(No Model.)

H. L. HILDRETH.

BOILER FLUE CLEANER.

No. 604,047. Patented May 17, 1898.

Fig. 1.

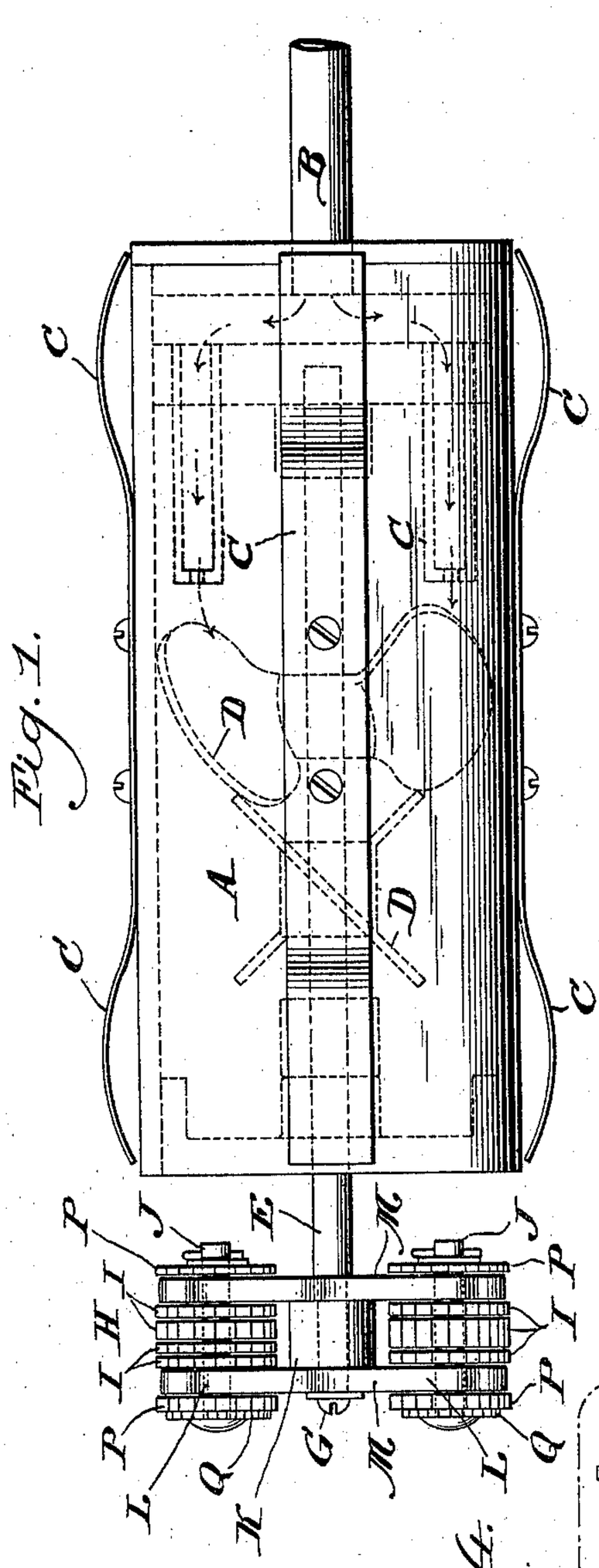


Fig. 2.

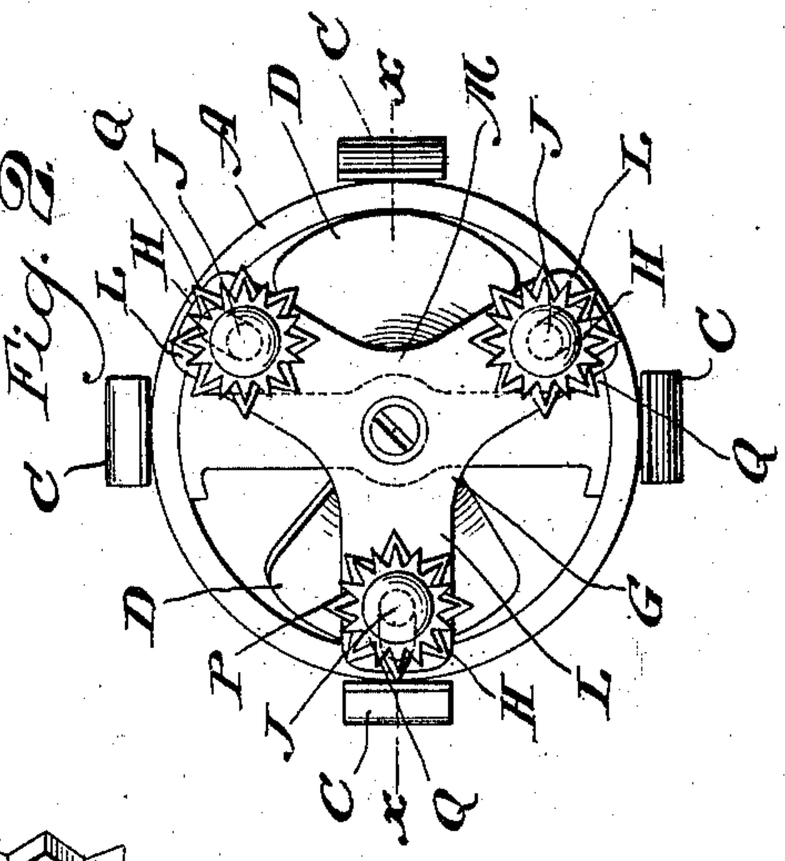


Fig. 3.

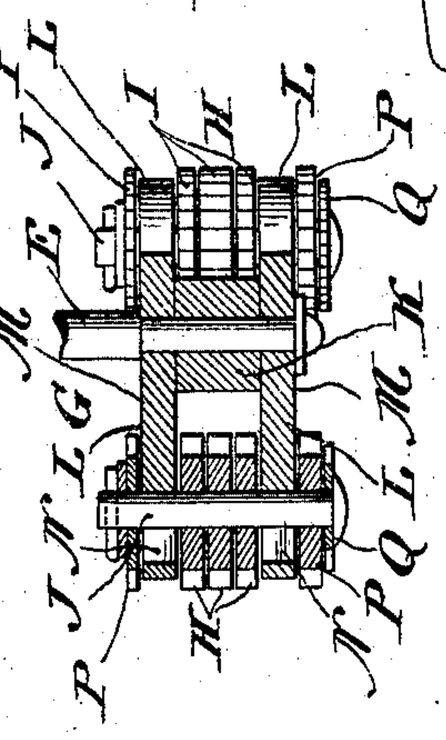


Fig. 4.

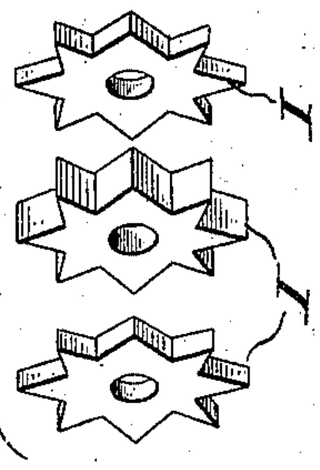
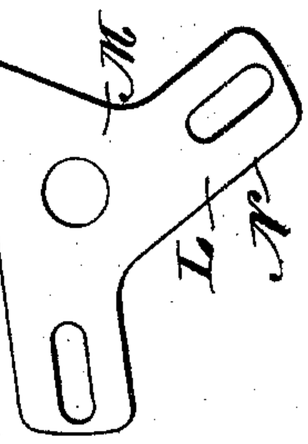


Fig. 5.



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HENRY L. HILDRETH, OF SAGINAW, MICHIGAN.

BOILER-FLUE CLEANER.

SPECIFICATION forming part of Letters Patent No. 604,047, dated May 17, 1898.

Application filed July 10, 1897. Serial No. 644,060. (No model.)

To all whom it may concern:

Be it known that I, HENRY L. HILDRETH, of the city and county of Saginaw, State of Michigan, have invented an Improvement in Boiler-Flue Cleaners, of which the following is a specification.

My invention relates to boiler-flue cleaners; and it consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

More particularly my invention relates to a device for cutting or loosening the scale from the interior of boiler-flues and permitting it to be blown out.

In Letters Patent No. 574,422, granted to me on the 5th day of January, 1897, I have shown a boiler-flue cleaner consisting of a hollow head containing a screw-propeller journaled therein and adapted to be rotated by a jet of steam or air forced through the head and provided on its end exterior to the head with arms carrying rotary scale-cutters which are adapted to be thrown outward by centrifugal force against the inner walls of the flue, and thus act to cut the scale therefrom when the head is drawn or moved through the flue.

My present invention relates particularly to the scale-cutters, and is designed to more perfectly and readily cut away or loosen the scale from the inner walls of the flues.

In the accompanying drawings I have shown my improved scale-cutters applied to the traveling head and rotary propeller of the aforesaid Letters Patent No. 574,422.

Figure 1 is a plan view of a boiler-flue cleaner embodying my invention. Fig. 2 is an end elevation of the same. Fig. 3 is a sectional view of the scale-cutting devices on the line *x x* of Fig. 2. Fig. 4 is a perspective view of some of the detached cutters; and Fig. 5 is a plan view of one of the cutter-plates, showing a modified construction thereof.

A is the head, which is open at one end and is attached to a tubular rod B, by means of which it may be moved through the boiler-flue and through which steam or air may be blown.

C are springs on the outside of the head A to guide it and adapt it to variations in the sizes of the tubes.

E is a propeller-shaft journaled in the hollow head A and provided with propeller-wings D. The end of the shaft E projects beyond the front end of the head and carries the scale-cutting devices. The air, steam, water, or other fluid is blown from the tube B and, passing through nozzles or apertures in a diaphragm in the rear of the body A into the hollow body, as indicated in dotted lines in Fig. 1, acts upon the propellers D to rotate the shaft E, and thus operate the cutters which the shaft carries.

So far as the apparatus has been described it is fully shown in the Letters Patent No. 574,422, before referred to, to which reference may be had for greater particularity.

I shall now describe my present improvements.

Mounted upon the front end of the propeller-shaft E is a frame G, having adjacent to its outer edge one or more scale-cutters H, carried on shafts located in slotted bearings on the frame G, so that they will be thrown outward by centrifugal force when the propeller rotates.

The particular shape of the frame G or the number of scale-cutters H is not material; but in my preferred construction, as illustrated in the drawings, the frame G is composed of two three-armed plates M, fastened together on the propeller-shaft E by an intermediate hub K, and each pair of arms L of the plates M is provided with slots N, in which are located the shafts J, on which the scale-cutters are mounted.

The scale-cutters consist of toothed disks mounted on the shafts J, and in my preferred construction, as illustrated in the drawings, I employ for each cutter a series of independently-rotatable toothed disks I I I, mounted on the common shaft J. Where more than one scale-cutter is employed, the disks in the different cutters may be made of different widths, so that the line of separation between the disks in the different sets will be in different planes, and thus cut the scale which lies intermediate of the disks of the other cutters.

The slots N, in which the axes of the scale-cutters are located, may be radial, as shown in Fig. 2. I prefer, however, to construct them on lines slightly inclined from the radii,

as is shown in Fig. 5, which tends to make the cutters press harder against the inner walls of the flue and to cut faster.

In addition to the cutters I, I may also employ cutting-disks P P Q, located on the outside of the arms of the frame, which serve both to increase the cutting action and to protect the arms. The small cutters Q act to finish off the cleaning of the scale.

I do not mean to limit myself to the details of construction which have been shown for the purpose of illustration, as it is apparent that they may be varied without departing from the invention.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a boiler-flue cleaner, the combination with the hollow head and rotary propeller-shaft mounted therein, of a frame carried upon and rotating with the propeller-shaft, and an independent freely-rotatable scale-cutter having its axis parallel to the propeller-shaft and mounted on the frame in slotted bearings located to one side of the axis of rotation of the frame so as to move outward under the action of centrifugal force when the propeller-shaft rotates and produce a rolling frictional cutting-contact with the scale upon the interior of the tube.

2. In a boiler-flue cleaner, the combination with the hollow head and rotary propeller-shaft mounted therein, of a frame carried by and rotating with the propeller-shaft and having near its outer edges more or less radially-slotted bearings, a movable shaft arranged parallel to the propeller-shaft and movable in the slotted bearings, and a toothed cutting-disk carried by said shaft and movable with it in the frame.

3. In a boiler-flue cleaner, the combination with the hollow head and rotary propeller-shaft mounted therein, of a frame having parallel arms carried by and rotating with the propeller-shaft and in which the arms are each provided with a slot more or less radially disposed to the propeller-shaft, a shaft loosely mounted in the slots of the arms of the frame and thereby movable in a more or less radial direction, and a series of loose toothed cutting-disks carried by said shaft whereby said disks rotate upon their own axis while being movable more or less radially and bodily moved about the shaft.

4. In a boiler-flue cleaner, the combination with the hollow head and rotary propeller-shaft mounted therein, of a frame carried by and rotating with the propeller-shaft, and a series of scale-cutters carried by the frame out of alinement with the shaft but in substantially the same plane with each other and each consisting of a series of toothed disks mounted upon the same axis in which the line of separation between adjacent faces of the disks of one scale-cutter are out of the plane in which the corresponding line of separation occurs between the disks in the others whereby one set of cutters is moved bodily over the path traversed by the others and every portion of the scale subjected to the action of the cutters.

5. In a boiler-flue cleaner, the combination with the hollow head and rotary propeller-shaft mounted therein, of a frame carried by the propeller and having two parallel slotted arms, a shaft journaled in said slotted arms and adapted to move outward in said slots under the action of centrifugal force when the propeller-shaft rotates, and a scale-cutter having a toothed periphery loosely carried by said shaft intermediate of the slotted arms.

6. In a boiler-flue cleaner, the combination with the head and rotary propeller-shaft, of a frame carried by the propeller-shaft and having two parallel slotted arms, a shaft journaled in said slotted arms and adapted to move outward in the slots thereof under the action of centrifugal force when the propeller-shaft rotates, a series of independent toothed disks, arranged side by side, and a shaft guided loosely in the slotted arms and supporting the disks between said arms.

7. In a boiler-flue cleaner, the combination with the head and rotary propeller-shaft, of a frame carried by the propeller-shaft and having two parallel slotted arms, a shaft journaled in said slotted arms and adapted to move outward in the slots thereof under the action of centrifugal force when the propeller-shaft rotates, and a series of independent toothed disks mounted on the shaft between the slotted arms and one or more additional toothed disks on the axis outside of the slotted arms.

8. In a boiler-flue cleaner, the combination with the head and rotary propeller-shaft, of a frame carried by the propeller-shaft and having a series of pairs of parallel slotted arms, a shaft journaled in each pair of parallel slotted arms and independently adapted to move outward in the slots thereof under the action of centrifugal force when the propeller-shaft rotates, and a series of independent and loosely-rotatable toothed disks mounted on each shaft between the slotted arms.

9. In a boiler-tube cleaner, the combination with the hollow head and a rotary propeller and shaft journaled therein, of a frame secured to and rotating with the propeller-shaft and having one or more pairs of laterally-projecting parallel arms each of which is provided with a slot arranged obliquely to a radial plane through the propeller-shaft, a movable shaft or pin loosely supported within the slots of the arms so as to be capable of moving at each end to different degrees, and rotary cutting-disks loosely supported upon the shaft or pin intermediate of the two parallel arms.

In testimony of which invention I hereunto set my hand.

HENRY L. HILDRETH.

Witnesses:
EZRA J. DEMOREST,
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