(No Model.)

J. L. LOCKHART.

MACHINE FOR REMOVING INCRUSTATION FROM BOILER TUBES.

No. 589,551. Patented Sept. 7, 1897.

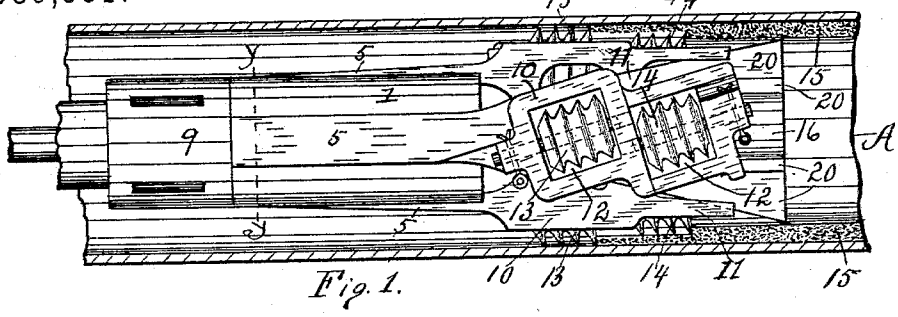


Fig. 1.

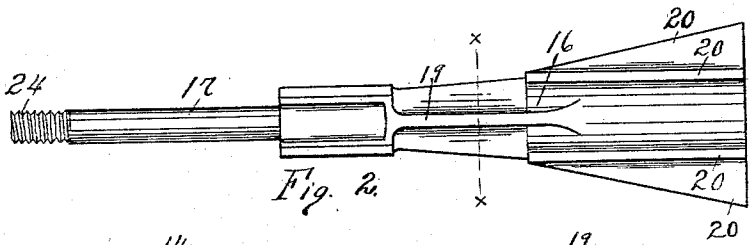


Fig. 2.

Fig. 3.

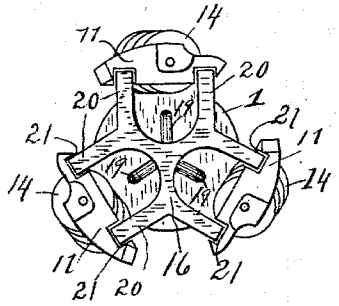


Fig. 4

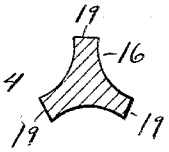


Fig. 6.

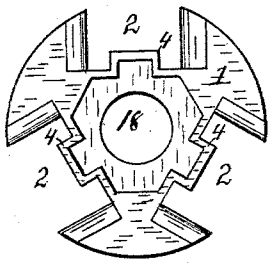


Fig. 5.

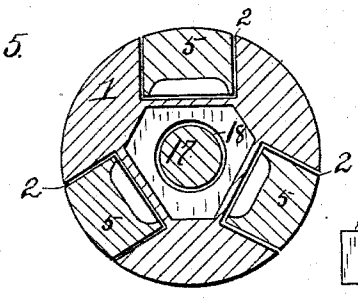


Fig. 7.

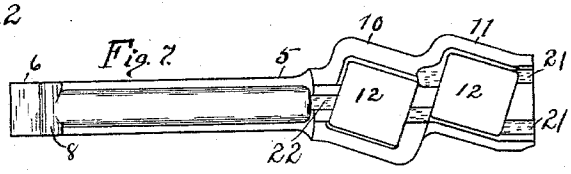
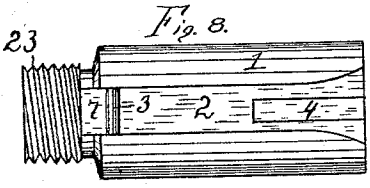


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES L. LOCKHART, OF BELLEFONTAINE, OHIO.

MACHINE FOR REMOVING INCRUSTATION FROM BOILER-TUBES.

SPECIFICATION forming part of Letters Patent No. 589,551, dated September 7, 1897.

Application filed May 22, 1897. Serial No. 637,806. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. LOCKHART, a citizen of the United States, residing at Bellefontaine, in the county of Logan and State of Ohio, have invented certain new and useful Improvements in Machines for Removing Incrustations from Boiler-Tubes; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the figures and letters of reference marked thereon, which form a part of this specification.

My invention relates to machines for removing scale or incrustation from boiler-tubes, and is an improvement of the boiler-tube cleaner shown and described in United States Letters Patent No. 564,932, granted to myself July 28, 1896.

The object of the present invention is to increase the capacity of the machine by making it capable of removing, say, about one-third more of incrustation in a given distance of travel as compared with the tube-cleaner specified in said patent.

A further object of said invention is to dispense with the guide-rollers by providing an extra set of cutters, which, in addition to performing the function of an extra cutter, also causes an equalization of the pressure on three sides of the machine, whereby it is maintained in a central position in the tube without the use of guide-rollers.

In a detailed description of the invention reference is made to the accompanying drawings, in which—

Figure 1 is a horizontal mid-sectional view of a portion of a boiler-tube, showing the machine therein in longitudinal elevation. Fig. 2 is a longitudinal elevation of the spreading-bar, detached. Fig. 3 is an end elevation of the machine, looking from the right on Fig. 1. Fig. 4 is a cross-section through the spreading-bar on the line $x\ x$, Fig. 2. Fig. 5 is a cross-section on the line $y\ y$, Fig. 1. Fig. 6 is an end elevation of the head of channel-bar. Fig. 7 is an elevation of one of the spreading-bar jaws, showing the inner side thereof. Fig. 8 is a longitudinal elevation of the head or channel-bar.

Similar reference-characters indicate corresponding parts.

1 designates the supporting-head or channel-bar, having three longitudinal channels 2 in the sides thereof at equal distances apart. One end of each of said channels has a transverse rib 3 and in the other end of each of said channels there is a raised portion or guide-rib 4.

5 designates a movable jaw, of which there are three mounted in the bar 1 in the channels 2. The extreme outer ends of these jaws terminate in reduced portions 6, that project into a recess 7 in the extreme outer end of said head 1, and which are separated from the channels 2 by transverse channels 8, that receive the ribs 3, so that said jaws may lie in the channels 2. The extreme ends 6 are inclosed by a collar 9, which is screwed onto the end of the head 1. This attachment or confinement of the jaws is not rigid, but is of such a character that the jaws may be opened or spread apart and be prevented from becoming detached from the head 1. The other end of each of said jaws terminate in enlarged parts 10 and 11, the former of which is raised or projects outwardly beyond the plane of the latter. These parts of the jaws have each a rectangular opening 12 entirely through the metal and on an angle to the longitudinal center of the jaws, substantially as shown. Mounted in said openings are two sets of rotary cutters 13 and 14, that conform to the positions of the openings, one set of said cutters—to wit, that set which occupies the inner position—being in advance of the other by reason of the variance in the thickness of the parts 10 and 11. One of said cutters occupies an inner plane and is designed to remove a portion only of the scale. The shafts in which the cutters are mounted are journaled, as shown in Fig. 1.

15 designates a lining of hard scale or incrustation adhering to the inner side of the boiler-tube A. As the machine advances the front cutters remove a portion of this scale, as hereinbefore stated, and the rear cutters following remove the remainder, substantially as described in my former patent.

16 designates a spreading-bar, the inner cylindrical stem 17 of which is loosely inclosed in a central opening 18 through the

head 1 and the outer portion of which is inclosed between the outer enlarged ends of the jaws 5. Projecting from said outer portion of the spreading-bars are a series of ribs 19 and 20, which provide a sliding surface and form guides for the inner and outer movements. It will be noted that these ribs taper inwardly from their outer extremities, and also that the outer ends of the inner ribs 19 terminate where the inner ends of the outer ribs 20 end. The object and purpose of this construction is to provide a bearing for the jaws throughout their entire forward travel, and by terminating the inner ends of the outer ribs 20 on a lower plane than the outer ends the jaws are permitted to come closer together than in my former patent. I am therefore enabled to cut through a thicker scale with my present invention.

As seen in Figs. 3 and 8, the ribs enter grooves or channels 21 and 22 on the inner sides of the jaws and provide bearings at the inner and outer ends of the portion of the jaws in which the cutters are mounted and upon which portions the greatest amount of strain takes place when the machine is in operation. It will be seen, therefore, that the peculiar construction of the spreading-bar is an important feature of the present invention. The outer ends of the head 1 and the spreading-bar are provided with exterior screw-threads 23 24 for the attachment of the means for operating the machine shown in my former patent.

Having described my invention, I claim—

1. In a boiler-tube cleaner, the combination with a head having three longitudinal channels in the sides thereof at equal distances apart, of movable jaws mounted in said channels, two series of rotary cutters mounted in the outer end of each of said jaws on angles to the longitudinal center of said jaw, and a spreading-bar mounted in said head and inclosed between said jaws, the outer end of said spreading-bar being provided with two series of inclined ribs which afford said jaws a bearing whether in their extreme inner or outer positions, or at any intervening point of their expansion, substantially as shown and described.

2. In a boiler-tube cleaner, the combination with a head, and a plurality of movable jaws mounted therein, each of which has two series of rotary cutters mounted therein at angles to the longitudinal centers of said jaws, of a spreading-bar mounted in said head, and inclosed between the jaws, the portion of said spreading-bar inclosed by the jaws being provided with a front series of ribs and a rear series of ribs, the front series terminating where the rear series begins and both of said series of ribs being on a slant toward their inner ends, whereby there is a gradually-inclining bearing-surface for said jaws throughout approximately one-half the length of the spreading-bar, so that a substantial range of movement may be imparted to the jaws, as herein shown and described.

3. A boiler-tube cleaner comprising a head having three channels in its sides, a corresponding number of jaws mounted in said channels, and maintained therein by a collar, the said jaws being provided with grooves 21 and 22 on their inner sides, two series of rotary cutters mounted in each of said jaws on angles to the longitudinal centers of said jaws, one of said series of cutters projecting outwardly beyond the other, and a spreading-bar provided with two series of ribs 19 and 20 adapted to enter the grooves 21 and 22 on the jaws, the said ribs providing a gradually-inclined bearing for said jaws, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES L. LOCKHART.

Witnesses:

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R. J. MCCARTY.