

(No Model.)

L. KRUEGER.  
FLUE CLEANER FOR BOILERS.

No. 597,421.

Patented Jan. 18, 1898.

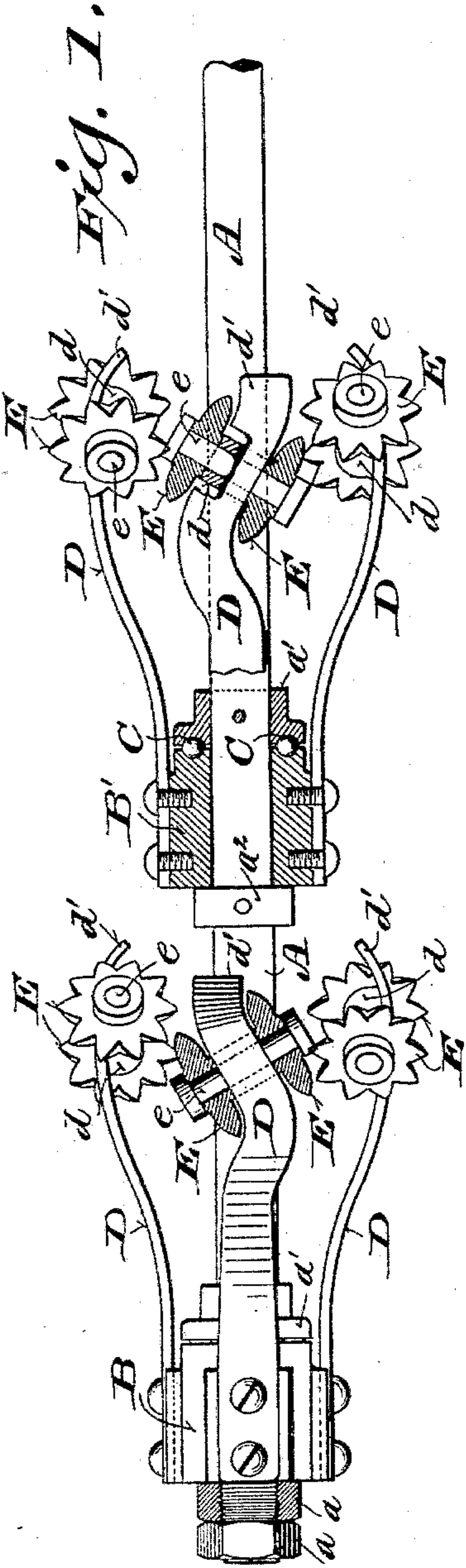
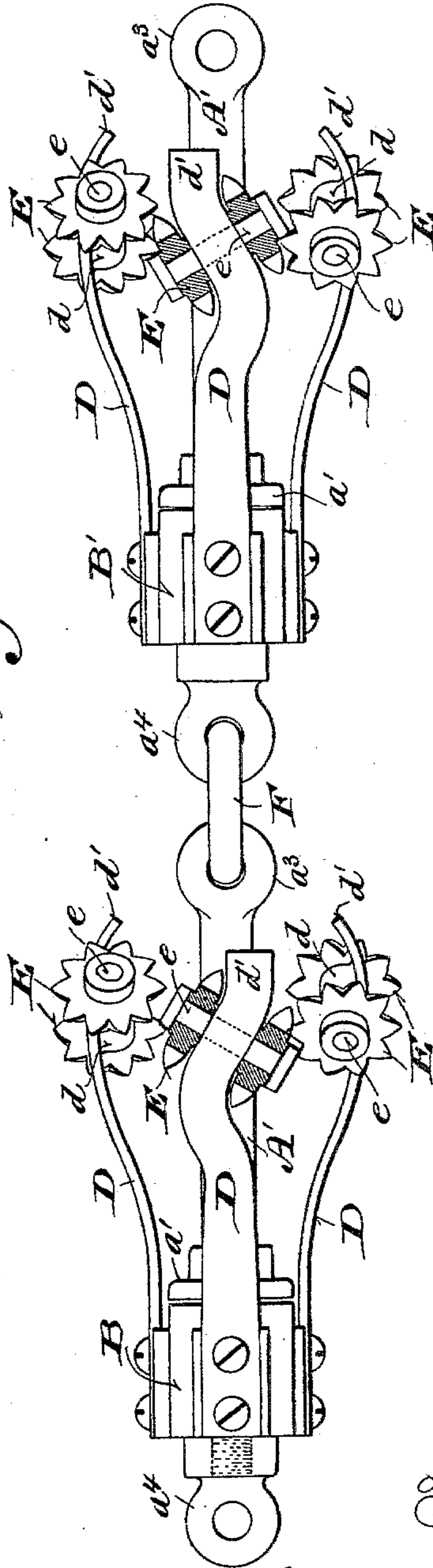


Fig. 2.



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# UNITED STATES PATENT OFFICE.

LOUIS KRUEGER, OF MILWAUKEE, WISCONSIN.

## FLUE-CLEANER FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 597,421, dated January 18, 1898.

Application filed December 21, 1896. Serial No. 616,372. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS KRUEGER, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Flue-Cleaners for Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main object of my invention is to loosen and remove the scale from the tubes or flues of steam-boilers.

It consists of certain novel features in the construction and arrangement of component parts of the flue-cleaner, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in both figures.

Figure 1 is a side elevation of one form of my improved flue-cleaner, certain parts being shown in section; and Fig. 2 is a similar view of a modified form of the device.

Referring to Fig. 1, which is particularly designed and intended for cleaning straight tubes or flues, A designates a rod upon one end of which the flue-cleaning heads are mounted and by which they are thrust through the boiler-tubes. B B' designate heads which are swiveled upon the rod A at or near one end thereof. The head B next to the end is held between nuts  $a$ , threaded on the end of the rod A, and a collar  $a'$ , formed upon or attached to said rod in any suitable manner. The head B' is held on the rod A a short distance from the head B between collars  $a'$  and  $a^2$ . The collars  $a'$  are formed in their faces next to the heads B B' with annular grooves or ball-races, and the adjacent ends of said heads are formed with corresponding grooves or races in which are inserted antifriction-balls C C, which enable the heads to turn more freely when they are thrust through boiler tubes or flues by the rod A. To each of the heads are attached lengthwise thereof a number of rearwardly-projecting and outwardly-curved springs D D, which are formed or provided at or near their free ends with trans-

verse sleeves  $d$   $d$ , arranged obliquely to the axis of the flue-cleaner. Upon the ends of pins or spindles  $e$   $e$ , inserted and held in these sleeves, are journaled the scale cutting or disintegrating disks E E, which may be constructed with teeth, as shown, or made with plain cutting edges. When the flue-cleaner is provided with two heads, the scale-cutting disks E of one head are set at an angle opposite that of those of the other head, so that as the flue-cleaner is thrust or drawn through the tube or flue the heads will be turned in opposite directions and the cutting or disintegrating disks of each head will describe spiral paths intersecting those described by the disks of the other head, thereby more effectively disintegrating and loosening the scale adhering to the interior of the boiler tube or flue. The spring-arms D D of the following head are spread a little more than the corresponding arms of the advancing head, so as to carry the disks E of the following head normally farther away from the rod A or the axis of the cleaner, and thereby cause them to more effectively loosen and remove the scale which may be left by the disks of the advancing head. In order that the heads, with their disks, may be thrust clear through a tube or flue and then withdrawn into and through it in a reverse direction, the spring-arms D D are preferably extended at their free ends  $d'$   $d'$  beyond the disks E and are curved inwardly toward the rod A, so as to terminate normally within the inner circumference of the boiler-tube and guide the disks E back into the same.

Referring to Fig. 2, which shows a modification of the device specially designed for use with curved or bent tubes or flues such as are employed in the Stirling boiler, instead of being mounted on a rigid rod A of sufficient length to reach through the tubes, the heads B B' are mounted upon separate short rods or stems A' A'. These stems are formed or provided at their ends with eyes  $a^3$  and  $a^4$  and are connected with each other by a link F or other flexible connection, by which they are permitted to pass through the curves or bends of the tubes without binding therein. To their outer ends are attached chains or ropes, by means of which they are drawn through the tubes. The eyes  $a^4$  are



tapped and screwed upon the ends of the stems A' and serve as collars or shoulders for holding the heads B B' thereon. Instead of swiveling the heads B B' upon the stems A' they may be rigidly fastened thereon and swivel connections provided between the outer ends of the stem and the cords or chains by which the device is drawn through the tubes. In place of with two heads, as shown, the cleaner may be made with a single head, having any desired number of spring-arms and pairs of disks. In short, the details of the device may be variously modified within the intended scope of my invention. For example, the ball-bearing shown at one end of each head may be duplicated at the other, the spring-arms D may be given a gradual quarter turn or twist to allow the oblique setting of the disks E without making the short lateral bends in said arms, as shown, and the ends d' of said arms may be further extended and attached to a sleeve or collar which is freely movable endwise upon the rod A or stem A'.

I claim—

1. In a flue-cleaner the combination with a rotary head adapted to turn about the longitudinal axis of the cleaner, a number of spring-arms attached lengthwise to said head, and a number of rotary disks mounted upon said arms obliquely to the axis of the flue-cleaner, substantially as and for the purposes set forth.

2. In a flue-cleaner the combination of a rod or stem, a head swiveled thereon, a number of spring-arms attached to said head lengthwise thereof, and a number of scale cutting or disintegrating disks mounted upon said spring-arms obliquely to the axis on which said head turns, substantially as and for the purposes set forth.

3. In a flue-cleaner the combination of two or more connected heads capable of turning about the axis of the flue-cleaner in opposite directions, and a number of spring-arms at-

tached to each head lengthwise thereof and provided at or near their free ends obliquely to the axis of the flue-cleaner with scale cutting or disintegrating disks, the disks of one head being set at an inclination opposite to that of the disks of the other head, whereby said heads are caused to turn in opposite directions when they are forced through the boiler tube or flue, substantially as and for the purposes set forth.

4. In a flue-cleaner the combination of a rod or stem provided with a collar which serves as a thrust-bearing and is formed with an annular groove or ball-race, a head fitted to turn upon said rod next to said collar, and formed in one end with a corresponding ball-race, antifriction-balls inserted between said head and collar, means of retaining the head upon said rod, and spring-arms attached to said head lengthwise thereof, and provided at or near their free ends with scale cutting or disintegrating disks which are set obliquely to the axis on which said head turns, substantially as and for the purposes set forth.

5. In a flue-cleaner the combination with a rotary head and means of forcing it through a boiler tube or flue, a number of spring-arms attached to said head lengthwise thereof and bent outwardly therefrom, and scale cutting or disintegrating disks mounted upon said arms and set obliquely to the axis of the flue-cleaner, said arms being extended at their free ends beyond said disks and curved inwardly toward the axis of the flue-cleaner, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

LOUIS KRUEGER.

Witnesses:

CHAS. L. GOSS,  
M. L. EMERY.