# P. C. Rowe,

## Steam-Boiler Cleaner.

No. 54,962. Patented May 22, 1866.

Fig. 1.

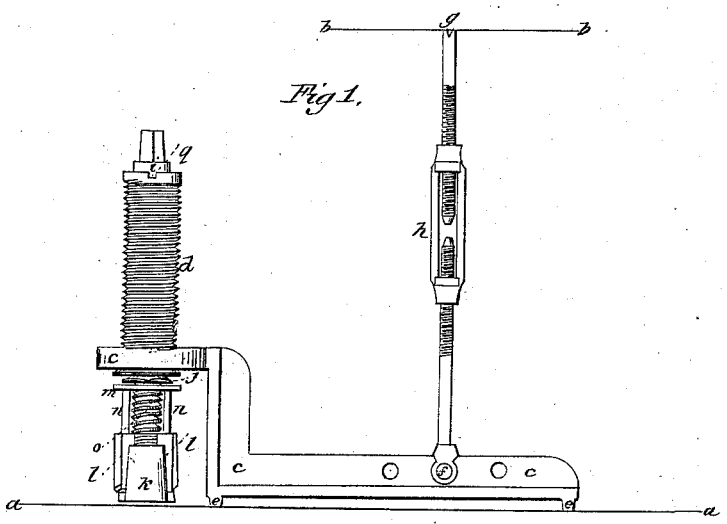



Fig. 2.

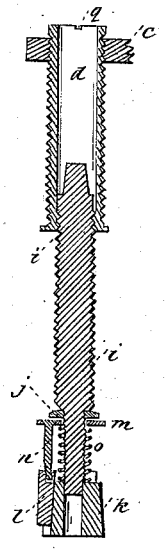



Fig. 4.

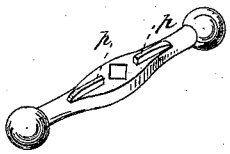
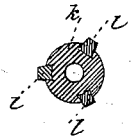



Fig. 3.




Witnesses.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN TOOLS FOR REMOVING SCALE IN BOILER-TUBES.

Specification forming part of Letters Patent No. **54,962**, dated May 22, 1866.

*To all whom it may concern:*

Be it known that I, PHILIP C. ROWE, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Apparatus for Removing Scale from the Interior of Boiler-Tubes; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

In that variety of steam-boilers which have vertical or nearly vertical water-tubes, some of which are known as "Martin's boilers," the tubes become coated on their interiors with a very hard scale, which is quite difficult of removal. Over such tubes in such boilers there is a water and steam chamber of height sufficient for removal and replacement of worn or leaky tubes, and it is in this chamber, which is usually of small height—say about four feet, more or less—that the apparatus must be worked to remove the scale from the tubes, the débris falling through the tubes into the space below the lower tube-sheet.

My invention relates to the combination, with the means for cutting or boring out the scale, of the devices herein shown for securing the cutter firmly in place over the center of any tube; also to the devices employed by which the height of the wrench or handle for applying power to work a cutter is brought near the upper tube-sheet, so that the apparatus can be conveniently worked by the operative in a sitting or kneeling position, instead of standing in a bent position; and to the detail of construction by which the cutters in the cutter-head are expanded or contracted, so as to fit the bore of any tube within reasonable limits.

Referring now to the drawings for a description of the construction and operation of my apparatus in detail, Figure 1 shows it, in side elevation, as clamped between the upper surface, *a a*, of the upper tube-sheet and the inner surface, *b b*, of the boiler-top. Fig. 2 is a vertical central section taken through the cutter-head and its feed-screws. Fig. 3 is a horizontal section taken through the cutter-head; and Fig. 4 is a perspective view of one of the wrenches by which the cutter is rotated and advanced or drawn back.

The piece *c* is formed, as shown in Fig. 1, with the threads of a nut cut therein at the end, through which the tubular screw *d* passes. On the piece *c* are projections or feet *e*, serving to clear the main part of *c* from rivet and stay heads and the projections of the ends of the tubes. To the piece *c*, between the feet *e e*, is pivoted the turn-buckle arrangement, clearly shown in Fig. 1, and having right and left hand screw-threads, so that the distance between the points *f* and *g* can be varied at pleasure by turning the piece *h*. It is evident that by this turn-buckle arrangement the whole apparatus can be clamped over any tube, the piece *c* resting on the tube-sheet *a a*, and being firmly held by the pressure exerted on the top of the boiler *b b*.

In the lower part of the screw-tube *d* is formed a nut fitting the screw-threads cut on the large part of the spindle *i*, said spindle having a square head adapted to receive an ordinary socket-wrench, with a shank long enough to run the spindle *i* into the position shown in Fig. 2, which shows the greatest downward extension of which the apparatus is capable, the tubular screw *d* being also shown as passed through its nut to its lowest position. The lower part of spindle *i* is reduced in size, as shown most clearly in Fig. 2, and has a screw-thread cut thereon on which works the nut *j*.

To the end of spindle *i* is fixed the cutter-head *k*, in which are dovetailed the cutters *l l l*, so that they can slide in the grooves in the head made to receive them. The bottoms of these grooves and the faces of the cutters in contact therewith are equally and relatively inclined with respect to each other, so that by longitudinal movements of the cutters in the head the size of hole which the cutter-head will bore can be varied, moving the cutters downward in the head increasing the diameter of the cut, while withdrawing them or moving them upward in the head decreases it. Each cutter *l* is connected with the disk *m* by a screw-bolt, *n*, tapped into the cutter, the bolt being left free to move in a suitable slot in the disk *m* as the cutters are moved outward or inward.

Between the head *k* and the disk *m* is the spiral spring *o*, which is compressed as the nut *j* is turned to force the disk *m* downward, and operating by its elasticity to draw back the cutters when the nut *j* is turned upward. By turning the screw-bolts *n* the cutters *l* are adjusted to cut a uniform diameter, after which

the size of the cut is regulated by the operation of the nut *j* and spring *o*.

To operate this apparatus, after it has been secured, as before described, with the center of the cutter-head in line with the axis of a tube, the wrench seen in Fig. 4 is placed on the square head of the spindle *i*, the parts being in the position shown in Fig. 1. As it is turned the spindle *i* rotates and descends within the tubular screw *d* till the projections *p* on the wrench drop into the notches *q* in *d*, when the tubular screw will turn, and, descending, will carry down with it the screw *i* until the top of *d* approaches the upper side of its nut. Then the wrench, Fig. 4, is removed and a socket-wrench is applied to the head of *i*, by turning which the remainder of the traverse and rotation needed to carry the cutter-head through the boiler-tube is obtained. The withdrawal of the cutter-head from the boiler-tube is effected in a sufficiently obvious manner by reverse rotation of the two screws *i* and *d*.

For clearing out the side, end, and corner tubes, an arrangement of a ratchet-wrench is to be applied to the screws *i* and *d*.

The nut in which the screw *d* works, instead of being a part of the piece *c*, may be pivoted thereunto, or may be hung in gimbals attached to the piece *c*, the object of this being to let the borer follow freely the bore of the tubes, and to save the time needed for the exact alignment of the axes of the feeding-screws with the axes of the tubes.

I claim—

1. In combination with a cutter-head, the tubular screw *d* and its internal screw, *i*, arranged to operate substantially as described.

2. In combination with the piece *c*, supporting the nut for the screw *d*, the turn-buckle clamping device, substantially as set forth.

3. The construction and arrangement of the parts described, by which the cutters of the head are adjusted, substantially as specified.

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