No. 635,164. Patented Oct. 17, 1899.

W. S. ELLIOTT.

TUBE CLEANER,

(Application filed Sept. 23, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

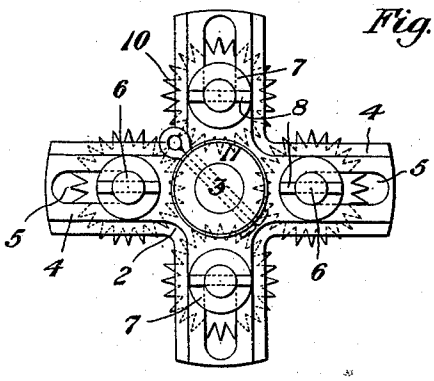


Fig. 1.

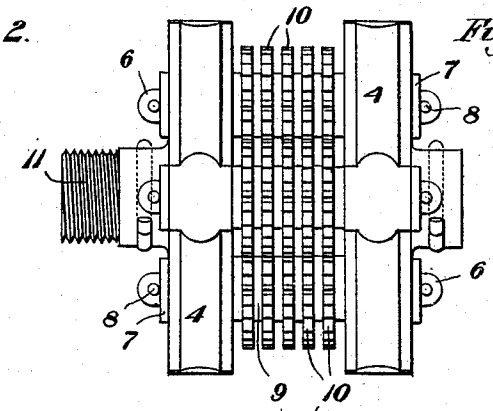


Fig. 4.

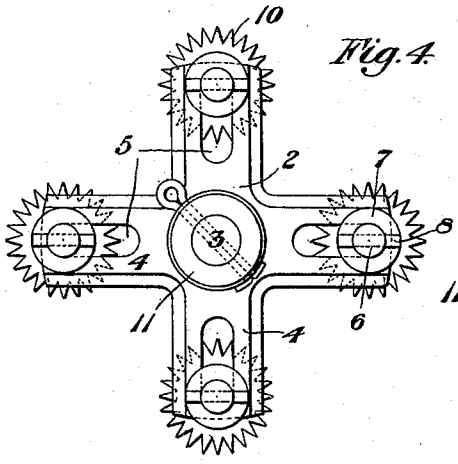


Fig. 3.

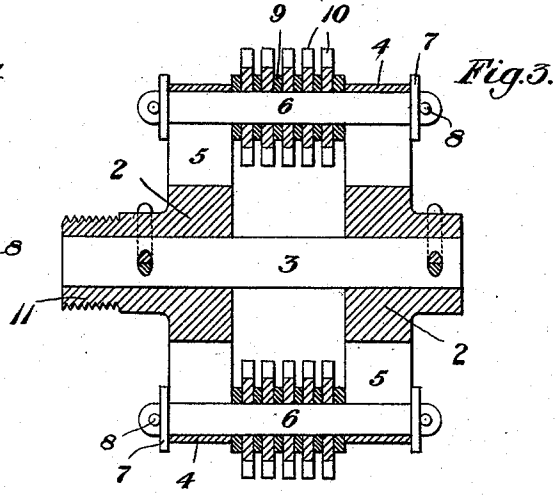


Fig. 6.

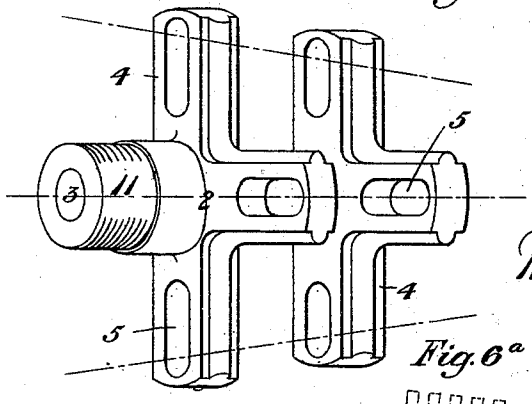


Fig. 6ª

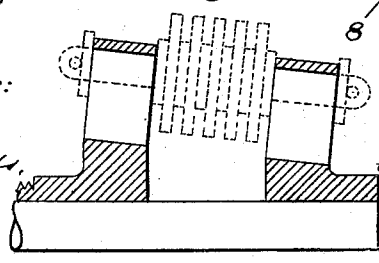
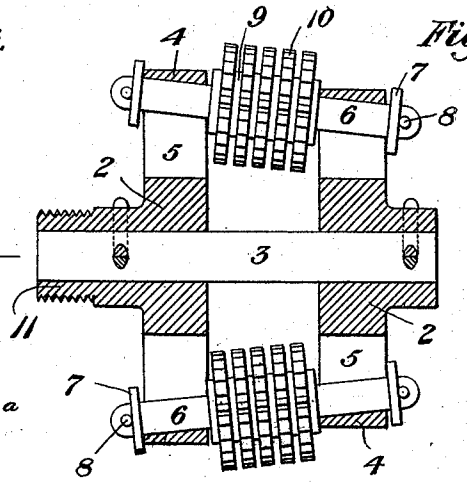


Fig. 5.



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Fig. 8.

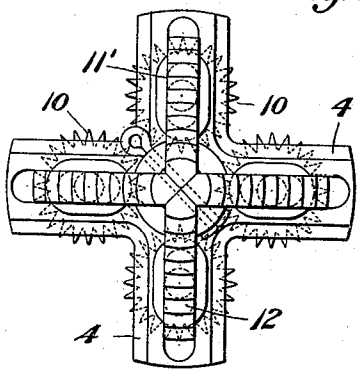


Fig. 7.

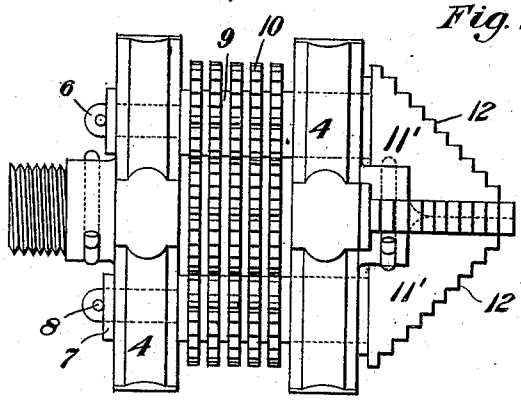


Fig. 10.

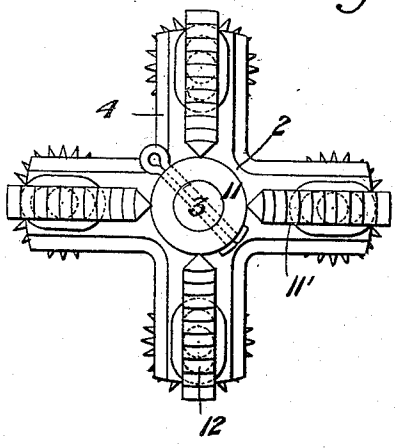


Fig. 9.

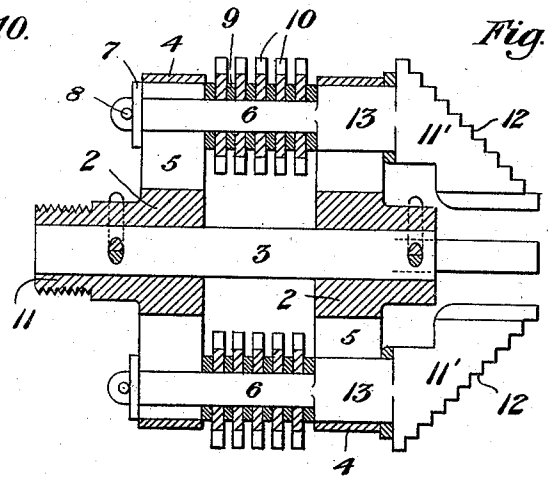
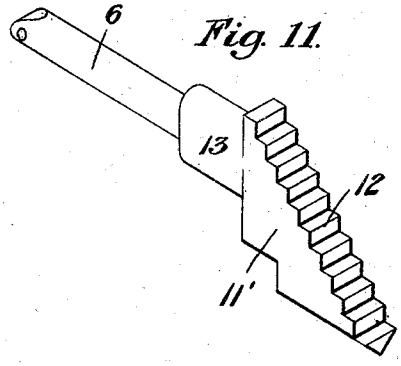


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM S. ELLIOTT, OF PITTSBURG, PENNSYLVANIA.

TUBE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 635,164, dated October 17, 1899.

Application filed September 23, 1898. Serial No. 691,728. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. ELLIOTT, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a new and useful Improvement in Tube-Cleaners, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view in side elevation of my improved scale-removing and polishing tool. Fig. 2 is an end elevation. Fig. 3 is a central longitudinal sectional view showing the cutters and their supporting-arms distended. Fig. 4 is an end elevation corresponding to Fig. 3. Fig. 5 is a view similar to Fig. 3, but showing the heads provided with slots so arranged as to permit the groups of cutters to assume a tapered form when in action. Fig. 6 is a view in perspective of the heads so constructed, the cutters and their supporting-pins being removed. Fig. 6ª is a half-sectional view illustrating slanted arms. Fig. 7 is a view similar to Fig. 1, showing the application of supplementary advance cutters formed integral with the supporting-pin. Fig. 8 is an end view of Fig. 7. Fig. 9 is a central longitudinal sectional view illustrating the advance cutters and showing the parts distended to working position. Fig. 10 is an end view of Fig. 9. Fig. 11 is a detail view of one of the cutter-supporting pins having the forwardly-extended integral cutting portion.

My invention relates to the class of devices for removing scale from the inner shells of boilers, more particularly from the interior of the tubes of water-tube boilers, and for polishing the interior of such tubes. It is designed to be used rotatively in combination with a turbine wheel or other similar fluid-actuated motor or any other suitable driving means, one of the objects in view being to reduce the obstructive area of the cleaning-tool, so as to allow for free passage of the water or steam, with the cuttings, &c., dislodged from the tube by the tool.

A further object of the invention is to provide a tool that is strong and simply constructed and capable of ready adjustment automatically to the varying conditions of use.

To this end the tool is composed of oppositely-disposed heads 2, rigidly joined by a central stem 3 or its equivalent and provided with a series of oppositely-located arms 4, having pin-supporting slots 5. Within these slots, which are of sufficient length to admit of considerable radial travel, are mounted the cutter-supporting pins 6, provided with means for preventing their displacement, as washers 7 and cotter-pins 8, somewhat loosely attached, so as to permit of free action of the pins when in operation.

Mounted on the pins 6 between the arms 4, with intervening washers 9, are the toothed cutters 10, so arranged as to insure their free rotation on the pins 6, while the pins may also rotate in their slotted bearings in case the cutters should bind.

The heads 2 are provided with central hubs, through which passes the central stem 3, one of the hubs being extended somewhat and formed into a threaded stem 11, by which the tool is connected to the driving-motor either rigidly or with a flexible coupling, so as to permit of its operation in curved tubes.

In the normal position of the cutters the toothed wheels and their supporting-stems occupy a retracted position toward the inner extremities of the slots, thus permitting the tool to be easily inserted in the tube. Upon rotating the tool at high speed the cutters will fly outwardly by centrifugal force and come into contact with the scale, dislodging it by a series of rapid strokes in succession, the efficiency of the machine being proportioned to its speed and the quality of the scale.

In Figs. 5 and 6 I have shown the arms and slots of the rear head as slightly longer than the forward head, whereby the rear end of the cutter-pin may travel beyond the forward end, thus permitting the tool to effect a tapering coniform cut, which is of advantage in cases of very hard or thick scale.

For the purpose of more effectually removing very heavy accumulations of scale and of clearing the center of the tube so as to permit the main cutters to operate I have extended the forward ends of the cutter-pins 6 beyond the forward arms and formed them into inwardly-tapering cutter-heads 11′, having teeth 12 on their inclined outward faces.

The portion of the pin 6 immediately be-

hind the head 11 is reinforced and widened in the direction of the slot, forming an intervening neck 13 of greater strength, thus providing a more rigid bearing for that portion of the pin that is subject to the shock of impact upon the forwardly-extending heads 12. Additional space is also thus provided in the back slot, whereby the rear end of the pin may swing out, as has been described with reference to Figs. 5 and 6.

In operation under the effect of centrifugal force when the tool is rotated at high speed the cutters operate to remove the scale and polish the interior of the tube in a very rapid, thorough, and efficient manner, and while subject to wear the cutters, which are usually milled in considerable numbers at one operation and at small cost, are easily and quickly renewed by removing the pins and replacing new cutters thereon.

My improved tool is very strong and durable, well adapted to the work for which it is designed, easy and cheap to construct, and not liable to get out of order, while its freedom of action and great number of cutters possess advantages over other forms of cleaning-tools employing pivoted or spring arms that will be appreciated by users of this class of devices.

The proportions and design of the tool may be varied from or the number of arms and their relation to each other may be changed without departing from my invention, since I do not desire to be limited to the exact construction shown and described, but to include all such changes and variations therefrom as would suggest themselves to the skilled mechanic.

What I claim, and desire to secure by Letters Patent, is—

1. A tube-cleaner comprising oppositely-located rigidly-connected heads having radial slotted arms, pins mounted in the arms having forwardly-projecting toothed extremities and cutter-wheels mounted on the pins between the arms, substantially as set forth.

2. A tube-cleaner comprising oppositely-located rigidly-connected heads having radial slotted arms, pins mounted in the arms having forwardly-projecting toothed extremities converging toward the center, and cutter-wheels mounted on the pins between the arms, substantially as set forth.

3. A tube-cleaner comprising oppositely-located rigidly-connected heads having radial slotted arms, pins mounted in the arms having forwardly-projecting toothed extremities in coniform arrangement, reinforcing-necks for the pins, and cutter-wheels mounted on the pins between the arms, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM S. ELLIOTT.

Witnesses:
J. F. McKENNA,
C. M. CLARKE.