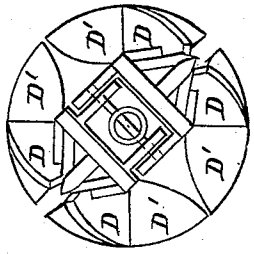
2 Sheets--Sheet 1.

T. H. DONOHUE.

Apparatus for Cleaning Boiler-Flues, &c.

No. 142,775. Patented September 16, 1873.

Fig. 3.



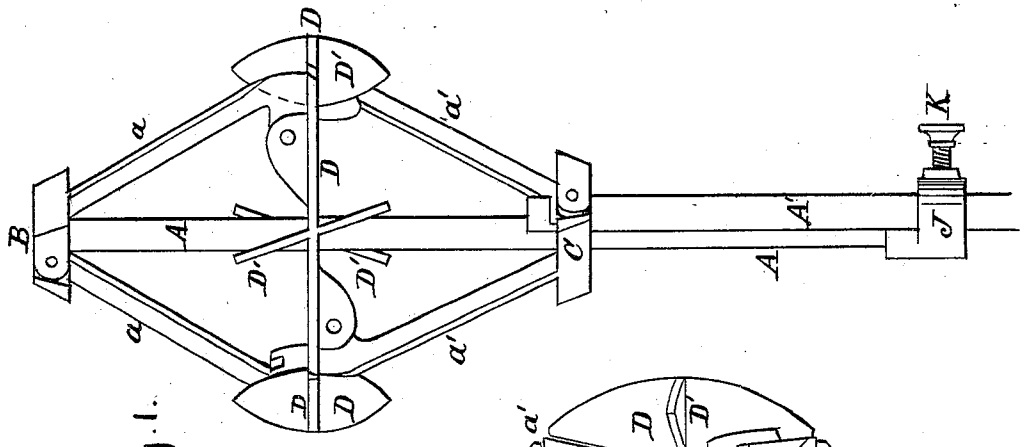
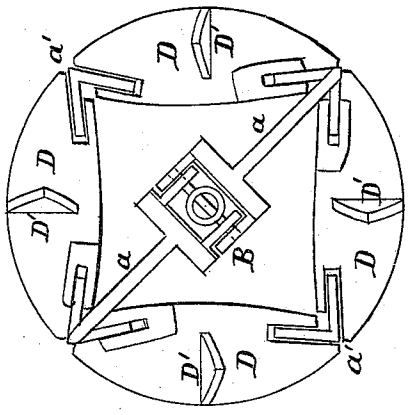


Fig. 1.

Fig. 2.



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by W. Morris Smith Atty

2 Sheets--Sheet 2.

T. H. DONOHUE.

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Fig. 5.

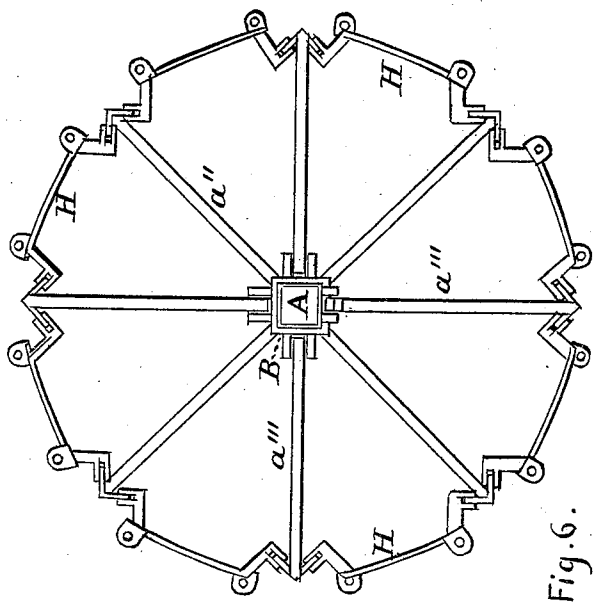


Fig. 6.

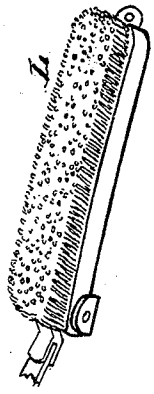
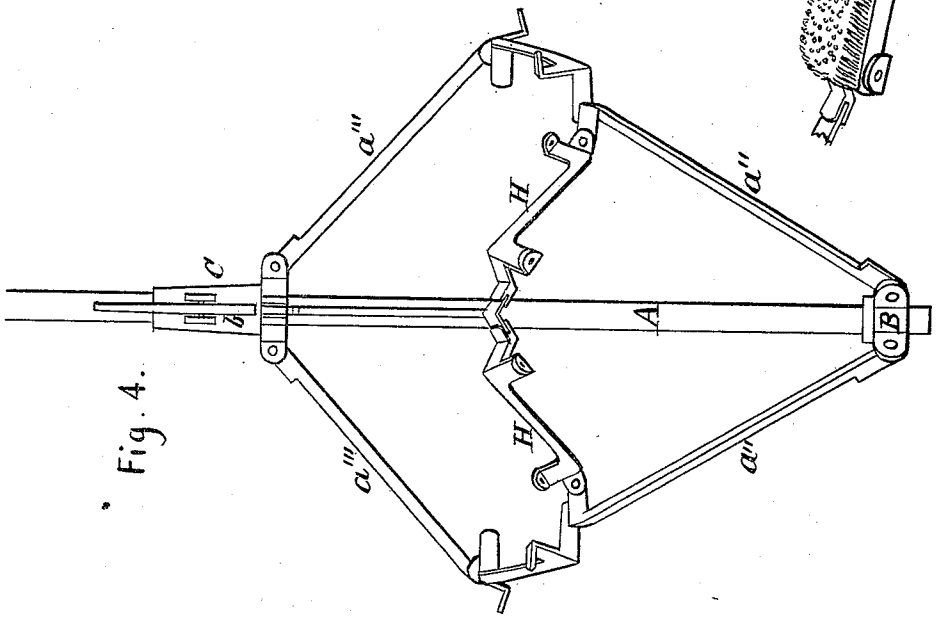


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS H. DONOHUE, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN APPARATUS FOR CLEANING BOILER-FLUES, &c.

Specification forming part of Letters Patent No. **142,775**, dated September 16, 1873; application filed August 12, 1873.

To all whom it may concern:

Be it known that I, THOMAS H. DONOHUE, of the city and county of Washington, in the District of Columbia, have invented an Improved Apparatus for Cleaning Boiler-Tubes, &c., of which the following is a specification:

This invention is designed especially for cleaning flue-tubes in steam-boilers, but is equally well adapted for such use in any circular pipes or sewers; and it consists in a novel combination of segments of a circle and diagonal supporting-arms with a central shaft, around which the former may be expanded or contracted at pleasure, to suit tubes of different diameters, without destroying the perfectly-cylindrical form at the periphery of said segments. It furthermore consists in a novel construction of the segmental blades or scrapers in combination with intersecting blades the peripheries of which are of different curvature, with the supporting-arms and central shaft, whereby the peripheries of said blades are made to assume a cylindrical form of any diameter between those of their greatest extension and contraction, as hereinafter more fully described. It also consists in a novel and positive method of determining and maintaining the desired amount of expansion of the scrapers.

In the accompanying drawings forming part of this specification, Figure 1 represents a side elevation of a flue-cleaner constructed according to my invention, showing the scrapers expanded to their greatest extent. Fig. 2 shows an end or top view of the same in the same position. Fig. 3 is a similar view of the same, showing the scrapers contracted to their smallest diameter. Fig. 4 is a side elevation of a similar apparatus expanded, which is adapted for use in tubes of larger diameter, to be fitted with brushes and scrapers arranged alternately around it. Fig. 5 is a top or end view of the same, and in the same position. Fig. 6 is a perspective view of a brush connected to one of the supporting-segments.

The same letters of reference occurring on the several figures indicate like parts.

This invention, in the main, is an improvement on and simplification of an apparatus for which I obtained a patent dated May 5, 1868, and numbered 77,466, for a chimney-cleaner; and I will now describe it by reference to the drawings, in which—

A represents the stem or staff of the apparatus, which, according to circumstances, may be constructed of the required length to reach from end to end of the flue or tube; or it may be made up in sections of convenient length to be connected successively by any suitable couplings. This staff, as shown in Fig. 1, carries a collar, B, which is rigidly attached at its upper end, and to which two or more arms, *a*, are hinged, the lower ends of each of the latter being connected with one end of each of two scrapers, D, the other ends of said scrapers being connected by similar arms *a'*, extending downwardly to a sliding collar, C, to which they are hinged, so that by lowering or raising the sliding collar C on the staff the circle described by the periphery of the scrapers may be diminished or enlarged. This construction is designed for small tubes—say from two to four inches diameter—for which I use four scraper-blades, D, connected, as before described, with the collars B and C, so that when the said collars are caused to approximate as nearly as possible to each other the scraper-blades D will form a circular disk around the stem A, and at right angles to the axis of the latter. On the other hand, to produce a circular scraper when the collars B C are extended far apart, the periphery of the body portion D of the scraper would form zigzag lines diagonal to the axis, when only a portion of their edges would come in contact with the tube through which they were passing. So, to provide for a perfectly-circular bearing-surface, I append to portion B, centrally, an upward and downward blade, D', which may be arranged slightly inclined upon the former, with their outer edges forming arcs of a circle of smaller diameter, and intercepting the blades D at an angle of between eighty and ninety degrees, so that in the expanded position the body portions D form a perfect circle of its largest diameter, and when contracted the upward and downward blades D' define the periphery of a circle of the smallest diameter, while, at any intermediate point, the two blades D and D' combined form a circle of any intermediate diameter. The instrument shown in Figs. 4 and 5 is substantially

the same in construction and operation; but, being designed for use in much larger tubes, I increase the number of scraper-bars H, and also of the links or arms a'' and a''', which connect said bars with the fixed collar B and sliding collar C. These bars H may be formed like those represented in Fig. 1, but are here shown as adapted to receive brushes L or detachable scrapers, which, when worn, may be removed for renewal or grinding.

In Fig. 4 the sliding collar is represented at the upper end of the staff A, and with which it is caused to engage through the medium of a spring-borne pawl, *b*, while in Fig. 1 the fixed collar B is at the upper end of the staff, and the sliding collar C below is connected with a supplemental staff, A′, passing through an eye, J, attached to the staff A, so that said collar may be secured firmly in position by the set-screw K, or by simply grasping the two staves together in the hand, whereby the scrapers are forced to cut their way through rust or other obstructions instead of yielding, as is the case when they are merely supported or expanded by springs.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The scraper-blades, in combination with their expanding arms, the fixed and sliding collars B C, and stem A, when said blades are connected in pairs at their one end with the fixed collar, and in like manner at their opposite ends with the sliding collar, as shown and described.

2. The scraper-blades D, constructed to form the longitudinal profile of a parabolic spindle, the outer edges of which form the arc of a circle of a diameter equal to the greatest expansion of the instrument, in combination with a similar blade, D′, whose outer curvature forms the arc of a circle equal to that under the greatest contraction of the same, as shown and described.

3. The combination of the supplemental or expanding staff A′, guide J, and sliding collar C with the staff A and scraper-blades D D′, for operation substantially as set forth.

Witnesses: THOS. H. DONOHUE.
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