(No Model.)

G. A. ROWELL.

TUBE CLEANER.

No. 348,141. Patented Aug. 24, 1886.

Fig. 1.

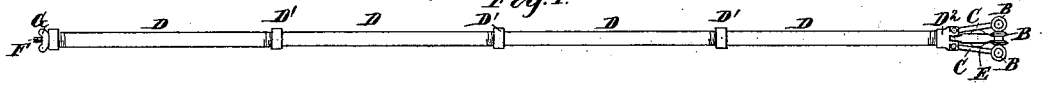


Fig. 2.

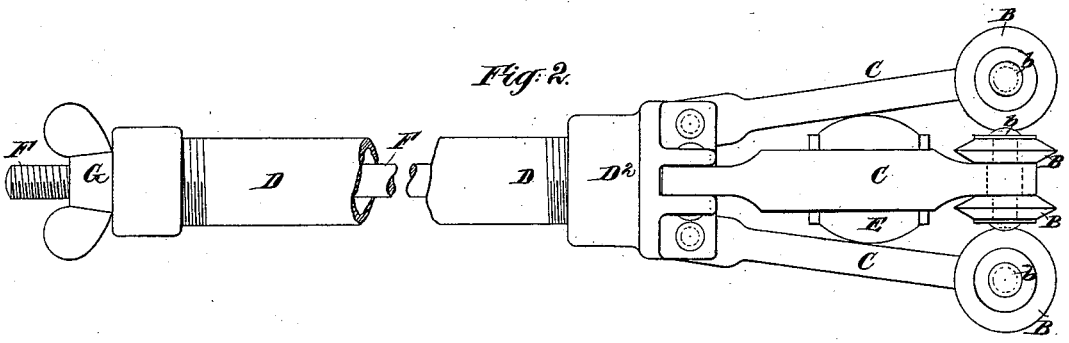


Fig. 3.

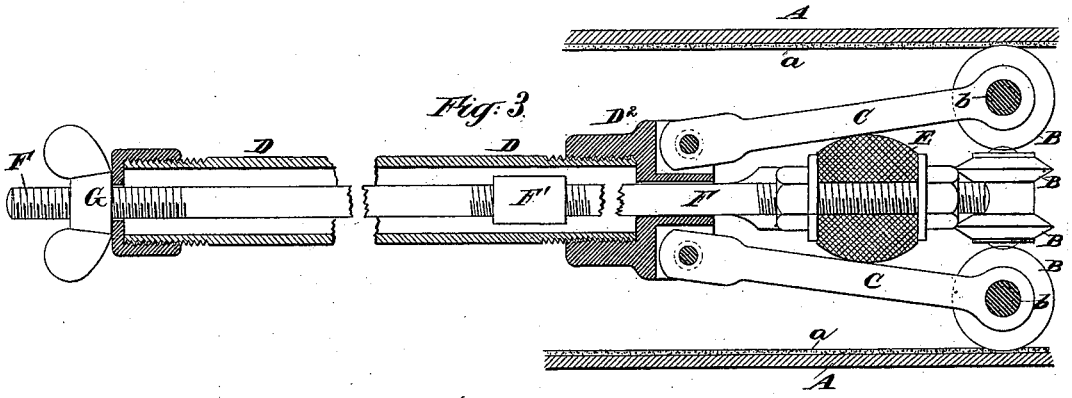


Fig. 4.

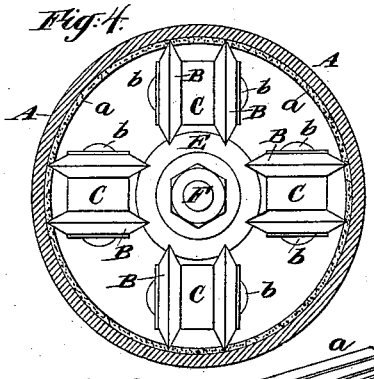
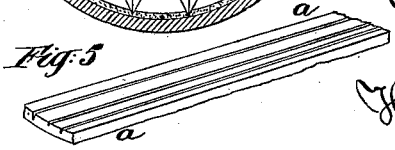


Fig. 5



Witnesses:
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by his attorney
Thomas Drew Stetson

UNITED STATES PATENT OFFICE.

GEORGE A. ROWELL, OF BROOKLYN, NEW YORK.

TUBE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 348,141, dated August 24, 1886.

Application filed September 10, 1885. Serial No. 176,681. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. ROWELL, of Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements in Tube-Cleaners, of which the following is a specification.

My invention is adapted to clean the interiors of tubes of that class of steam-boilers and analogous apparatus in which the water is held within straight tubes and the hot gases circulate on the outside. The device cuts up and loosens the carbonate of lime and other hard matter which deposits in the form of scale on the interiors of such tubes.

I employ cutter-wheels adapted to produce in the interiors of such tubes a series of longitudinal scores or deep V-sectioned grooves. The wheels are operated by connections extending from one end of the tube. The connections are jointed, to allow the device to be inserted and removed in situations where there is not room to introduce and withdraw a single continuous rod of sufficient length. I provide for holding the cutter-wheels apart by an elastic action, and for adjusting the intensity of the force at will.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a general side elevation showing the device with several lengths of its operating-connections properly applied together for use a considerable distance inward from the entering end of the tube. The remaining figures are on a larger scale. Fig. 2 is a side view, a large portion of the operating means being broken out, and the ends represented near together. Fig. 3 is a corresponding longitudinal section. Fig. 4 is an end view of a tube with my cleaning device introduced and in action, it being reciprocated longitudinally by the strength of the operator or by any other sufficient force. Fig. 5 is a perspective view of a piece of scale as it appears after it has been removed by my cleaner.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A is a tube, which, it will be supposed, is connected to suitable tube-sheets, (not represented,) so that the tube forms a water-containing portion of a steam-boiler which has been in use a sufficient time with hard water to induce the formation of a layer of hard stony material or scale adhering tightly to the interior of the tube. This scale is marked *a*.

B B, &c., are what I term "cutter-wheels." They are fixed one on each end of a short shaft, *b*. The shaft *b* turns freely in a bearing in the free end of a lever, C, which is jointed or pivoted loosely to a collar, D^2, on the end of a tube, D. There are four of these levers C, each carrying one shaft, *b*, and two cutter-wheels, B.

E is a ball or an approximately spherical mass of soft vulcanized rubber firmly set on the end of a rod, F, which latter extends loosely along the interior of the tube D, and is capable of being moved endwise therein by means of an adjusting-nut, G, which is fitted on the end of the rod F. The rod F is made up of relatively short lengths united by screw-couplings F'. The tube D is also made up of relatively short lengths united by screw-collars D'. The several sections or lengths of the rod F must be so much less in diameter than the hollow interior of the tube D that the coupling F' will be accommodated. The parts must play loosely one within the other, so that by turning the nut G the rubber E may be moved inward or outward. Turning the nut G in one direction draws the rubber E toward itself, and moves the cutter-wheels B outward with greater force. Turning the nut G in the opposite direction allows the rod F and its connected rubber ball E to be thrust farther away. The first adjustment urges the cutter-wheels B outward with more force. The second relaxes the force with which they are held outward.

In the use of the device the nut G is relaxed and the rod F thrust so as to move the ball E and allow the arms C and cutter-wheels B to yield inwardly. In this condition the device is inserted in the tube, the nut G turned to draw the ball E and force the cutter-wheels B outward into hard contact with the scale *a*. In this condition of the parts the entire device is reciprocated backward and forward in the tubes, with the effect to cut a series of narrow V-shaped longitudinal scores in the scale. After the device has been reciprocated awhile

near the entering end of the tube it is shifted farther inward, and caused to perform a series of short reciprocations there. Thus the work proceeds, successive lengths being added to the tube D and to the internal rod, F, until the device has been operated in all parts of the length of the tube.

The nut G is or may be operated from time to time to urge the cutter-wheels B out with greater force, as the indications may require. The effect is to deeply score the scale, and as the operation is continued, to break the scale into a series of longitudinal strips. The operation also loosens these strips, so that in a short time a large part or the whole of the scale is not only divided into longitudinal strips, but the several strips are loosened from their previous firm hold on the inner face of the tube. Then, after the removal of my device, the loosened scale may be brushed out, washed out, or blown out, and the tube will stand with its interior thoroughly cleaned, ready for another period of effective service.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. I can use more than four of the pivoted arms C, each with its pair of cutter-wheels B. Three of the pivoted arms, with their wheels, may suffice.

The invention may serve successfully with only one cutter-wheel B carried on each arm C. In such case the end of the arm C may be forked, and the single cutter-wheel may be mounted in the fork.

I attach importance to the fact that the ball E is elastic. I esteem the yielding property of much advantage in working the device where the interiors of the tubes are not perfectly round and uniform throughout, and especially where they are irregularly coated with scale. The use of rubber for the ball E allows each cutter-wheel B to produce a continuous score from one end of the tube to the other, even if the scale varies considerably in thickness at different points. This is highly desirable. Then by drawing the ball E gradually toward the operator and continuing the work the scores are deepened, and the entire mass of scale is detached.

I am aware that wheels having puncturing-teeth upon their peripheries have been forced against opposite sides of boiler-tubes by toggles for a similar purpose, and such construction I do not seek to cover in this application.

I claim as my invention—

The combination, with the sleeve or tube D and with the equidistant levers C, pivoted thereto and having cutters B journaled in their free ends, of the rod F, operating through the tube D, the yielding elastic ball supported on said rod between the levers C, and a nut, G, serving, in connection with the rod F, tube D, and ball E, to force the cutter-wheels B outward, as set forth.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 28th day of August, 1885, in the presence of two subscribing witnesses.

GEO. A. ROWELL.

Witnesses:

J. W. LAWSON,

W. A. PEARSALL.