H. L. NEEDHAM.

BOILER TUBE CLEANER.

APPLICATION FILED MAY 28, 1917.

1,313,725.

Patented Aug. 19, 1919.

2 SHEETS—SHEET 1.

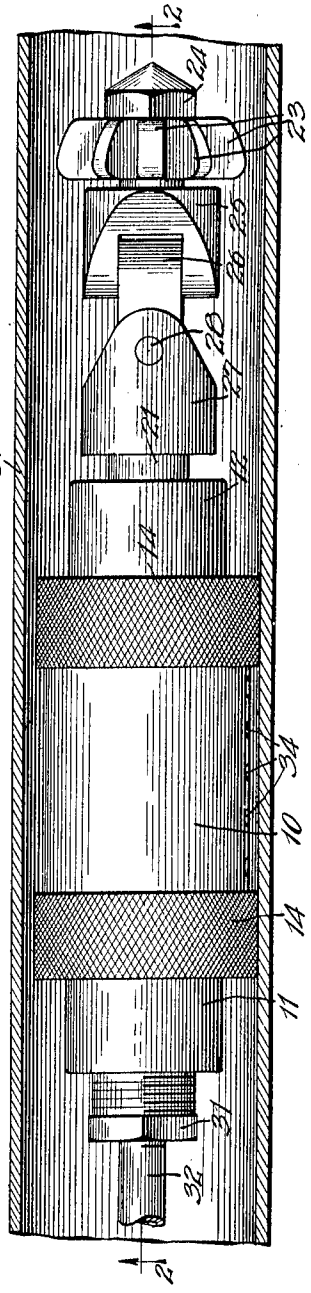


Fig. 1.

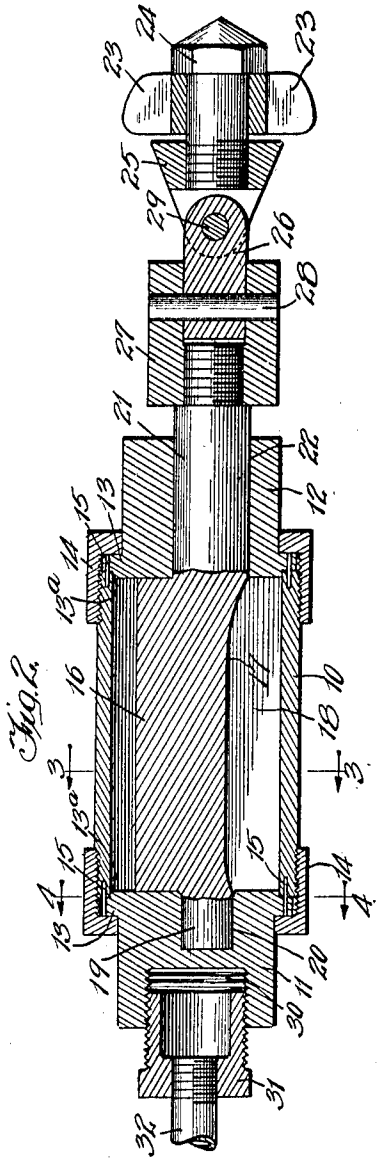


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

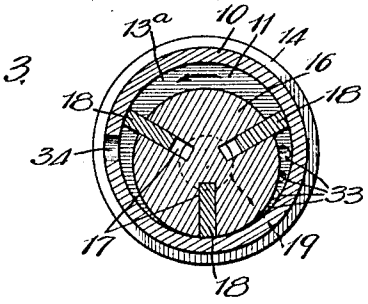


Fig. 4.

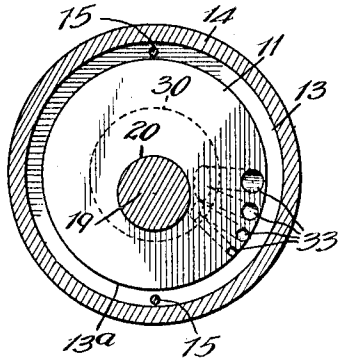


Fig. 5.

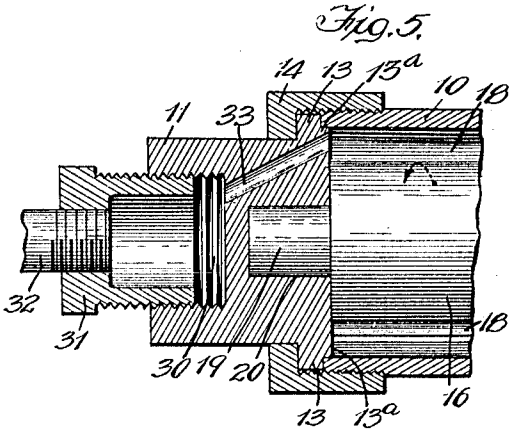
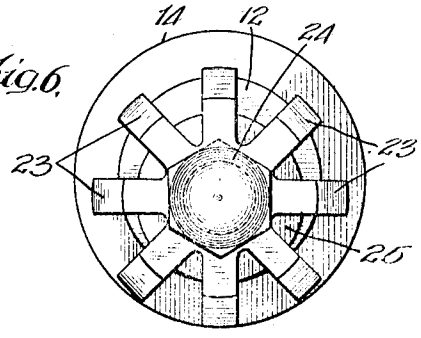


Fig. 6.



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HOUGHTON L. NEEDHAM, OF CHICAGO, ILLINOIS.

BOILER-TUBE CLEANER.

1,313,725. Specification of Letters Patent. Patented Aug. 19, 1919.

Application filed May 28, 1917. Serial No. 171,444.

To all whom it may concern:

Be it known that I, HOUGHTON L. NEEDHAM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boiler-Tube Cleaners, of which the following is a specification.

The general object of this invention is to produce a boiler tube cleaner of simplified and improved construction, and a special aim is to provide a device which embodies a minimum number of parts so constructed and arranged as to afford the maximum degree of strength and durability and be capable of being cheaply manufactured, and in which the parts subject to the greatest wear may be quickly and easily replaced, so that the device may be operated and repaired by an inexperienced workman.

In the accompanying drawings, Figure 1 is an elevational view illustrating a boiler tube cleaner embodying my invention in place in a tube. Fig. 2 is a longitudinal central section through the entire device taken in the plane of line 2—2 of Fig. 1. Figs. 3 and 4 are transverse sections through the cleaner taken in the planes of lines 3—3 and 4—4, respectively of Fig. 2. Fig. 5 is an enlarged longitudinal section through the rear end of the cleaner taken in a plane approximately perpendicular to that of Fig. 2. Fig. 6 is an end elevation looking at the right-hand end of Fig. 2.

Referring to Fig. 1, A indicates a boiler tube through which the cleaner is adapted to be inserted for the purpose of cleaning the scale from the tube. The cleaner comprises a motor section and a reamer or tool section. It is to the former that the present invention relates.

In the preferred embodiment of the invention shown in the drawings, the motor comprises a cylindrical tubular casing 10, the ends of which are closed by a rear head 11 and a front head 12, respectively, said heads being located externally to the casing. The main portion of each of said heads is of considerably smaller diameter than the casing 10 and at the inner end face of each head is formed an annular radial flange 13 which abuts against the end of the casing. At the inner end face of the head is a circular projection 13^a which fits snugly within the end of the casing 10.

Each head is arranged to be tightly clamped to the casing by an annular collar 14 having an inwardly-extending radial flange which fits about the head and is arranged to engage the shoulder provided by the flange 13. The exterior of the casing 10 at the ends thereof and the interiors of the collar 14 are screw-threaded so that when the collars are turned up on the threads the heads will be securely held in place.

Means is provided to insure the association of the heads with the casing 10 in correct position to aline the eccentric bearings in said heads and to prevent relative rotation between the heads and the casing. Said means is of an interlocking character and in the present instance comprises pins 15 fixed in and projecting from the ends of the casing 10 and adapted to fit into corresponding openings in the flanges 13 of the heads.

The casing and heads constitute the stator of the motor. The rotor is in the form of a cylindrical body 16 having a plurality of radial slots 17 (in this instance three) extending from end to end thereof parallel with the axis of said body. In each of said slots a blade or vane 18 fits loosely, said blades being of such length as to extend the full distance between the inner faces of the heads 11 and 12. Preferably the bottoms of the slots 17 and the inner edges of the blades 18 are somewhat rounded or inclined at their end portions so that the rotor journals will not be weakened by said slots. The rotor is eccentric to the casing 10 and in the rotation of the rotor the blades 18 are thrown outwardly into contact with the inner face of the casing 10 and the blades move in and out on account of the eccentric relation of the rotor and casing.

On the rear end of the rotor is a stub journal 19 concentric with the rotor which is mounted in a socket or bearing 20 in the inner part of the rear head 11, said socket or bearing being eccentric to the head. A journal or shaft 21 projects concentrically from the forward end of the rotor 16 and passes through the head 12, being mounted in an eccentric bearing 22 in said head.

On the forward end of the shaft 21 is mounted the cleaning tool. The tool and mounting means may be of any common or preferred construction. In the present exemplary form the tool 23 is rotatably mounted on a bolt 24 which is threaded in a knuckle 25. Said knuckle is joined by a

link 26 to a knuckle 27 which is threaded upon and rigidly fixed to the forward end of the shaft 21. The pivot pins 28 and 29 connecting the link 26 to the two knuckles are at right angles to each other, so that a universal connection between the tool 23 and the shaft 21 is provided. Due to the eccentric mounting and rapid rotation of the shaft 21, the tool 23 will be caused to deliver sharp blows in quick succession to the tube A so as break up and remove the scale therefrom.

The outer end of the rear head 11 has a chamber or cavity 30 therein which is interiorly threaded to receive a coupling element 31 for securing to the head a flexible hose 32 by which compressed air or other motive fluid is conveyed to the motor. The cavity 30 communicates with the interior of the casing 10 through one or more inlet ports 33 (Figs. 4 and 5), four being shown in the present instance. Said ports extend at an angle to the axis of the head and deliver the motive fluid to the space between the exterior of the rotor 16 and interior of the casing 10. The motive fluid acting on the blades 18 will cause rapid rotation of the rotor and at the proper time the motive fluid escapes from the casing through exhaust ports 34 (Figs. 1 and 3). The chamber 30 acts as an equalizing and distributing chamber from which the inlet ports 33 are supplied. As the blades 18 pass the ports 33 the rotor will receive successive impulses from the incoming air jets.

It will be noted that the heads 11 and 12 project beyond the caps 14 and are of long dimension in an axial direction. A long bearing is thus provided for the shaft 21 of the rotor, which shaft and bearing receive most of the shock caused by the impacts of the cleaning tool 23. The great axial length of the rear head 11 allows the employment of simple means for coupling the air hose to the head and for introducing the air into the cylinder. The caps 14 provide strong and durable means for securing the heads to the casing 10 and at the same time a means which is readily removable when it is desired to renew a worn blade 18. The whole motor may be taken apart by simply removing the two caps 14, the peripheries of the caps preferably being knurled so that they may be tightly gripped in the hands. By reason of the fact that the motor embodies so few parts, is durably constructed, and may be readily repaired, it is possible to employ a cheap class of labor to operate a cleaner of this type. Furthermore, the simplicity and the paucity of parts conduce to extreme cheapness in manufacture.

While I have herein described in detail the preferred embodiment of my invention, it should be understood that I do not thereby intend to limit myself to the exact form disclosed, but aim to cover in the appended claims all modifications and equivalents falling within the scope of the invention.

I claim as my invention:

1. A boiler tube cleaner having, in combination, a casing having concentric inner and outer peripheral walls, heads closing the opposite ends of the casing and having annular external flanges abutting against the extreme ends of the casing, collars threaded upon the ends of the casing on the outer periphery thereof and having inwardly extending flanges which surround the heads and engage with the flanges thereon to clamp the heads to the casing, and a rotor in the casing having journals at its opposite ends mounted in said heads eccentrically thereof and also of the outer periphery of the casing; there being a motive fluid inlet port in one of the heads and an outlet port in the casing, said rotor having blades adapted to pass said ports successively in the movements of the rotor, and one of said journals being extended and having a tool mounted on its extended end.

2. A boiler tube cleaner having a motor casing adapted to be entered into a tube, a rotor eccentrically mounted in said casing and having a projecting journal eccentric to the casing and consequently eccentric to the tube, and a tool having a flexible connection to the journal.

3. A boiler tube cleaner comprising a cylindrical motor casing adapted to be entered into a tube, a shaft projecting from the end of the casing and eccentric to the axis thereof, means in the casing to rotate the shaft, and a tool flexibly connected to the outer end of the shaft.

In testimony whereof, I have hereunto set my hand.

HOUGHTON L. NEEDHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."