

No. 704,520.

Patented July 15, 1902.

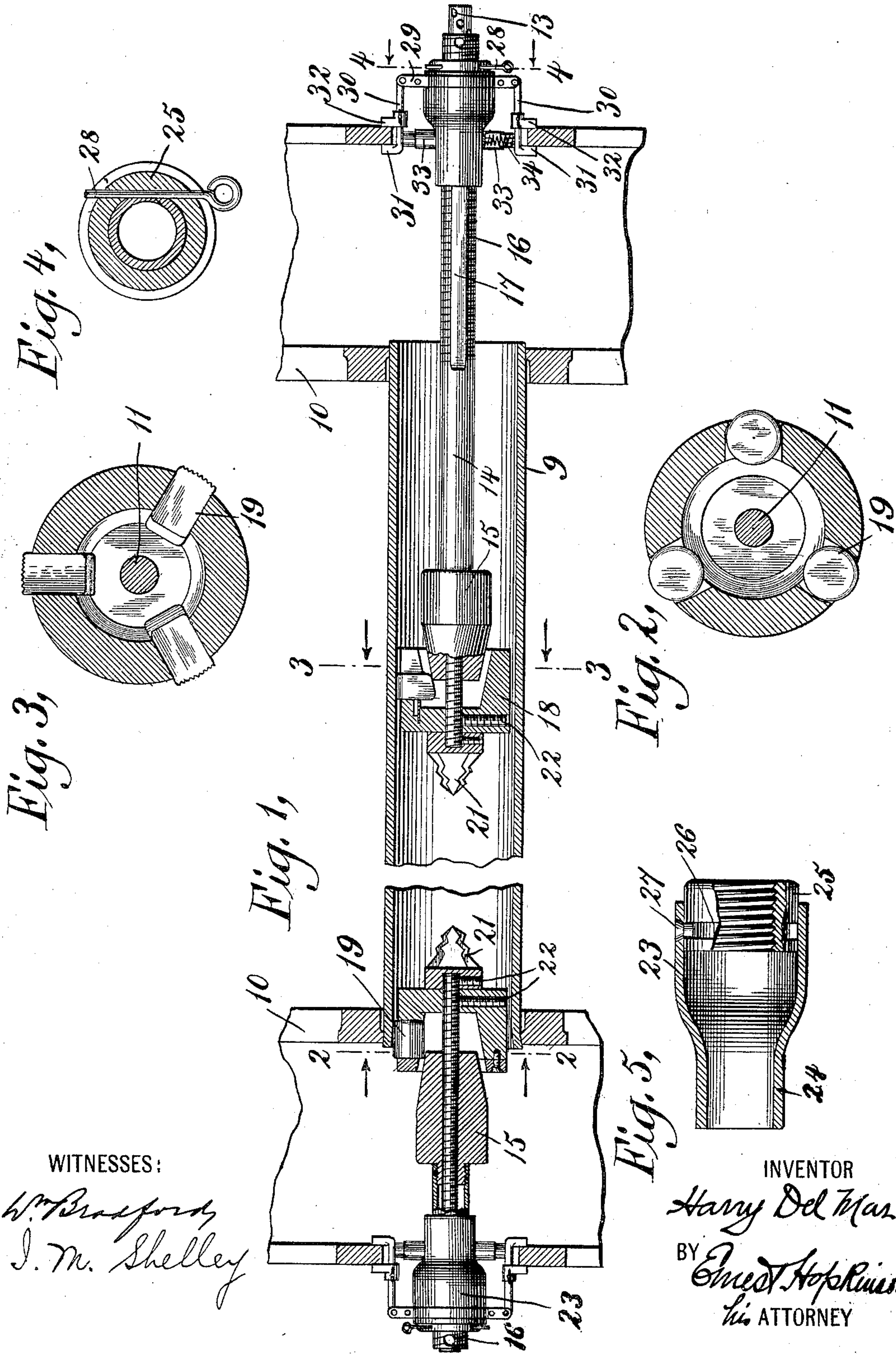
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TUBE CLAMPING, CUTTING, AND EXPANDING MACHINE.

(Application filed July 15, 1901.)

(No Model.)

2 Sheets—Sheet I.



WITNESSES:

*W. Bradford*  
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INVENTOR

*Harry Del Mar*  
BY *Ernest Hopkinson*  
his ATTORNEY

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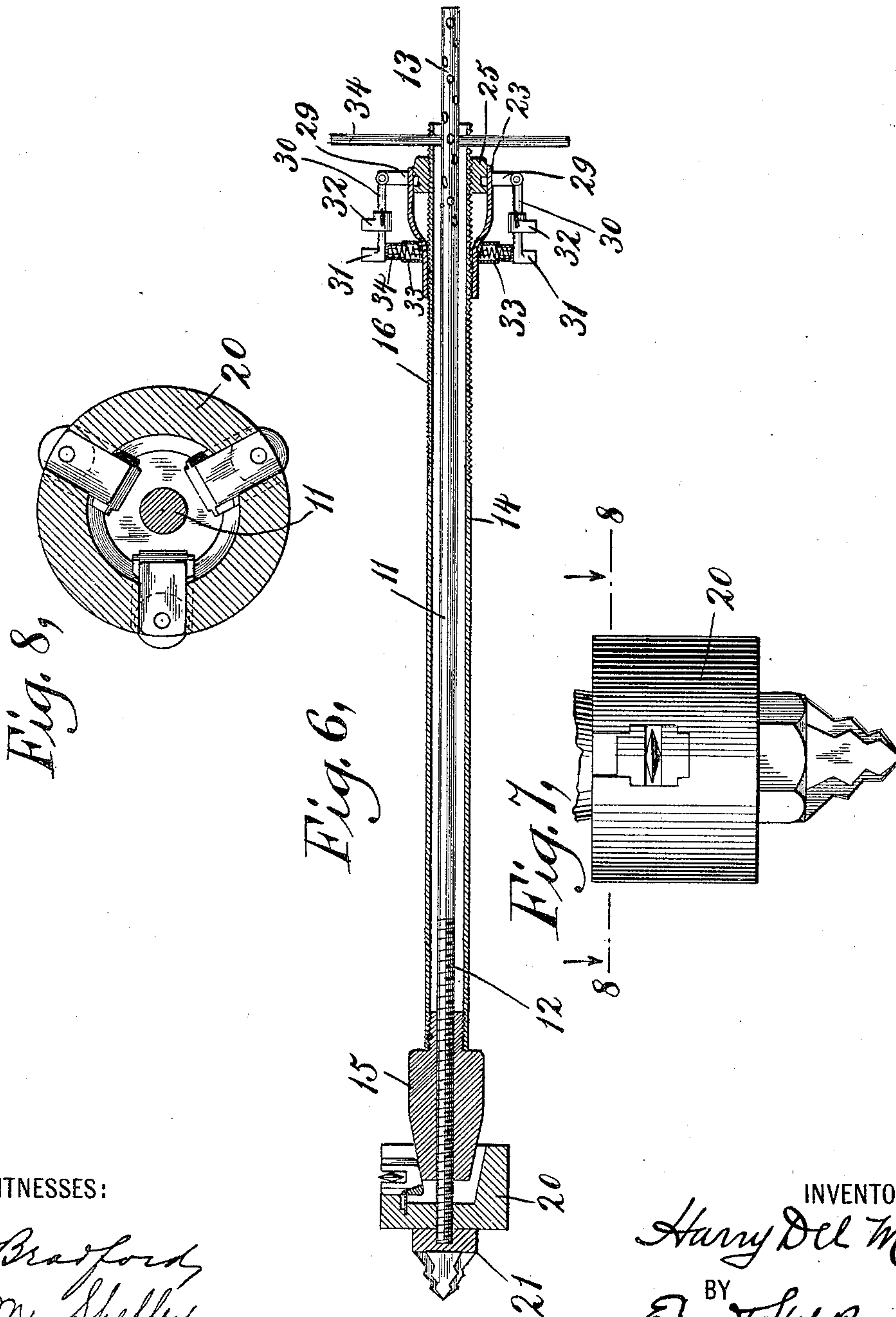
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# UNITED STATES PATENT OFFICE.

HARRY DEL MAR, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO  
EUGENE DEL MAR, OF NEW YORK, N. Y.

## TUBE CLAMPING, CUTTING, AND EXPANDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 704,520, dated July 15, 1902.

Application filed July 15, 1901. Serial No. 68,291. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY DEL MAR, a citizen of the United States, residing at No. 428 West One Hundred and Twenty-fourth street, borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Tube Clamping, Cutting, and Expanding Machines, of which the following is a specification.

10 The present invention relates to a device for operating upon boiler-tubes while in position in the boiler.

It has for its object to provide a device which may be adjusted to a predetermined position on a boiler-head and operate upon the inside of a tube to cut the same when it is desired to remove a tube and place a new one in position.

Also, it is a further object of the invention to provide such a device with means whereby when it is desired to insert a new tube it may be held in exactly the desired position in the boiler-heads and while in such position expanded.

25 In the drawings accompanying this specification I have illustrated a construction embodying the features of the present invention.

Referring to said drawings, Figure 1 is a view, partly in side elevation and partly in section, showing two devices embodying my invention, one of which is operating to hold a tube in the desired position while the other is expanding the end of the tube in the head of the boiler. Fig. 2 is a view taken along line 2 2 of Fig. 1 looking in the direction of the arrows. Fig. 3 is a view taken along line 3 3 looking in the direction of the arrows. Fig. 4 is a view taken along line 4 4 looking in the direction of the arrows, Figs. 2, 3, and 4 being drawn to a larger scale than that of Fig. 1. Fig. 5 is a detail view, partly in side elevation and partly in section, of a portion of the device. Fig. 6 is a general view, partly in side elevation and partly in central section, of the entire device. Fig. 7 is a plan view of the cutting devices, and Fig. 8 is a view taken along line 8 8 of Fig. 7 looking in the direction of the arrows.

Like letters of reference refer to like parts throughout the several views of the drawings.

Referring to said drawings in detail, 9 rep-

resents a tube which is shown as held in position between the two boiler-heads 10.

The device consists, generally, of what may be termed, first, a "bracket member"—that is, a member which is secured to one of the boiler-heads and affords a journal or bearing for the free end of the tool; second, an operating device—that is, one which operates to cut, expand, or clamp the tube—and, third, an actuating device, whereby the cutter, clamp, or expanding devices are operated.

Referring first to the actuating devices, these consist of the central rod 11, which at one end has a threaded portion 12 and at the other end is provided with pin-holes 13, and the tube 14, which carries at one end the tapered mandrel 15 and at the other end is provided with a threaded portion 16, this threaded portion being mutilated or provided with a flat face 17 for the purposes hereinafter described. The mandrel 15 has threaded through it the central rod 11, which projects beyond its end.

On the projecting end of the central rod 11 at the threaded end there is screwed the operating device—that is, the device which operates to either clamp, cut, or expand the tube. Any desirable form of construction may be used for this purpose, and therefore it will not be more particularly described in this specification except to say that whether the device carries cutters, expanders, or clamps the mandrel 15 operates when threaded forward on the rod 11 to expand them as the work requires.

In Fig. 1, 18 designates a clamping device, and 19 an expanding device, while in Figs. 6, 7, and 8, 20 designates a cutting device. It will be seen, however, that the construction is such as to permit of the interchangeability of these several devices on one actuating and adjusting tool.

21 designates a plow which is screwed on the extreme end of the rod 11 and is for the well-understood purpose of breaking up and cleaning out a passage through the deposit which may have formed on the inside of the tube. The operating devices and the plow may be secured on the end of the rod 11 by any desired means, set-screws 22 being illustrated for that purpose.

The bracket member consists of a sleeve 23,



having a contracted portion 24. At the wide end of this sleeve there is located a collar 25, provided with a circumferential groove 26, in which groove a pin 27 projects from the sleeve 23. This collar 25 is provided with threads on its inside engaging the threaded end of the tube 16, and is also provided with key-openings through which passes a key or feather 28, so that when the key is in position the tube 16 and collar 25 turn in unison. On the outside of the sleeve 23 project standards 29, each carrying at its end a pivoted arm 30, provided with a toe-piece 31 and a sliding clamp 32.

33 designates the telescoping tubes, each of which is provided with an internal coil-spring 34, these telescoping tubes projecting from the contracted portion of the sleeve 23 and abutting against the ends of the pivoted arms 30 to press them out against the openings in the boiler-head, as hereinafter described.

The method of operation of the device will be apparent. Assume it is desired to insert a new tube in a boiler. First, the tube is placed in approximately the desired position, with the ends resting in the openings in the boiler-heads, as illustrated in Fig. 1. The tool, associated and provided with a clamping device, is inserted in the interior of the tube, the bracket portion secured in the opening in the outer plate of the boiler-head, the pivoted arms 30 and telescoping springs 33 permitting of securing the bracket in openings of varying sizes. The clamps (referring now to the right-hand portion of Fig. 1) are expanded in the tube by taking out the pin 28 and threading the tube 16 through the collar 25, thus projecting the tapered end of the mandrel 15 under the clamping devices, pushing them outwardly and with great force against the inside of the tube. The tube is now held positively and may then be adjusted to exact position by passing an operating-pin 34 through the end of the tube 16 and the central rod 11 and turning both together through the collar 25 until the exact adjustment is obtained. When this is obtained, the key 28 is placed in position, locking the collar 25 and the tube 16 together. The tube being now held in position another device similar to the clamping device is inserted at the opposite boiler-head, except that the operating end of the tool is provided with expanders instead of clamps. Here the rotation of the expanders is effected by passing a pin through the tube 16 and the central rod 11 and turning them both together, the collar 25 being locked by the pin 28 to turn with the tube 16. When the limit of expanding effect has been produced by the rotation of the expanders and it is desired to still further expand, the central rod 11 and the tube 16 are disconnected by withdrawing the pin passing through the tool and by which they have been turned together and the outer tube 16 turned forward independently of the

central rod 11 and also independently of the collar 25, so that it is threaded forward and pushes the mandrel up farther under the expanders to obtain greater compression. The central rod 11, the tube 16, and the collar 25 are then locked to turn in unison and the expanders rotated again, the position of the mandrel being maintained.

When it is desired to cut out an old tube from a boiler, the same operations are gone through with regard to the adjustment of the devices and the rotation of the cutters and the pushing outward of the cutters by the mandrel, as has been described in connection with the expansion and clamping of the tube. Of course, however, in the case of cutting out an old tube no clamps will be necessary.

What is claimed as new is—

1. In a device of the character described, a supporting-bracket, means for securing said bracket positively to the boiler head or plate, said securing means consisting of collapsible and expansible clamping devices, substantially as specified.

2. In a device of the character described, a supporting-bracket, means for positively securing said bracket to the boiler head or plate, said means consisting of collapsible and expansible clamping devices, and means for adjusting the operating devices relatively of the bracket, substantially as specified.

3. In a device of the character described, a supporting-bracket, means for securing said bracket positively to the boiler head or plate, means for adjusting the operating devices relatively of the bracket, and means for turning the operating devices in fixed position relatively to the supporting-bracket, substantially as specified.

4. In a device of the character described, a central rod, a tool at one end of said rod, a mandrel, a supporting-bracket, means for securing said bracket positively to the boiler head or plate, a connection between the supporting-bracket and the mandrel, and means for turning the tool and mandrel independently or in unison, substantially as specified.

5. In a device of the character described, a central rod, a tool located at one end of said rod and provided with expansible devices, a tapered mandrel projecting under said expansible devices, a supporting-bracket provided with adjustable clamping devices, a tube passing through said bracket and carrying at its opposite end a mandrel, and means for turning the central rod with the tool carried thereon and the tube carrying the mandrel independently or in unison, substantially as specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HARRY DEL MAR.

Witnesses:

ROBERT TRUSLOW,  
I. M. SHELLEY.