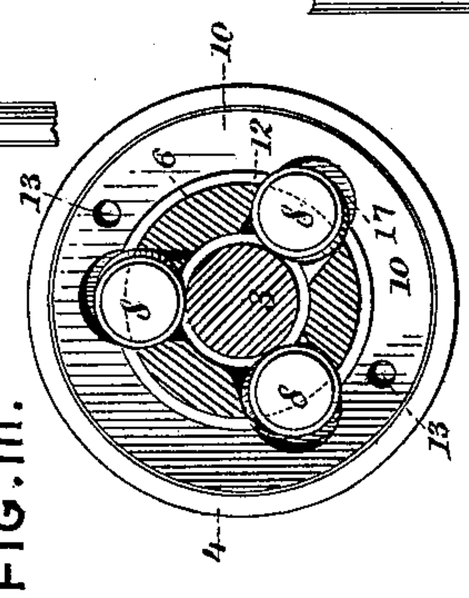


FIG. IV.

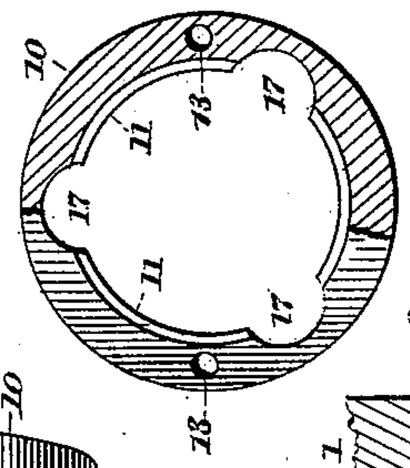
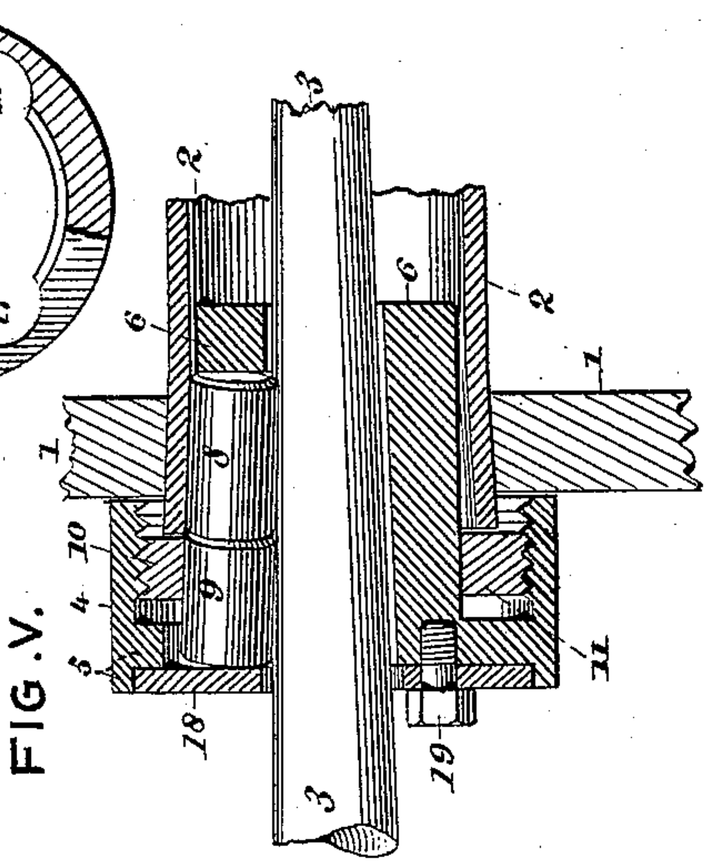


FIG. V.



WITNESSES:

Gustave Dieterich.

Geo. E. Crisp.

INVENTOR

Augustus L. Henderer

BY Brig Lee Bros

ATTORNEYS.

UNITED STATES PATENT OFFICE.

AUGUSTUS L. HENDERER, OF WILMINGTON, DELAWARE.

TOOL FOR EXPANDING THE ENDS OF BOILER-TUBES.

SPECIFICATION forming part of Letters Patent No. 483,920, dated October 4, 1892.

Application filed December 15, 1891. Serial No. 415,141. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS L. HENDERER, a citizen of the United States, residing at Wilmington, county of New Castle, State of Delaware, have invented a new and useful Tool for Expanding the Ends of Boiler-Tubes, of which the following is a specification.

My invention relates to an improvement in those instruments which being inserted in the ends of boiler-tubes are employed to expand the same, so as to fasten them in the tube-sheet; and my improvement relates more particularly to such expanding-tools in which a series of rollers are both revolved and gradually forced outward by the combined thrust and rotation within them of a conical distending pin or mandrel.

Referring to the accompanying drawings, which form a part of this specification, Figure I is a perspective view representing the members of my expanding-tool detached. Fig. II represents the tool in axial section. Fig. III is a section on the line III III, Fig. II. Fig. IV is a latitudinal section of the thrust and gage ring. Fig. V shows a modification of my stock and thrust and gage ring.

1 may represents part of a head-plate (tube-sheet) of a tubular boiler having the customary perforations for reception and retention of the ends of the boiler-tubes.

2 may represent a part of a boiler-tube.

3 may represent a long and tapering mandrel or drift-plug such as customarily employed in the class of boiler-tube expanders to which my invention pertains.

4 is the shell or guard ring, 5 the head, and 6 the hub or roller cage, preferably of one integral piece of cast-steel and constituting the stock. Three equidistant oblique slots 7 in said head and hub receive and hold and guide as many expanding-rollers 8, of cast-steel, and the same number of supporting-rollers 9. These rollers are capable of lateral movement toward and from the axis of the stock. These parts are so proportioned that when the mandrel is retracted to a position in which its thinnest portion is within the stock said rollers do not project beyond the periphery of the said hub and so that said rollers gradually project more and more through said periphery as the mandrel is forced by a combined thrusting and twisting action within the stock. (See Fig. II.)

The oblique presentation of the rollers is beneficial in several ways. For example, it invests them with a spiral traction that facilitates the penetrating action of the mandrel it tends to draw the tube firmly to its place in the tube-sheet, and on the mandrel being rotated reversely it facilitates its withdrawal from the completed work. In order, however, to prevent the tube being thus drawn too far out through the tube-sheet and to regulate the extent of its protrusion, I provide a thrust and gage ring 10, which has an internal screw-thread 11 to fit a corresponding screw-thread 12 on the hub 6. 13 are holes in said thrust-ring for a suitable screw-driver, whereby said ring can be set for any desired protrusion of the tube end beyond the tube-sheet. Coves 17 in the said ring afford room for the outthrust of the rollers. A cap 18, fastened by screws 19, serves to retain the rollers within the stock, or, being removed, affords ready access to and removal or substitution of rollers. The guard-ring 4 resting against the outer face of the tube-sheet and the thrust and gage ring bearing on the end of the tube, the group of obliquely-presented rollers and the conical mandrel, adapted to both thrust and revolve within said group of rollers, co-operate to expand the tube end in the manner stated.

The right is reserved to modifications not essentially departing from the above embodiment of my invention. For example, the thrust and gage ring may, as shown in Fig. V, be threaded on its external periphery and be screwed within the internally-threaded guard-ring. The supporting-rollers 9 may be omitted and the working rollers 8 be made long enough to occupy the slots 7 throughout their entire length.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

In a boiler-tube expander, the combination, with the thrustable and rotatable conical

mandrel 3, of the guard-ring 4, the head 5, and the hub 6, said head and hub having the series of equidistant oblique slots 7 and said hub having the peripheral screw-thread 12, the cylindrical expanding-rollers 8 and supporting-rollers 9 within said slots, and the thrust and gage ring 10, having the coves 17 and the thread 11 on its interior periphery, all as herein described and shown.

AUGUSTUS L. HENDERER.

Witnesses:
MYRON C. HENDERER,
HECTOR HANNAM.