(No Model.)

L. J. WOLF.

FLUE CLEANER.

No. 589,589. Patented Sept. 7, 1897.

FIG. 1.

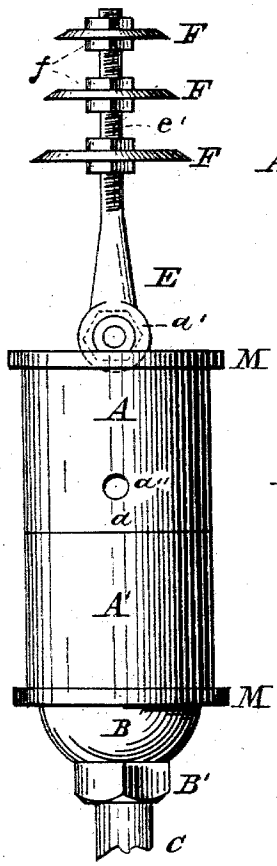


FIG. 3.

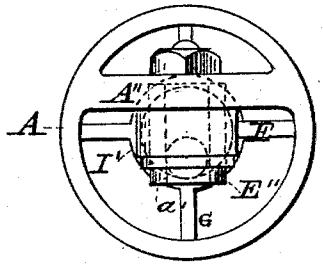


FIG. 4.

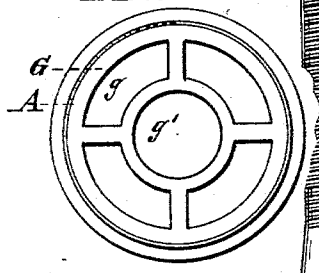


FIG. 5.

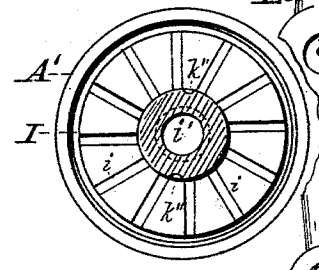
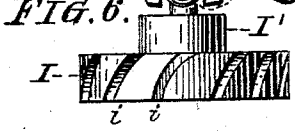


FIG. 6.



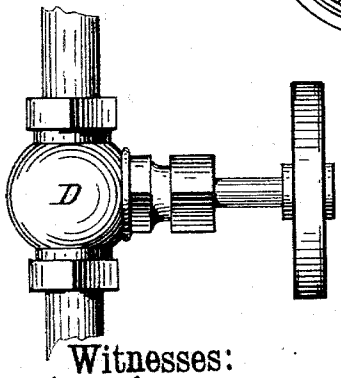


FIG. 2.

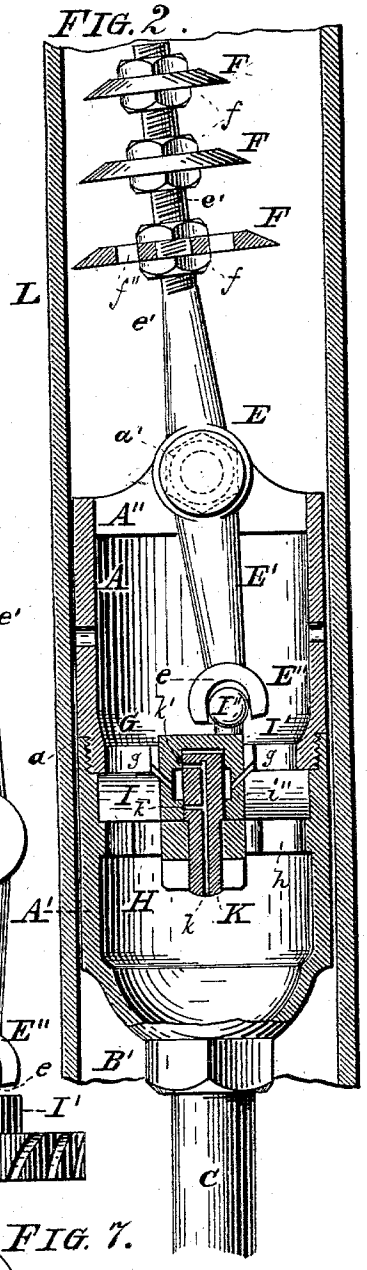
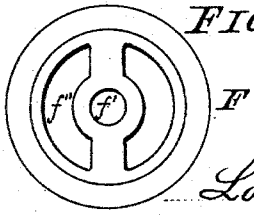


FIG. 7.



Witnesses:

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FLUE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 589,589, dated September 7, 1897.

Application filed February 4, 1897. Serial No. 621,972. (No model.)

To all whom it may concern:

Be it known that I, LOUIS J. WOLF, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Flue-Cleaners; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has general reference to flue-cleaners, and especially that class of devices adapted for use in so-called "water-tube" boilers for removing therefrom the deposits of lime and other impurities from the water; and it consists, essentially, in the novel and peculiar combination of parts and details of construction, as hereinafter first fully set forth and described, and then pointed out in the claims.

In the drawings already referred to, which serve to illustrate my said invention more fully, Figure 1 is an elevation of my improved flue-cleaner. Fig. 2 is a longitudinal sectional elevation. Fig. 3 is a plan of a portion of the flue-cleaner, the parts projecting above the body being omitted. Fig. 4 is a plan of the upper section of the body, looking toward the forward end thereof. Fig. 5 is a plan of the lower portion of said body. Fig. 6 is an elevation of the propeller-wheel and the vibrating lever connected therewith. Fig. 7 is a plan of one of the cutting disks or chisels.

Like parts are designated by corresponding letters of reference in all of the figures.

The object of this invention is the production of an efficient flue and tube cleaner, and it is especially designed for cleaning the tubes of that class of steam-boilers usually designated "water-tube" boilers in which the water to be converted into steam is contained within the tubes.

A A′ in the drawings represent the body of the flue-cleaner. It is a cylindrical shell composed of two sections screwed together at *a*, as clearly illustrated in Fig. 2. The upper section of this body has in its upper end a bridge A″, located to one side of the center line of said shell, to which is pivoted, by a bolt *a′*, a lever E, hereinafter to be referred to.

In the lower end of the section A there is formed integral with the shell a spider G, Fig. 4, having a central opening *g′* and side passages *g*, said spider acting as a diaphragm or bearing-surface for a propeller-wheel I, located in the lower section A′ and above a spider H, Fig. 2, in all respects similar to the spider G and formed integral with the said shell or lower section A′. In the central aperture of this spider H there is secured a stud-bolt K, upon which the propeller-wheel I revolves, said stud being provided with a central passage *k*, having branches *k′*, leading from the center to the periphery of said stud. This passage *k* and its branches *k′* serve as lubricating channels or conduits, as hereinafter to be described.

The propeller-wheel I consists of a circular disk having radially-arranged curved slots through its body and a central aperture *i*, engaging the stud K. This propeller-wheel I has upon its upper surface and centrally thereupon a boss I′, which in turn has upon it and to one side of its center a ball-shaped arm I″, wherewith engages the vibrating lever E in the following manner: The lower short arm E′ of this lever has transverse projections E″, the lower side of which is provided with a groove *e*, the width of which corresponds with the diameter of the ball-shaped arm I″, and in which groove the said ball revolves and reciprocates, whereby the rotary motion of the propeller-wheel is converted into a reciprocating one at the lower end of the said lever E.

The lever E is pivoted to the face of the bridge A″ by the bolt *a′*, already described, passing through the bolt-hole *b*, Fig. 6, of the lever, so that the lever may be readily placed into position by passing its lower end through the top or upper end of the shell A. Its upper long arm is formed into a screw *e′* to engage with and hold in proper position a series of chisels or circular disks F by means of lock-nuts *f*, said disks being made sharp at their periphery and the larger ones thereof provided with openings *f‴* to prevent obstruction to the passage of steam, air, or water as much as possible. These disks are of increasing diameter, the one nearest to the end of the lever being the smallest, as clearly shown in Figs. 1 and 2, and every next suc-

ceeding one somewhat larger in size, so that when the cleaner is in use each of these cutters takes and removes a portion of the deposit in the flue L. They are made circular in form in order to enable their being turned when worn or dull and thus allow of their entire periphery being successively brought into action and thereby to increase their usefulness to a considerable term. When dull at their entire periphery, they may be sharpened by grinding, and adjustment for reduction in size compensated for by proper adjustment of the lock-nuts *f* in a manner readily comprehended.

The lower end of the section A′ terminates in a bell B, having a hexagonal section B′ for the application of a wrench to enable the two sections being screwed together and taken apart, holes *a″* being provided in the upper section A for the application of a spanner-wrench.

Into the wrench-section B′ is screwed a pipe C, by means of which the flue-cleaner is pushed into and withdrawn from the flue L, a stop cock or valve D being provided at the outer end of the pipe to control the steam, compressed air, water, or other means by which the propeller-wheel is actuated.

In operation steam, compressed air, water under pressure, or other means is admitted to the shell A′, and, passing through the curved radial slots in the disk or propeller-wheel I, causes the latter to revolve very rapidly. This rotary motion is communicated to the vibrating lever by the arm I″, but this rotary motion is converted into a reciprocating one of said lever by the ball-shaped arm revolving in the groove *e* at the lower end of the said lever E, and which in turn causes the vibration of the long arm of said lever. The disks or chisels at this end of the lever being sharp act as cutters, and they will chip off the usually solid deposit within the tube L, each cutter taking a portion thereof, while the flue-cleaner is slowly revolved and pushed into the tube, the entire operation of cleaning a flue of all its deposits being accomplished in a few minutes of time. That portion of the said deposit removed by the cutters F is blown out of the flue by the steam or other fluid used as a means for revolving the propeller-wheel, it being understood that the device can be operated successfully with either steam, compressed air, or water under pressure.

In constructing the disks F, I make them a trifle smaller than required to touch the inner surface of the tube L to prevent injury to the tube, but this will not prevent the inner surface of said tube being perfectly cleaned, for the reason that the disks, by their momentum, will travel a trifle farther than the movement due to the throw of the lever.

To lubricate the revolving and reciprocating parts of the cleaner, which I find necessary for successful operation, I connect a lubricator (not shown) with the pipe C, which lubricator will discharge the lubricant in minute particles. A portion of this lubricant will pass through the passage *k* in the stud K and through its branches to the revolving and adjacent surfaces of the propeller-wheel and the spiders.

Flue-cleaners are usually made in various sizes ranging from two to five inches. In order to enable me to produce these sizes at but a comparatively small expense for patterns and to enable me to supply the demand for such various sizes from a relatively small stock, I provide the shell A A′ with projecting flanges M, Fig. 1, formed in one piece with or screwed onto the said shells. In this case I make the body of the shells to measure, say, two, three, and four inches in external diameter, and make the flanges to measure two and three-fourths, three and three-fourths, and four and three-fourths inches, respectively. Now if a flue-cleaner of any size below two and three-fourths inches is required I shall turn down the flanges M to fit the size demanded and do the same with the larger sizes. In this manner I am enabled to supply the demand for any size within the range of those made from a comparatively small stock, which is quite an advantage in the manufacture and sale of flue-cleaners.

By the construction of the flue-cleaner as described I have reduced the mechanism to but a few parts, all of which may be readily produced, so that the cost of manufacture of the apparatus is very low.

Having thus fully described my invention, I claim as new and desire to secure to me by Letters Patent of the United States—

1. A water-tube cleaner consisting, essentially, of a suitable shell, a motor within said shell, a vibrating lever pivoted within said shell and connected with said motor at one end, and a series of circular cutting-disks upon the other, projecting, end of said lever, said cutting-disks being of progressively-decreasing diameter and revolubly and adjustably mounted upon said projecting end of said lever, as and for the purpose specified.

2. A water-tube cleaner consisting, essentially, of a shell, a propeller-wheel in said shell, a ball-shaped arm on said propeller-wheel, a lever pivoted to a bridge in said shell, a groove at the lower end of said lever adapted to engage the ball of the arm, and a series of sharp-edged disks adjustably arranged upon said lever, as described.

3. In a water-tube cleaner the combination, with the shell composed of two parts screwed together as described, of a bridge in one of said parts and located to one side of the center thereof, a lever pivoted to said bridge and projecting with one end into the said body, a spider formed in one piece with the upper part of said body, a propeller-wheel below said spider, a further spider located below said propeller-wheel and formed in one piece with the lower part of said body, a ball-shaped

arm at the upper surface of the propeller-wheel, a slotted projection on the lower end of the said lever engaging the ball of said pitman, and a series of chisels at the upper end of said lever, said chisels being of different diameter, as and for the object stated.

In testimony that I claim the foregoing as my invention I have hereunto set my hand in the presence of two subscribing witnesses.

LOUIS J. WOLF.

Attest:
MICHAEL J. STARK,
MICHAEL J. STARK, Jr.