No. 864,772. PATENTED SEPT. 3, 1907.

C. S. DEAN.

# STEAM BOILER TUBE OR FLUE CLEANER OR SCRAPER.

APPLICATION FILED JAN. 29, 1906.

Fig. 1.

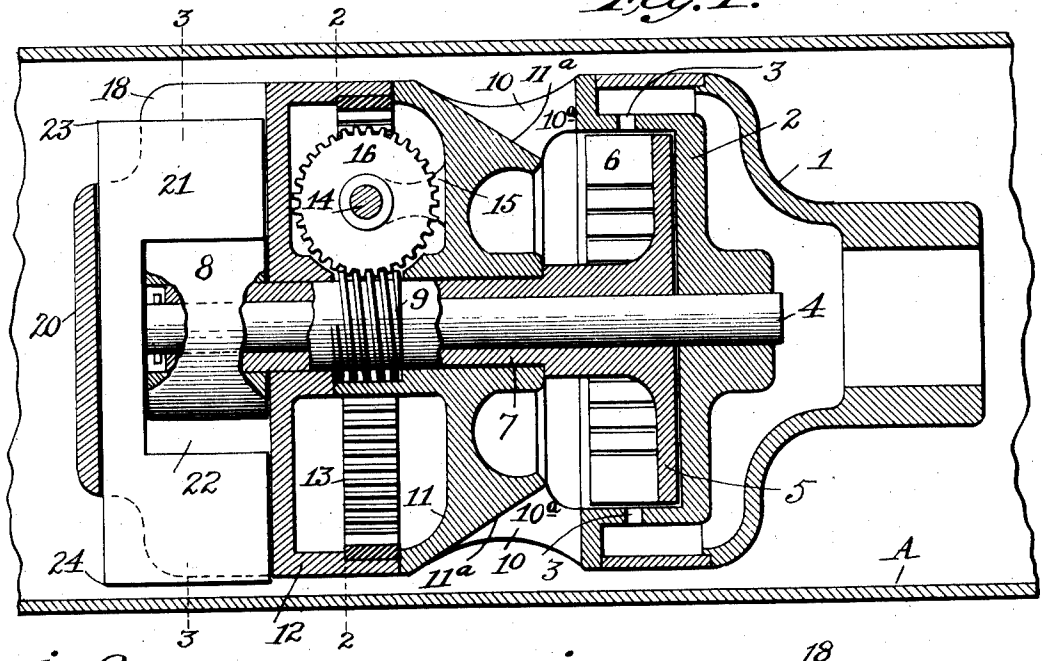



Fig. 2.

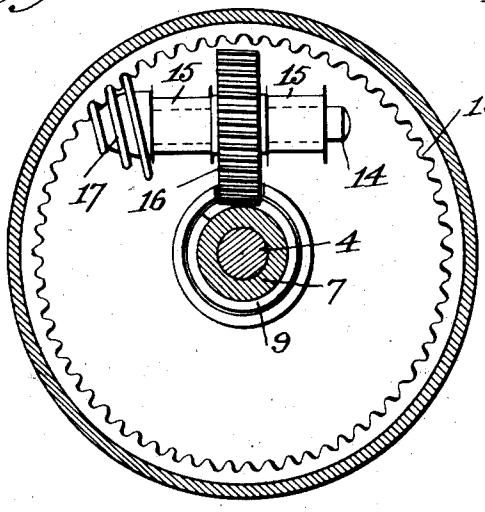



Fig. 3.

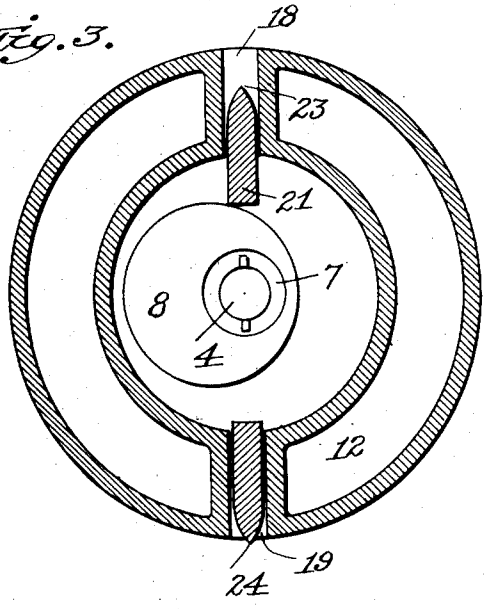
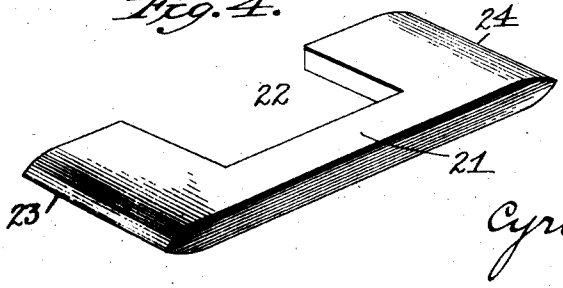



Fig. 4.




Witnesses

Edwin L. Yewell

Sarah A. Lockwood

Inventor

Cyrus S. Dean

By George H. Hamlin

Attorney

# UNITED STATES PATENT OFFICE.

CYRUS S. DEAN, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF TO ALBERT D. JAMIESON, OF BUFFALO, NEW YORK.

## STEAM-BOILER TUBE OR FLUE CLEANER OR SCRAPER.

No. 864,772. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed January 29, 1906. Serial No. 298,493.

*To all whom it may concern:*

Be it known that I, CYRUS S. DEAN, a subject of the King of Great Britain, residing at Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Steam-Boiler Tube or Flue Cleaners or Scrapers, of which the following is a specification.

My invention relates to steam boiler tube or flue cleaners or scrapers.

The object of the present invention is the provision of a steam boiler tube or flue cleaner or scraper of simple, inexpensive and durable construction, adapted to be operated by an attached motive fluid motor having improved means for actuating or driving the cutter with great rapidity so that it will deliver a large number of blows on the incrustation or deposit on the interior of the tube or flue, will automatically slowly rotate the cutter so that the blows will be directed upon all parts of the interior of the tube or flue, and one which will be adapted to utilize the exhaust motive fluid to blow away the cuttings as the cleaner advances in the tube or flue.

An important object of the present invention is the provision of a cutter which will be of long life and such simple construction that it is practically impossible for it to get out of order, and to provide a very simple and yet extremely effective means for vibrating the cutter, whereby the blows of the cutter may be delivered with the greatest possible force.

Having the foregoing objects in view, the invention embraces certain improved features and novel combinations of parts set forth hereinafter and recited in the appended claims.

In the accompanying drawings: Figure 1 is a longitudinal section, partly in elevation, of the complete invention in position within a steam boiler tube or flue; Fig. 2, a section on line 2—2 of Fig. 1; Fig. 3, a section on line 3—3 of Fig. 1; and Fig. 4, a detail perspective of the cutter.

The general type of motive fluid pressure turbine for operating the present invention is set forth in my copending application, Serial No. 269,693, filed July 14, 1905, and this turbine motor consists of a head or shell 1 adapted to be coupled to the motive fluid pressure supply pipe and an entrant or inner head or shell 2, between which and the shell 1 is a fluid motive space to let the motive fluid through the ports or ducts 3. Rigidly secured to and projecting from the shell 2 is a stub shaft 4, on which is loosely mounted a turbine wheel 5 having vanes 6 adapted to receive the motive fluid coming from the ports 3, whereby the turbine wheel 5 is rotated at a rapid rate. Formed integral with, or rigidly secured to, the turbine wheel 5 is a sleeve 7, to the outer end of which is rigidly secured a cam 8. The sleeve 7 has a worm 9.

Formed integral with the shell 2, or connected thereto by brackets or arms 10 between which are openings $10^a$, is a stationary cleaner head section 11 of general conical form, the conical formation $11^a$ being adjacent the turbine wheel so that the exhaust motive fluid issuing from the open side of the shell 2 will pass through openings $10^a$ and be spread or diverted to the interior of the boiler tube of flue A by the cone $11^a$, and thus the cuttings will be blown ahead of the device.

A rotary cleaner head section 12 is loosely mounted on the sleeve 7 and provided with an internal circular rack 13. Secured to a short shaft 14, mounted in brackets 15 integral with the stationary cleaner head 11, are a worm gear wheel 16 and a conical gear 17, the former meshing with the worm 9 and the latter with the rack 13. This gearing causes a comparatively slow rotation of the entire rotary cleaner head 12. The rotary cleaner head 12 has radial guides 18 and 19 disposed diametrically opposite and these, together with the outer end 20 of the rotary cleaner head 12, guide the cutter, which is shown at 21, being of substantial U-shape with its cut-out portion 22 receiving cam 8 in a loose fashion so that the action of the cam on the cutter is an impactive one and the shell receives blows which rapidly reciprocate it so that its sharpened ends or blades 23 and 24 alternately strike opposite sides of the tube or flue A.

In operation, the motive fluid pressure received in the interior of the shell or head 1, passes through the ducts 3 and rapidly rotates the turbine wheel 5 by impinging on the blades or vanes 6 thereof, which causes corresponding rotation of the cam 8 and an extremely rapid impactive vibration of the cutter 21, causing the blades or edges 23 and 24 to alternately strike diametrically opposite portions of the tube or flue A, but the gearing 9, 16, 17 and 13 causes the entire rotary cleaner head section 12 to be turned at a relatively slow rate so that as the entire device is fed through the tube or flue, the cutter strikes around the entire circle of the interior of the tube and thereby successively cuts out zones of incrustation, the exhaust motive fluid pressure meanwhile, being spread by the conical stationary cleaner head section 11 and blowing ahead of the device the cuttings.

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

1. In a steam boiler tube or flue cleaner or scraper, the combination with a cleaner head, of a slidable cutter adapted for free vibration in both directions transversely of the cleaner head and carrying at its opposite ends cutter blades adapted to strike from opposite sides of the cleaner head, a cam having a loose impactive co-action with the cutter for vibrating the said cutter, and means for rotating the cam.

2. In a steam boiler tube or flue cleaner or scraper, the combination with a relatively stationary cleaner head section, of a relatively rotatable cleaner head section, a cut-

ter carried by the relatively rotatable cleaner head section, a motor, means for operating said cutter from said motor, means for rotating the rotary cleaner head section from the motor comprising an internal circular rack carried by the rotary cleaner head section, and gearing carried by the relatively stationary cleaner head section interposed between said rack and the motor.

3. In a steam boiler tube or flue cleaner or scraper, the combination with a relatively stationary cleaner head section, of a relatively rotatable cleaner head section, a cutter carried by the relatively rotatable cleaner head section, a motor, means for operating said cutter from said motor, and means for turning the rotary cleaner head section from the motor comprising a circular rack carried by the rotary cleaner head section, a worm operated by the said cutter operating means, and gearing on the stationary cleaner head section comprising a worm wheel meshing with the worm and a conical gear connected to the worm and rotating therewith and meshing with the rack aforesaid.

4. In a steam boiler tube or flue cleaner or scraper, the combination with a relatively stationary cleaner head section, of a relatively rotatable cleaner head section, a cutter adapted to vibrate transversely of the rotary cleaner head section and carried thereby, a rotary member, a cam carried by the rotary member and adapted for vibrating the cutter, and gearing for rotating the rotary cleaner head section comprising a circular rack carried by said rotary cleaner head section, a worm carried by the rotary member aforesaid, a worm wheel meshing with the worm and carried by the stationary cleaner head section, and a conical gear secured to and rotating with the worm wheel and meshing with the rack aforesaid.

In testimony whereof, I hereunto affix my signature in presence of two witnesses.

CYRUS S. DEAN.

Witnesses:
SARAH V. LOCKWOOD,
F. W. HUGHES.