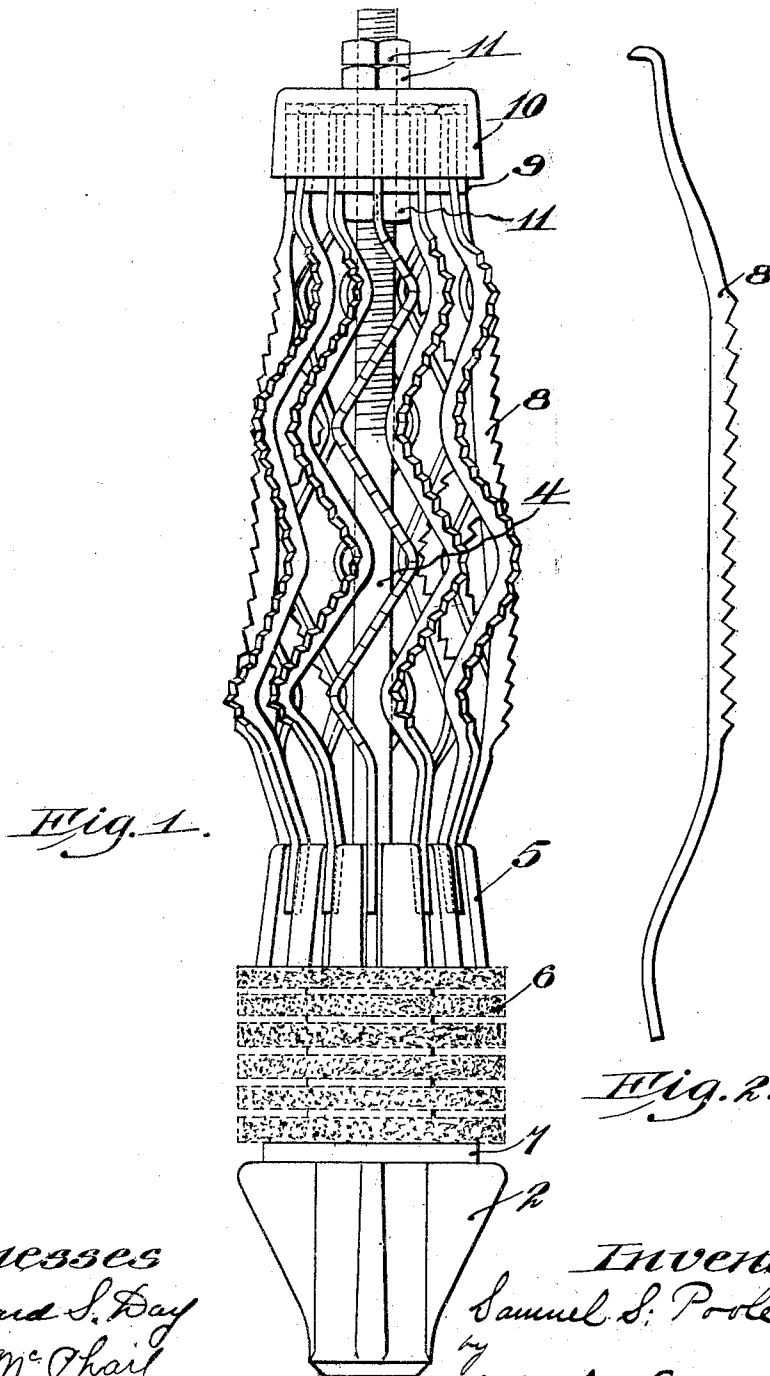


S. S. POOLE.
TUBE CLEANER.
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UNITED STATES PATENT OFFICE.

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TUBE-CLEANER.

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To all whom it may concern:

Be it known that I, SAMUEL S. POOLE, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Tube-Cleaners; and I do hereby 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.

The present invention relates to tube cleaners, and more particularly to cleaners which are adapted for use in removing scale and other incrustations from boiler tubes.

The object of the invention is to provide a tube cleaner of a simple construction which may be manufactured cheaply, which is efficient in its action, and which is capable of withstanding long continued, hard usage without impairing its efficiency.

With these ends in view, a feature of the invention contemplates the provision of a plurality of bars supported about a suitable standard and arranged in a cylindrical formation, the bars having their outer working faces serrated to form cutting teeth. The working or serrated portion of each bar is arranged obliquely to the supporting standard and this is accomplished in the preferred form of the invention by forming the bars of a zigzag shape. The bends in the successive bars are also arranged to overlap one another in order that the cutting teeth shall engage with the entire surface of the tube.

In the accompanying drawings illustrating the preferred form of the invention, Figure 1 represents an elevation of the improved tube cleaner; and Fig. 2 is a detail showing one of the bars removed from the cleaner, and illustrating the shape of the bar and the manner in which the teeth are cut thereon.

In the illustrated embodiment of the invention the cleaner comprises a head 2 from which extends longitudinally a threaded supporting standard or rod 4. A conical nut 5 is mounted upon a threaded portion of the head 2 (not shown) and serves to clamp a cleaning brush 6 against the disk 7 formed upon one end of the head. The bars 8 are supported at their upper ends in a slotted head 9 and are retained in position by a cup-shaped member 10 which fits over the head 9 and serves to clamp the bars 8 in position. The lower ends of the bars are seated in a

plurality of slots formed in the surface of the conical nut 5, and by adjusting the head 9 in a longitudinal direction relatively to the nut 5 the free ends of the bars 8 are moved along the conical surface of the nut 5 and the bars are spread apart or are allowed to come together in order to accommodate for boiler tubes of varying diameters. The head 9 and member 10 are locked upon the rod 4 in any adjusted position by a plurality of lock nuts 11. The head 2 is provided with a socket (not shown) which is adapted to receive the end of a handle or rod by means of which the cleaner is supported and reciprocated through the boiler tubes.

In tube cleaners of this type, it is important that the cleaning means shall engage with every part of the inner surface of the tube in order that there shall be no possibility of leaving any scale in the tube, and it is further important that the teeth or other cutting means shall be so arranged as to obtain the best possible cutting action when operating upon the hard refractory boiler scale. To this end, the bars 8, which may be aptly termed cutter bars, are supported lengthwise of the supporting standard and are arranged to have their outer faces present a cylindrical surface to the interior of the boiler tube throughout a substantial portion of their length. This is accomplished by shaping the bars, as shown clearly in Fig. 2 of the drawings, with their opposite ends bent inwardly and the working portions lying in the surface of a cylinder. Each bar is serrated transversely along its outer face to form a plurality of cutting teeth and the cutting teeth extend throughout the length of the working portions of the bars. By forming the teeth directly upon the bars in this manner, the employment of rotary cutters, or other moving parts, is avoided, and the effective cutting area of the cleaner extends throughout the entire length of the cylindrical surface and is not confined to a few scattered points. In order that the cutting teeth shall not track, as it is termed, and leave ridges of the scale in the boiler tube, the cutting bars are bent into a zigzag shape, as shown clearly in Fig. 1, and the bends of one bar overlap the bends of the next succeeding bar in order that there shall be no spaces between the bars which are not operated upon. With this zigzag formation of the bars, the thrust upon the bars, due to the engage-

ment of the cutting teeth with the interior of the tube, is lengthwise of the cleaner and there is no tendency to a lateral displacement of the ends of the bars. This construction, therefore, avoids the necessity of tying, or otherwise fastening, the bars at both ends, as is necessary in various other types of tube cleaners. In order to accommodate for variations in the interior diameter of the boiler tube and to allow for obstructions in the interior of the tube, the bars are conveniently formed of a resilient material which allows the bars to yield upon encountering an obstruction in the tube without damaging either the cleaner or the tube. This arrangement of cutter bars has also the added advantage that as the cleaner is forced longitudinally through the boiler tube, the cutting teeth are presented obliquely to the interior surface of the tube, which arrangement enables the most efficient cutting action to be obtained.

From the above it may readily be seen that the present type of tube cleaner is efficient in its action, in that all parts of the interior surface of the boiler tube are engaged and thoroughly cleaned owing to the relatively large cutting area which is presented by the cleaner. It is simple in construction and subject to no material deterioration, for the cutting teeth are formed directly upon the bars and there are no rotating cutters or other moving parts to get out of order; and that furthermore, the device may be readily retained in working condition, as it is a simple matter to sharpen the teeth or to replace any one of the cutter bars when desired.

While it is preferred to employ the specific construction and arrangement of parts shown and described, it will be understood that this construction and arrangement is not essential except so far as specified in the claims, and may be changed and modi-

fied without departing from the broader features of the invention.

What is claimed is:—

1. A tube cleaner, comprising a plurality of bars, each provided with cutting teeth formed along its outer face, the bars having a zigzag shape in order that the cutting teeth shall engage with all portions of the surface of the tube, substantially as described.

2. A tube cleaner, comprising a plurality of bars, each provided with cutting teeth formed along its outer face, the bars having a zigzag shape and the bends in one bar overlapping the bends of the next succeeding bar in order that all portions of the surface of the tube shall be cleaned, substantially as described.

3. A tube cleaner, comprising a plurality of bars having a zigzag formation, the bars arranged to present a cylindrical surface to the interior of the tube throughout a substantial portion of their length, and a plurality of cutting teeth formed upon the outer face of each bar in order to engage with the entire surface of the tube as the cleaner is moved therethrough, substantially as described.

4. A tube cleaner comprising a standard, and a plurality of resilient bars having a zigzag shape supported lengthwise thereof and fastened to the standard at each end, the bars being arranged to present a cylindrical surface to the interior of the tube and each having transverse serrations formed along its outer face whereby the cutting teeth operatively engage with all portions of the interior surface of the tube, substantially as described.

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