No. 647,676. Patented Apr. 17, 1900.

H. LAVERACK.

MEANS OR APPARATUS FOR CLEANING TUBES OF TUBULAR BOILERS.

(Application filed Sept. 25, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

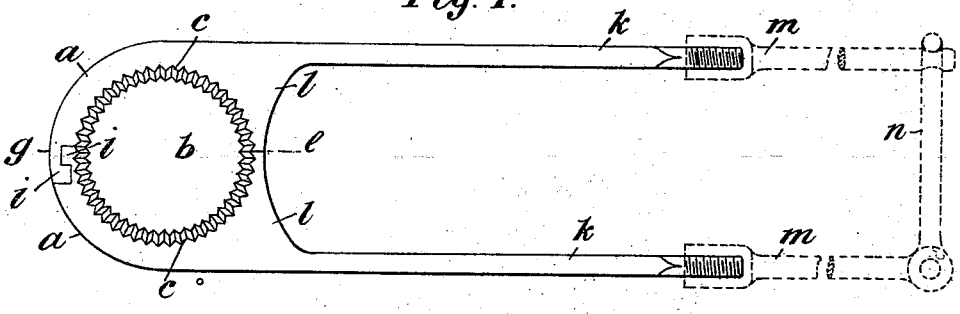


Fig. 2.

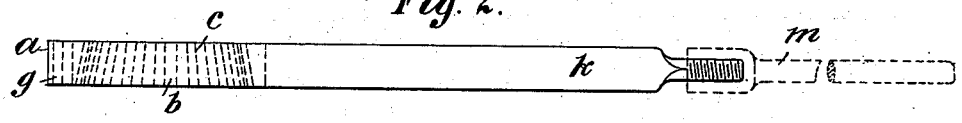


Fig. 3.

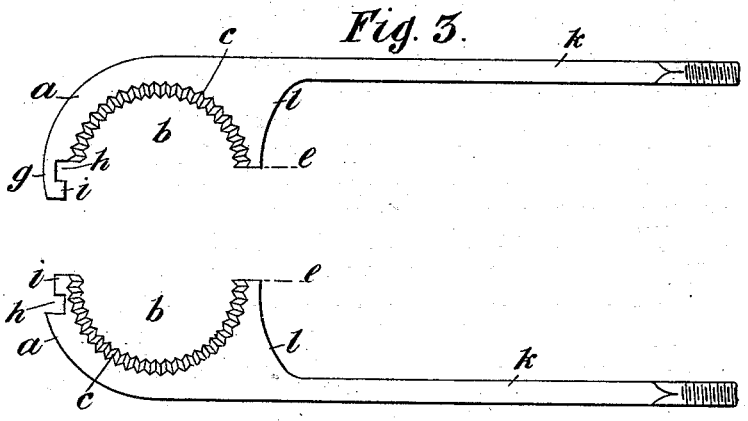
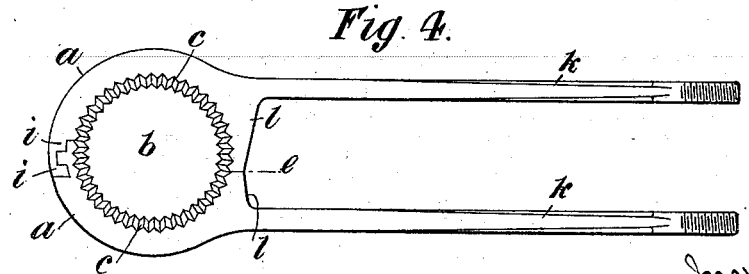


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

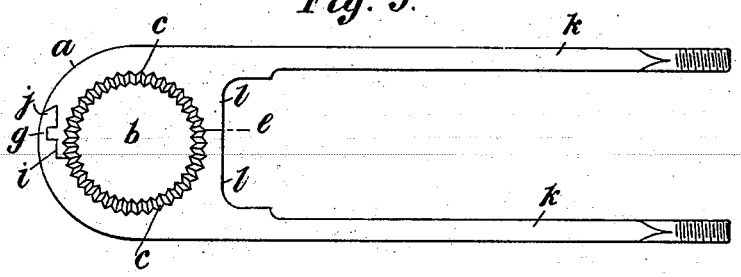


Fig. 8.

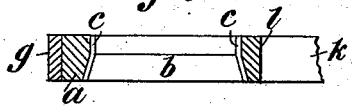


Fig. 6.

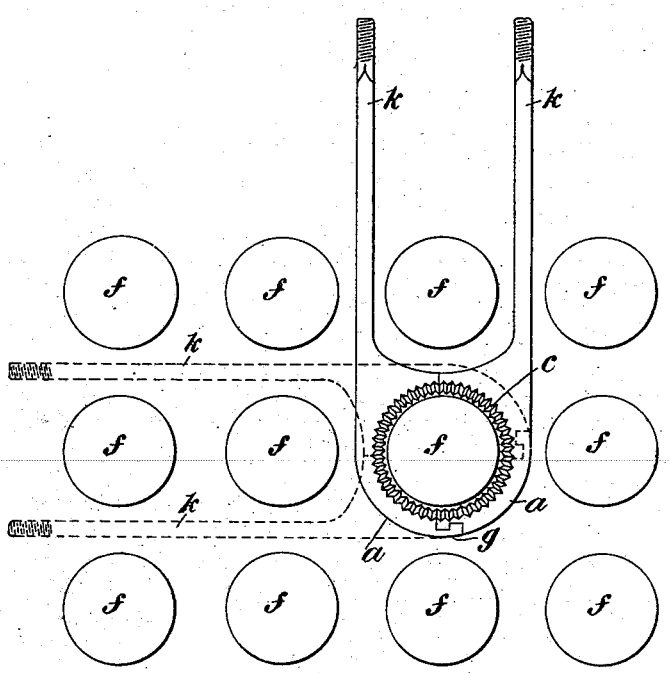


Fig. 7.

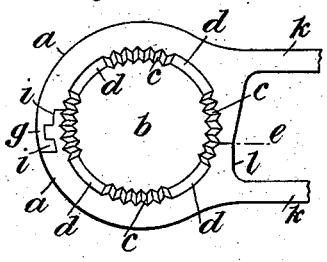
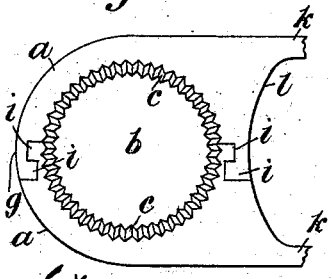


Fig. 9.



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UNITED STATES PATENT OFFICE.

HENRY LAVERACK, OF ARMLEY, ENGLAND, ASSIGNOR OF ONE-HALF TO WILLIAM FOX, OF LEEDS, ENGLAND.

MEANS OR APPARATUS FOR CLEANING TUBES OF TUBULAR BOILERS.

SPECIFICATION forming part of Letters Patent No. 647,676, dated April 17, 1900.

Application filed September 25, 1899. Serial No. 731,619. (No model.)

To all whom it may concern:

Be it known that I, HENRY LAVERACK, a subject of the Queen of Great Britain and Ireland, residing at 20 Far Fold, Armley, near Leeds, in the county of York, England, have invented new and useful Improvements in or Relating to Means or Apparatus for Cleaning the Tubes of Tubular Boilers, of which the following is a specification.

This invention relates to improvements in means or apparatus for cleaning or removing deleterious matter, such as scale, from the exterior of the tubes of, say, a marine or other tubular boiler.

The object of the present invention is to provide a tool of simple construction that will more readily and quickly clean the tubes of tubular boilers than by usual and ordinary means now employed.

In the drawings hereunto annexed, Figure 1 is an elevation of a tool constructed according to this invention; Fig. 2, a plan of same; Fig. 3, an elevation of the tool shown at Fig. 1 with the portions thereof shown asunder. Figs. 4 and 5 are elevations of tools with modified forms for interlocking the parts together; Fig. 6, a diagrammatic view showing the application of the tool to the tube of a boiler; Fig. 7, an elevation of the head of tool, showing the teeth arranged in groups; Fig. 8, a sectional plan of head of tool with a part-parallel and partly-tapering hole formed therein; Fig. 9, an elevation of head of tool with double interlocking device.

Like parts in all the views are marked with similar letters of reference.

The tool is made, as shown, say, tong-shaped and of metal, such as, say, wrought iron or steel. Its head or principal portion, hereinafter termed the "head *a*," is made in, say, two parts arranged to be hooked or otherwise interlocked together, as hereinafter described, to enable it the more readily to engage with and embrace the tube of the boiler to be cleaned.

In the head *a* of the tool, which may be of any required width, is cut, formed, or otherwise provided a circular or other shaped tapering hole *b*. A circular tapering hole is shown in the drawings. If desired, a parallel hole or parallel for a portion of its length and tapering for the remainder of its length, as at Fig. 8, may be used in place of a tapering one; but in practice it has been found that a tapering hole allows the tool to get more readily to its work. The periphery or wall of the hole *b* is provided with a number of serrated or ratchet-like teeth *c* for removing the scale. The teeth *c* may be arranged either entirely around the periphery of the hole *b* at the same pitch or varying pitches apart or in a group or groups at the same or irregular distances apart.

In the drawings at Figs. 1, 4, 5, and 9 the teeth *c* are shown entirely around the periphery of the hole *b* and at the same pitch; but when the teeth *c* are made in a group or groups, as at Fig. 7, there will be a space *d* between the groups or between the ends of a single group extending from the root or lower portion of the tooth—that is to say, the space thus left will be of larger diameter than at the top of the teeth *c*.

When the tool is made of wrought iron or steel and the teeth *c* having been formed in the hole *b* in the head *a*, the latter is hardened or tempered by ordinary means and in the usual manner. The tapering hole *b* is made at its smallest diameter about, say, the same size as or slightly larger than the original diameter of the tube to be cleaned, while the larger diameter of the said hole may be, say, half an inch (more or less, as occasion requires) larger than the diameter of said tube for the purpose of more readily gripping and removing the scale or other impurity adhering to the outer periphery of the said tube. This also admits of the tool being used upon tubes which vary slightly in diameter.

The head *a* of the tool is shown divided into two portions. The division-line *e* is shown at Figs. 1 and 5 about equidistant from the outer edges of the head of the tool; but at Fig. 4 the division-line is shown nearer to one edge than the other. On reference to the drawings it will be seen that the division-line on the right-hand side of each view, except at Fig. 9, is in the form of a straight horizontal line, while at the left hand thereof it takes an irregular course according to the contour of the interlocking device which is formed thereby. The position of the division-line,

as well as the form of the same and of interlocking device to be used, varies according to circumstances—such as, for example, say, size of tube to be cleaned and the distance between or pitch of the said tubes; but in all cases it is essential that the division-line *e* should be so arranged that only about, say, one-half of the hole *b* should be included in each portion of the head *a*. Otherwise difficulty may be experienced in getting the tool into position on a tube *f*.

g is an example of interlocking arrangement which has by experiment been found suitable for holding the parts of the tool together when placed in position on the tube *f*, as shown at Fig. 6. At Figs. 1 to 4 the interlocking arrangement is shown to consist of a recess *h*, Fig. 3, and a hooked projection *i*, Fig. 3, formed in each portion of the head *a*, (by the course of the division-line,) and which are made respectively to fit loosely into each other when the two parts of the tool are placed together upon a tube, as at Fig. 6—that is to say, the hooked projection *i* of one portion is made to fit loosely into the recess *h* of the other portion, as shown at Figs. 1 and 4; but for, say, larger sizes of tools an extra dovetail *j* may be provided on one of the parts, as shown at Fig. 5, which is made to fit loosely into a correspondingly-shaped recess of the other part. Dovetails may also be provided on each portion of the head *a*, as well as the number of recesses and projections may be increased as occasion requires. In the drawings square-shaped recesses *h* and hooked projections *i* are shown; but these may also vary in their configuration as may be required or desired.

Each portion of the head *a* of the tool is provided with an extending arm *k* of a suitable length, with an inner projection *l* formed thereon, and which is also a part of the head *a* in which a portion of the tapering-hole *b* is formed. The space between the arms *k* should be always greater than the diameter of the tube to be cleaned or scaled to permit of the free oscillation of the head *a*. The said inner projections vary in length or size, according to the position of the division-line *e*, and they answer the double purpose of providing means for the complete formation of the said tapering hole as well as allowing of the arms *k* being kept at such a distance apart so that not only may one or more tubes pass between them, but there is also space to oscillate or work the head *a* of the tool backward and forward on the tube *f* it is made to embrace for cleaning purposes.

If desired, a similar form of interlocking arrangement to that shown at *g* may also be additionally provided in or on the projections *l*, as shown at Fig. 9, for retaining the portions of the tool in position on the tube; but for the majority of cases one set of interlocking parts formed at the point shown in the drawings will be found to be sufficient.

Means, if desired—such as, say, a hook or link *n*, (shown in dotted lines at Fig. 1)—may or may not be employed for holding the outer ends of the extending arms together when the head portion *a* is made to clasp or clamp the tube for cleaning purposes.

The extending arms *k* may each be provided with a number of lengthening-pieces *m*, (shown in dotted lines,) screwed or otherwise fixed thereto or arranged, say, telescopically therein or thereon. The number of lengthening-pieces will vary with the number of rows of the tubes in the boiler. By this means the tubes in, say, the middle and lower rows may be as easily and readily cleaned as those in, say, the upper row.

On reference to Fig. 6 it will be seen that the tool can be used equally in a horizontal position (shown in dotted lines) as in a vertical position, which is shown in full lines. The two portions of the tool are placed separately in position on the tube, and after being moved in a horizontal direction for causing the parts forming the interlocking device to mesh together the tool is then made to embrace or clamp a tube *f*, and by rocking or oscillating the tool on a tube *f* the scale will be easily removed.

Having now described the nature of my said invention, what I claim, and desire to secure by Letters Patent, is—

In apparatus for cleaning the tubes of tubular boilers, the combination of a head divided into two parts, a hole as described in the center of said head armed with teeth, the means described arranged in opposite portions of said head for interlocking its two portions together and clamping them onto a tube to be cleaned, arms for oscillating purposes extending from said head with a space between them, and lengthening-pieces adapted to be fixed onto said extending arms, all as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY LAVERACK.

Witnesses:

ANNIE PARK,

WILLIAM SADLER.