

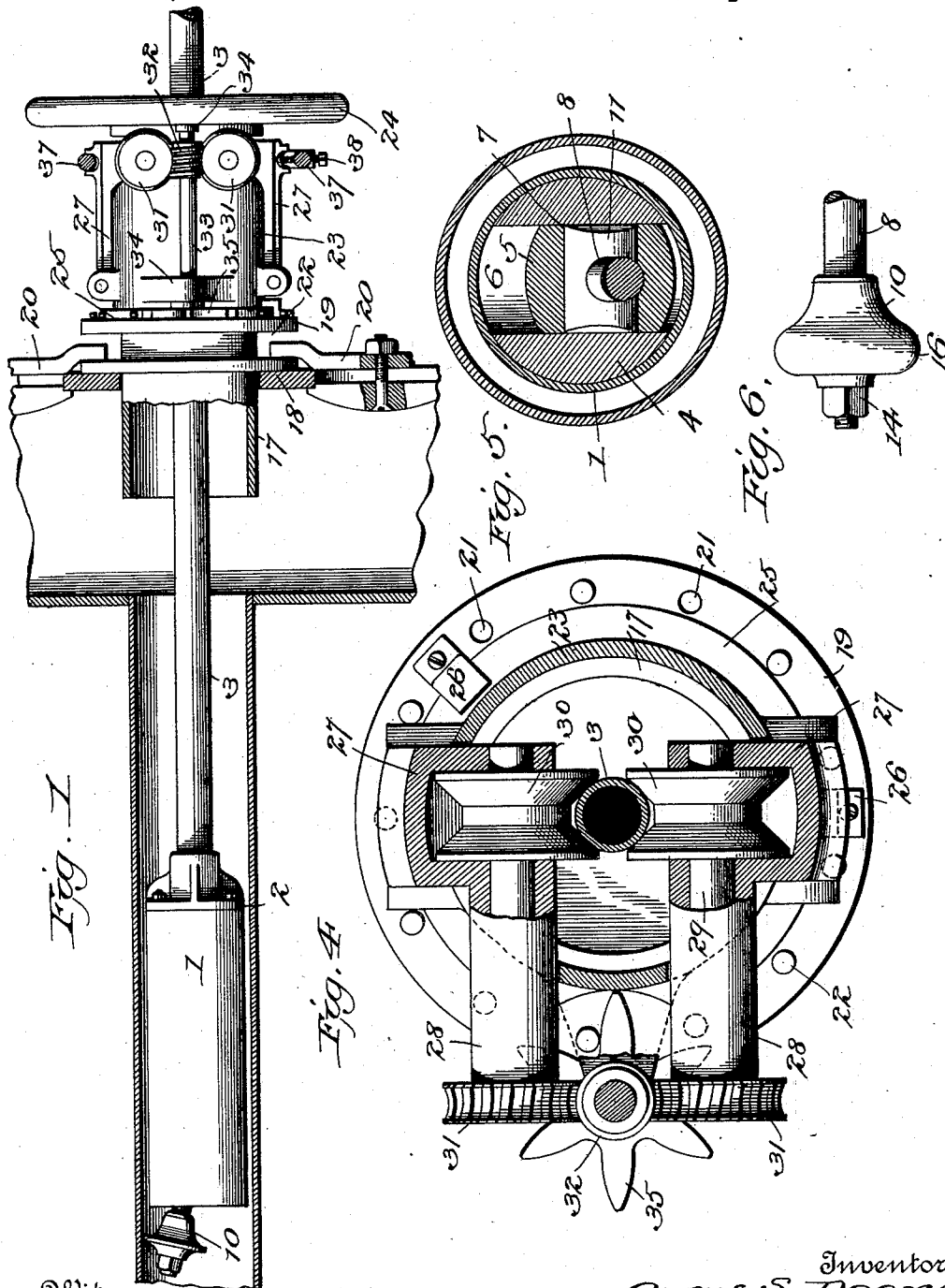
(No Model.)

2 Sheets—Sheet 1.

C. S. DEAN.
WATER TUBE CLEANER.

No. 580,775.

Patented Apr. 13, 1897.



Witnesses
Albert Spiden
Albert Spiden

Inventor
Cyrus S. Dean
By *Van Buren Hillyard*
Attorney

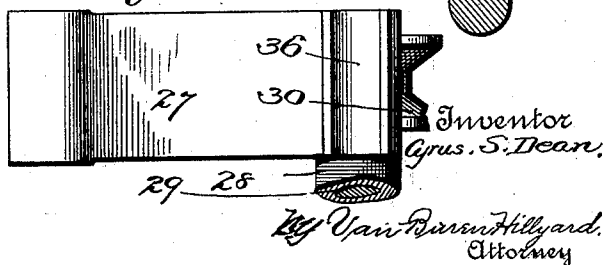
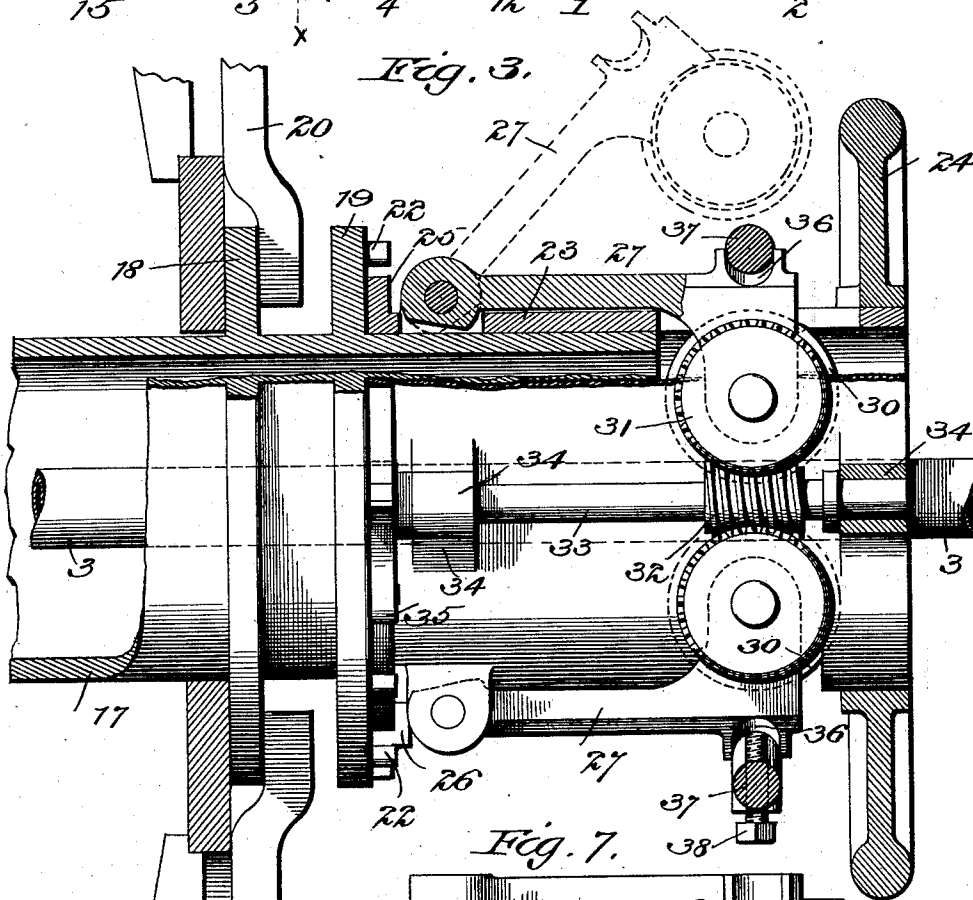
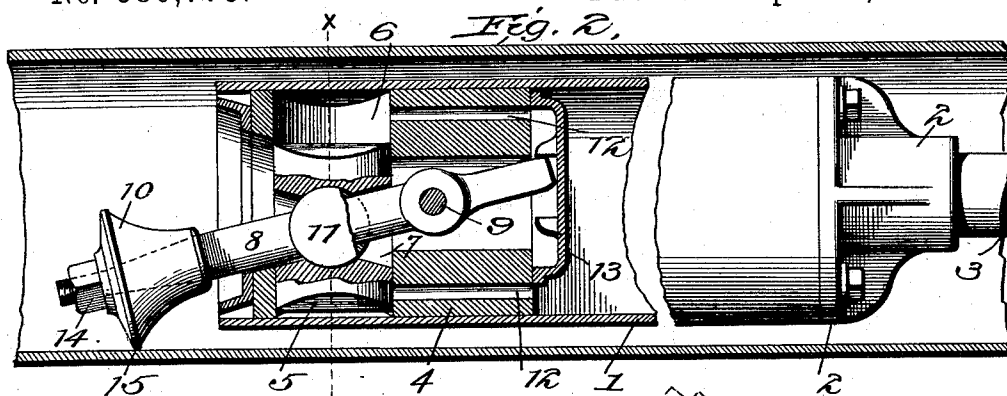
(No Model.)

2 Sheets—Sheet 2.

C. S. DEAN.
WATER TUBE CLEANER.

No. 580,775.

Patented Apr. 13, 1897.



Witnesses
Albert Spiden.

Inventor
Cyrus S. Dean.

Wm Van Buren Hillyard,
Attorney

UNITED STATES PATENT OFFICE.

CYRUS S. DEAN, OF FORT ERIE, CANADA, ASSIGNOR TO WILLIAM B. PIERCE, OF BUFFALO, NEW YORK.

WATER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 580,775, dated April 13, 1897.

Application filed November 13, 1896. Serial No. 611,949. (No model.)

To all whom it may concern:

Be it known that I, CYRUS S. DEAN, a subject of the Queen of Great Britain, residing at Fort Erie, in the county of Welland and Province of Ontario, Canada, have invented certain new and useful Improvements in Water-Tube Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to tube-cleaners, and aims to provide a tool which will remove and loosen the scale, deposits, and incrustation from either the inner or outer side of a tube, the scale-loosener being provided in different forms and removably fitted to a vibrating arm, so that when one loosener is worn it can be replaced by a new one, or one form be substituted by another.

A vital feature of the invention is the provision of means for securing a positive feed of the cleaner throughout the entire length of the tube without requiring an adjustment of the feed mechanism after the cleaner has advanced a certain length or distance and to enable the device to be operated in a comparatively small space.

Other objects and advantages are contemplated and will suggest themselves to those skilled in the art as the nature and details of the invention are fully understood; and to this end reference is to be had to the following description and the accompanying drawings, in which corresponding and like parts are designated in all the views of the drawings by the same reference-characters.

Referring to the drawings, Figure 1 is a detail view of a tube-cleaner embodying the essential principles of this invention, the same being shown partly in elevation and partly in section and as it will appear when in service. Fig. 2 is an enlarged view of the cleaner, parts being broken away. Fig. 3 is an enlarged view of the mechanism for advancing the cleaner through a tube, the dotted lines showing the pivoted arms thrown outward when it is required to place the cleaner within a tube or remove it therefrom after the feeding mechanism is in place. Fig. 4 is a view of the feeding mechanism from its inner end. Fig. 5 is a section on the line X X of Fig. 2. Fig. 6 is a detail view of

a scale-loosener for removing the incrustation from the outer sides of a tube. Fig. 7 is a top plan view of a pivoted arm.

The cleaner comprises a shell or hollow body 1, closed at one end by a cap 2, to which a hose or other pipe 3 is fitted and having a chambered head 4 at its opposite end. A piston 5 reciprocates within the chamber 6 of the head and has a transverse mortise or opening 7, through which passes a vibrating arm 8, pivoted to the head at 9 and bearing a scale-loosener 10 at its outer end. The mortise or opening 7 flares toward its ends at a middle point to afford clearance for the vibrating arm 8 when the cleaner is in operation. A rocking bearing 11 is mounted in a bore in the piston at right angles to the mortise 7 and has a transverse opening for the passage of the vibrating arm 8. This arm has a relative sliding movement in the rocking bearing by reason of its pivot 9 being fixed and the piston reciprocating in a straight line, thereby permitting of the point of engagement between the said rocking bearing and arm adapting itself so as to permit the piston to reciprocate freely without any binding between it and the parts 8 and 11.

The piston and rocking bearing are constructed of different metals of such nature as to obviate the necessity of a lubricant between them. If the piston is constructed of iron or steel, the rocking bearing will be formed of brass or like composition for the purpose specified. Ports 12 lead into the ends of the chamber 6 and open into the shell 1 through the rear end of the head 4, and these ports are controlled by a slide-valve 13, which is operated by a rear extension of the vibrating arm 8. The vibrating arm has a limited play relative to the slide-valve, whereby a rebound of the scale-loosener will uncover the inner end of a port by moving the piston without shifting the slide-valve, thereby admitting the steam or other motive medium behind the piston to drive it before the said slide-valve is shifted, the parts being so proportioned that the opposite port is closed by the piston an instant prior to the shifting of the slide-valve for uncovering the said ports. Thus it will be seen that the ports are alternately closed and opened at their oppo-

site ends by means of the slide-valve and pistons, this construction being necessary to the successful operation of the tool.

The scale-loosener is of circular form and is mounted upon a tapering portion of the vibrating arm 8 and is held thereon by a nut 14. When the diametrically opposite points of the scale loosener or cutter are dulled or become unfit for further effective work, the nut 14 is loosened and the cutter turned so as to bring new points in position for active service, after which the nut is retightened, so as to hold the cutter in the adjusted position. For cutting or loosening scale, incrustation, &c., from inner sides of a tube the scale-loosener has a cutting edge 15; but where the scale is to be removed from the outer side of a tube the device has a rounded or blunt edge 16, which impacts against the inner sides of a tube and causes the latter to vibrate to such an extent as to dislodge and cause the scales to peel or strip.

The feeding mechanism consists of a tube 17, having outer flanges 18 and 19 between its ends and is adapted to be secured in an opening in the head-sheet of a boiler opposite the tube to be cleaned by suitable means, preferably by clips 20, bolted to the head-sheet and engaging the flange 18. The flange 19 is formed with a series of openings 21, in which pins 22 are removably fitted, whereby the relative speed of the feeding mechanism can be varied by placing the pin in each or every alternate opening, as will be readily understood. A tubular head 23 is rotatably mounted upon the outer end of the tube 17 and has a hand-wheel 24 secured to its outer edge to be grasped for rotating the head, and the inner end of the head is flanged, as shown at 25, and is engaged by a clip 26, secured to the flange 19, so as to retain the head 23 in place. Arms 27 are located at diametrically opposite points and have pivotal connection at their inner ends with the tubular head and are provided at their outer ends with bearing-sleeves 28, in which are journaled shafts 29, bearing feed-pulleys 30 at their inner ends and worm-wheels 31 at their outer ends, which intermesh with a worm 32 on a shaft 33, journaled in bearings 34, projecting from a side of the head 23. A star-wheel 35 is secured to the inner end of the shaft 33 and its points or cogs engage with the pins 22 as the head 23 is rotated, thereby imparting movement to the shaft 33 and to the feed-pulleys 30 through the intermediate instrumentalities, as herein described. The feed-pulleys 30 have approximately V-shaped peripheral grooves, so as to insure a sufficiently firm gripping action between them and the pipe 3 to feed or advance the cleaner through the tube.

The outer ends of the pivoted arms 27 operate through openings in the head 23 and have notches 36 to receive a clamp ring or band 37, by means of which they are held in place and the feed-pulleys 30 caused to grip the opposite sides of the pipe 3. This clamp-

band 37 has a binding-screw 38, by means of which the pressure of the feed-pulleys against the sides of pipe 3 can be regulated.

When it is required to place the cleaner in position or remove it from a tube after the feeding mechanism is in place, the clamp-band 37 is disconnected from the arms 27 and the latter are thrown outward, as indicated by the dotted lines in Fig. 3, whereby an unobstructed passage is afforded for the entrance or exit of the cleaner. After the cleaner has been introduced into a tube to be cleaned and the feed-pulleys 30 have been caused to grip the sides of an operating-pipe 3, and the steam or other motive medium being supplied to the shell and the scale-loosener set in operation in the manner set forth, the cleaner is advanced by turning the hand-wheel 24, which rotates the head 23 upon the tube 17, and by reason of the star or spur wheel 35 engaging with the pins 22 the feed-pulleys 30 are rotated in the manner set forth, and engaging frictionally with the sides of the pipe 3 move the latter and the cleaner carried thereby. The feed can be regulated either by turning the hand-wheel 24 more or less rapidly, or if the said hand-wheel is to be rotated at a uniform speed the feed can be regulated by changing the position of the pins 22, either by placing them in each opening 21 or at any required distance apart, having one or more openings intervening.

The tube-cleaner, comprising the chambered head, reciprocating piston, slide-valve, and scale-loosener, as herein disclosed, with the exception of the rocking bearing and the vibrating arm having sliding or loose connection therewith, is not claimed herein, because it forms the subject-matter of an application filed by me September 9, 1896, Serial No. 605,238.

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

1. In a tube-cleaner, the combination of a chambered head, a reciprocating piston located in the chamber of the head and having a transverse mortise, a rocking bearing located in the mortise of the piston and having a transverse opening, a vibrating arm bearing a scale-loosener and operating loosely through the opening of the rocking bearing, and means for reciprocating the piston to vibrate the said arm, substantially as set forth.

2. In a tube-cleaner, the combination of a head, a reciprocating piston having a transverse mortise flaring toward its ends from an intermediate point, and having a circular bore at right angles to the mortise, a rocking bearing located in the said bore and having a transverse opening, a vibrating arm bearing a scale-loosener and operating loosely through the opening of the rocking bearing, and an actuating mechanism for reciprocating the piston, substantially as and for the purpose set forth.

3. In combination, a tube-cleaner, an op-

erating pipe or stem connected therewith, oppositely-disposed feed-pulleys for gripping the pipe or stem upon opposite sides, actuating mechanism for rotating the feed-pulleys
5 for advancing or withdrawing the tube-cleaner, and a rotatable head carrying the feed-pulleys and their actuating mechanism whereby the tube-cleaner is simultaneously
10 turned and advanced or moved longitudinally, substantially as set forth for the purpose described.

4. In combination, a tube-cleaner having an operating pipe or stem, independently-movable supports, parallel shafts journaled
15 in the said supports and bearing pulleys at their inner ends to grip the opposite sides of the operating stem or pipe, and having gear-wheels at their outer ends, a third shaft having a gear intermeshing with the gear-wheels
20 of the parallel shafts, and means for rotating the third shaft, substantially as set forth for the purpose described.

5. In combination, a tube-cleaner having an operating pipe or stem, pivoted arms, bearing
25 feed-pulleys to engage with the opposite sides of the operating pipe or stem, means for securing the pivoted arms when closed to

hold the feed-pulleys in positive engagement with the operating-stem, and actuating mechanism for the feed-pulleys, substantially as
30 set forth.

6. The herein-described means for simultaneously turning and moving longitudinally a tube-cleaner, consisting of a support provided with projecting portions, a head rotatably
35 mounted upon the support, arms having pivotal connection with the rotatable head, means for holding the pivoted arms together at their free ends, parallel shafts journaled to the pivoted arms and having feed-
40 pulleys and gear-wheels, a third shaft having a gear to intermesh with the gears of the aforesaid parallel shafts, and a star or spur wheel secured to the third shaft and adapted to engage with the projections of the support
45 upon rotating the head for imparting a positive movement to the shafts and feed-pulleys, substantially as specified.

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

CYRUS S. DEAN.

Witnesses:

ALEXANDER H. BELL,
ELLIS HUGHES.