(No Model.) 2 Sheets—Sheet 1.

D. P. ANTHONY.

APPARATUS FOR REMOVING INCRUSTATION FROM BOILER TUBES.

No. 525,177. Patented Aug. 28, 1894.

Fig. 1.

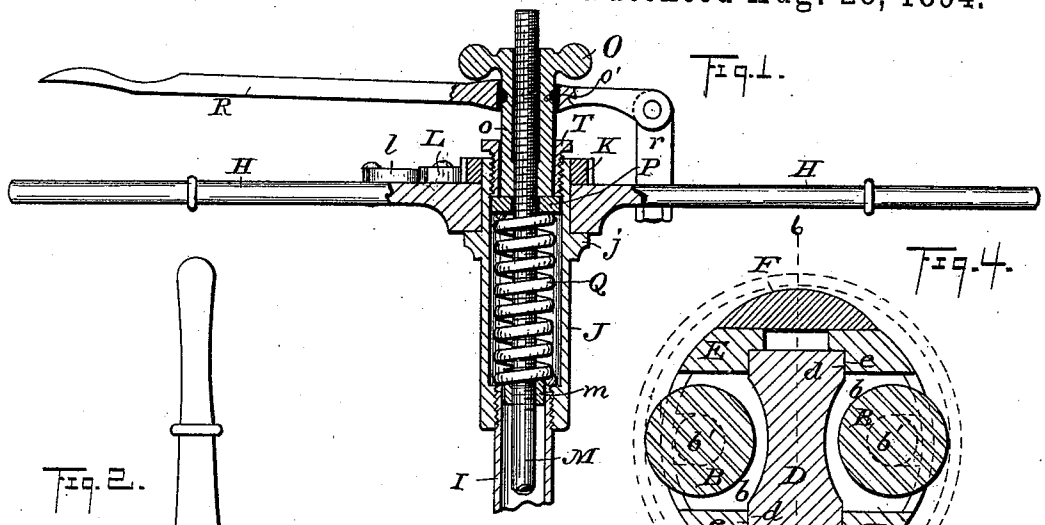


Fig. 2.

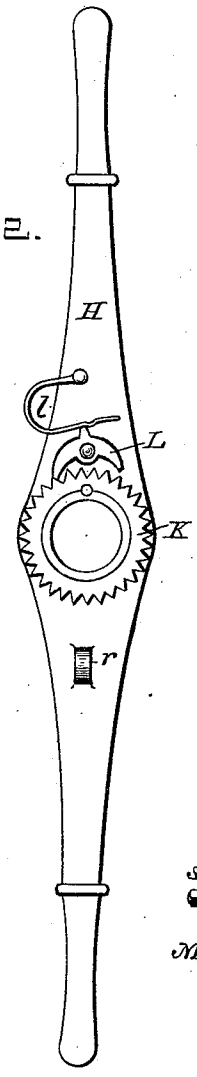


Fig. 3.

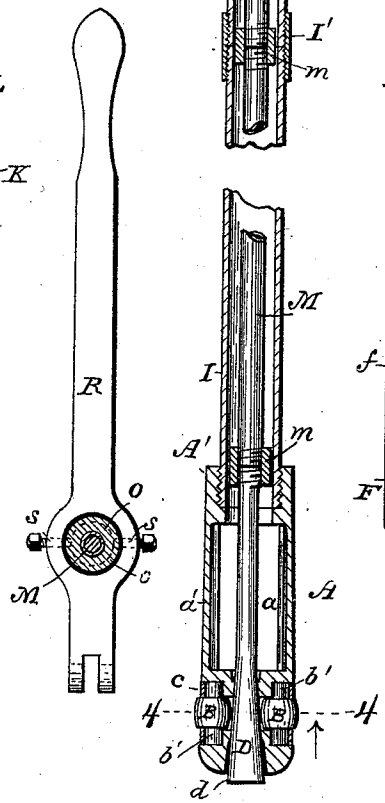


Fig. 4.

Fig. 5.

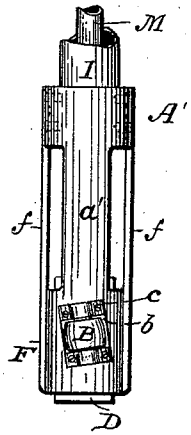
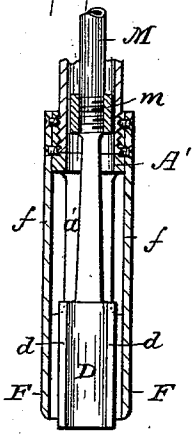


Fig. 6.



Witnesses
Belle S. Lownie.
Cornelia A. Skinkle

Inventor
Daniel P Anthony
By his Attorney
Wm A. Skinkle

THE MORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

D. P. ANTHONY.

APPARATUS FOR REMOVING INCRUSTATION FROM BOILER TUBES.

No. 525,177. Patented Aug. 28, 1894.

Fig. 7.

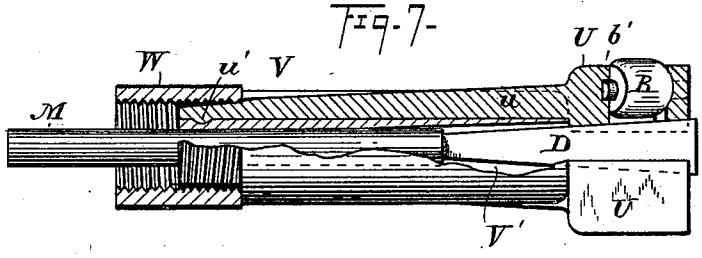


Fig. 8.

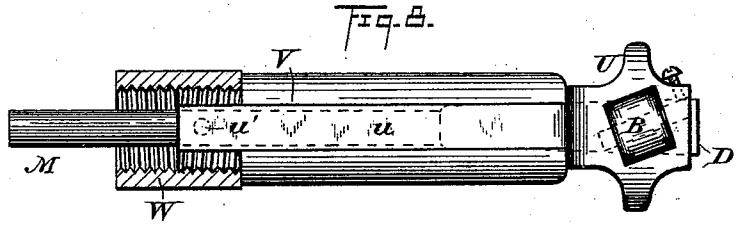


Fig. 9.

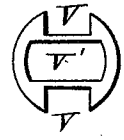


Fig. 10.

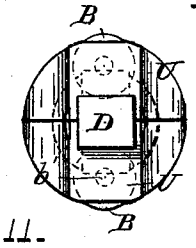
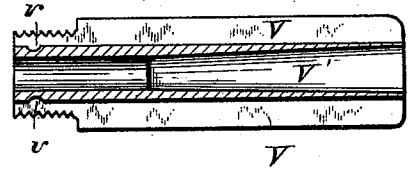


Fig. 11.



Witnesses
Belle A. Lourie.
Cornelia A. Skinkle

Inventor
Daniel P. Anthony
By his Attorney
Wm. A. Skinkle

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DANIEL P. ANTHONY, OF TECUMSEH, MICHIGAN.

APPARATUS FOR REMOVING INCRUSTATION FROM BOILER-TUBES.

SPECIFICATION forming part of Letters Patent No. 525,177, dated August 28, 1894.

Application filed February 13, 1893. Serial No. 462,013. (No model.)

To all whom it may concern:

Be it known that I, DANIEL P. ANTHONY, a citizen of the United States, residing at Tecumseh, in the county of Lenawee and State of Michigan, have invented certain new and useful Improvements in Apparatus for Removing Incrustation from Boiler-Tubes, of which the following is a specification, that will enable those skilled in the art to which my invention pertains to make and use the same.

My invention relates to an instrument for removing incrustation and scale from the exterior surfaces of boiler tubes by temporarily slightly springing and enlarging the tube in opposite directions at the immediate point where the instrument is operating, the tube resuming its normal shape at such point as soon as the instrument has passed along. The scale formed on the outer surface of the tube being brittle and absolutely inelastic, cracks off and falls away from the tube when the latter is slightly expanded as explained in Letters Patent No. 420,689, to James P. Karr, on a process for removing incrustation from boiler tubes, granted February 4, 1890, which process will be practiced in the use of my invention. In the Karr device a pair of rollers set at a slight angle are forced apart to spring the tube by means of a tapering spindle which is crowded in between them by a screw adjustment. It has been found in practice that when the boiler tubes are perfectly true in diameter that this device works nicely but when there are any irregularities on the inner surface, such for instance, as a weld or seam, there is danger of splitting the tube because the rollers with the spindle between them cannot yield when passing such point and if the obstruction is great enough the tube will be sprung to excess and possibly be split or otherwise damaged. I have therefore, devised an instrument in which the rollers are held apart by a wedge, the wedge being drawn into working position by means of a spring which will allow it to yield when the rollers encounter an obstruction that would subject the tube to undue pressure.

The accompanying drawings show my invention in the best form now known to me but many changes and modifications might be made within the skill of a good mechanic without departing from the spirit of my invention as set forth in the claims at the end of this specification.

Figure 1, is a central longitudinal section through my improved scale remover. Figs. 2, and 3, are views of the handles by means of which the instrument is operated. Fig. 4, is a transeverse section through the roller head on the line 4. 4. of Fig. 1. Fig. 5, is a side view of the head, and Fig. 6, is a longitudinal section of the same on the line 6. 6. of Fig. 4. Figs. 7 to 11, inclusive, illustrate a modification which will hereinafter be more fully described.

In the form shown in Fig. 1, the roller head consists of a cast metal cylindrical head A, cut away or slotted at its sides *a*, so that the remaining portions *a'*, will have some spring or resiliency. Sockets or recesses *b*, are formed on opposite sides of the head and in them are mounted rollers B, the trunnions *b'*, of which are covered and held into their seats by plates or caps *c*, suitably secured by screws. A wedge shaped block D, is fitted into the head in such manner that when drawn into the head it forces apart the adjacent sides by which the rollers are carried, its bearing surfaces *d*, working against the inclined surfaces *e*, on the inner side of the head. (See Fig. 4.) Lips or projections E, embrace the sides of the wedge not only holding it in place but also maintaining the relative positions of the sides of the head to each other. At its inner end the sides of the head are united by a sleeve or collar A'. Attached to this sleeve by screws are spring bars *f*, which extend to the outer extremity of the head and are provided with bearing surfaces F, which cover the openings at each side of the wedge and act to hold the tool centrally in the tube in case either of the rollers should strike an obstruction. It will be observed that the rollers are set at an angle so that when the head is revolved with the rollers bearing against the inside of the tube the tool will automatically feed itself along the tube G, shown by dotted lines in Fig. 4. The head which thus works its way through the boiler tube is connected to the handle H, through which it is operated by a shank composed of pipe or sections of pipe or tube I, the first of which is screwed into the collar A', of the head and the succeeding sections (as many as may be

desired) are connected to the first section or to each other by means of common pipe couplings I'. These sections of pipe, each preferably about four feet long, are or may be added from time to time during the progress of the work as the head advances through the tube. The handle H, by means of which the tool is rotated is mounted upon a socket J, which is screwed upon the outer end of the pipe I. The handle is loosely mounted on the socket between a flange *j*, at one side and a ratchet wheel K, secured to the outer end of the socket. A double pawl L, is pivoted to the handle, one or the other of its points engaging the teeth of the ratchet wheel according to the direction in which it is desired to rotate the tool. In operation the handle may be turned round and round with the tool or it may be worked back and forth after the manner of a ratchet-drill handle where lack of space or obstacles of any kind prevent the complete rotation of the handle. A wedge D, is attached at its inner end by a collar or pipe coupling *m*, to a shank M, which extends out and through the socket. This shank may be composed of sections of pipe similar to, but of smaller diameter than the sections I, which form the main shank of the tool. The couplings *m*, which unite the several sections of the wedge shank are slightly smaller in diameter than the inside of the outer pipe so that they will act as guides to hold the inner shank in proper alignment.

The outer end of the wedge shank is threaded and has screwed upon it a hand wheel or nut O, having a long hub or boss *o*, the inner end of which bears against a loose washer P, which in turn rests upon the end of a heavy coil spring Q, surrounding the shank inside of the socket J, against the bottom of which it bears. It will be observed that the end thrust or pressure of the spring delivered through the washer P, and hand wheel O, to the shank, tends to pull the wedge in between the rollers and force them apart.

The end thrust or pressure of the spring and the degree of force which it exerts upon the wedge may be regulated or adjusted by screwing the hand wheel along the shank to further compress or ease the pressure on the spring as desired.

An experienced operator will soon ascertain the pressure at which the instrument should be set. If in operation it is desired, (in order to pass an obstacle of unusual size or for any other purpose whatever,) to force the wedge backward and relieve the pressure of the rollers without altering the adjustment of the hand wheel on the shank it can be done by means of the lever R, pivoted to the stud *r*, on the handle and embracing the hub *o*, of the hand wheel, a groove *o'*, in which, is engaged by the points of screw studs *s*, in the handle. Pressure upon the end of this handle forces the hand wheel and washer against the spring, compressing it still further and at the same time forcing the shank M, of the wedge endwise and the wedge out from between the rollers affording instant relief from undue or excessive pressure on the rollers.

It sometimes occurs, particularly in old tubes that small pits or depressions will form upon the surfaces of the tubes. When in operation a roller, spring pressed, as in my device, suddenly finds its way into one of these pits, the spring unless its action is limited, will suddenly snap the wedge farther back to compensate for the loss of pressure on the rollers, the effect produced, being almost like a blow of a hammer. This in tubes that are already somewhat weakened by long use or corrosion is likely to endanger their safety. I have therefore, provided a stop to limit the outward thrust of the spring. This stop consists of a hollow nut or sleeve T, screwed into the outer end of the socket until brought in contact with the washer P, at whatever point it may be set. The hub *o*, of the hand wheel may play freely back or forth inside of this sleeve but the washer P, which takes the direct thrust of the spring finds its outward movement limited by the sleeve T.

Figs. 7 to 11, show a modification of the roller head. Instead of the rollers being mounted in the sides of the split head which are sprung by a wedge as in the previously described construction, they are mounted in loose blocks U, the shanks *u*, of which, lie in grooves or channels V, on each side of the head. The inner extremity of these shanks lie under the coupling W, by which the head is connected to the shank of the tool and they are provided with teats or enlargements *u'*, which rest in depressions *v*, in the head to prevent them from being pulled out endwise. It will be observed that the blocks U, project beyond the end of the head and are forced apart by the wedge D, the shank of which, extends through the opening V', through the center of the head. By this construction I avoid having to spring the sides of the head in order to expand the roller and it possesses some features which I think are highly desirable.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. In a tool for removing scale from boiler tubes, a head piece, a pair of rollers opposite each other supported by the head piece, a wedge for forcing the rollers apart, a spring tending to draw the wedge between the rollers and means for adjusting the pressure of the spring, substantially as set forth.

2. In a tool for removing the scale from boiler tubes, the head piece, the rollers supported thereby, the handle by which the tool is rotated, the tubular shank connecting the head-piece to the handle, the wedge for forcing the rollers apart and having a shank extending through the handle and screw-threaded at its end, a hand wheel or nut, on

this threaded extremity and a spring surrounding the shank and interposed between the handle and the nut, substantially as and for the purpose hereinbefore set forth.

3. In a tool for removing scale from boiler tubes the head piece with its guide lips E, the rollers carried thereby, the wedge, and the guide plates F, at each side of the head, substantially as and for the purpose hereinbefore set forth.

4. In a tool for removing scale from boiler tubes the head piece, the rollers supported thereby, the handle connected by a tubular shank to the head piece, the wedge between the rollers and its shank extending to the handle, a screw nut on the end of the wedge shank, the spring pressing on the screw nut, and the lever pivoted to the handle and engaging the screw nut, substantially as and for the purpose hereinbefore set forth.

5. In a tool for removing scale from boiler tubes the combination of the head piece, the rollers, the wedge, the spring forcing the wedge between the rollers to expand them and the check collar T, to limit the action of the spring, substantially as hereinbefore set forth.

In testimony whereof I affix my signature, in the presence of two witnesses, at Cleveland, Ohio, February 10, 1893.

DANIEL P. ANTHONY.

Witnesses:

WM. A. SKINKLE,

CORNELIA A. SKINKLE.