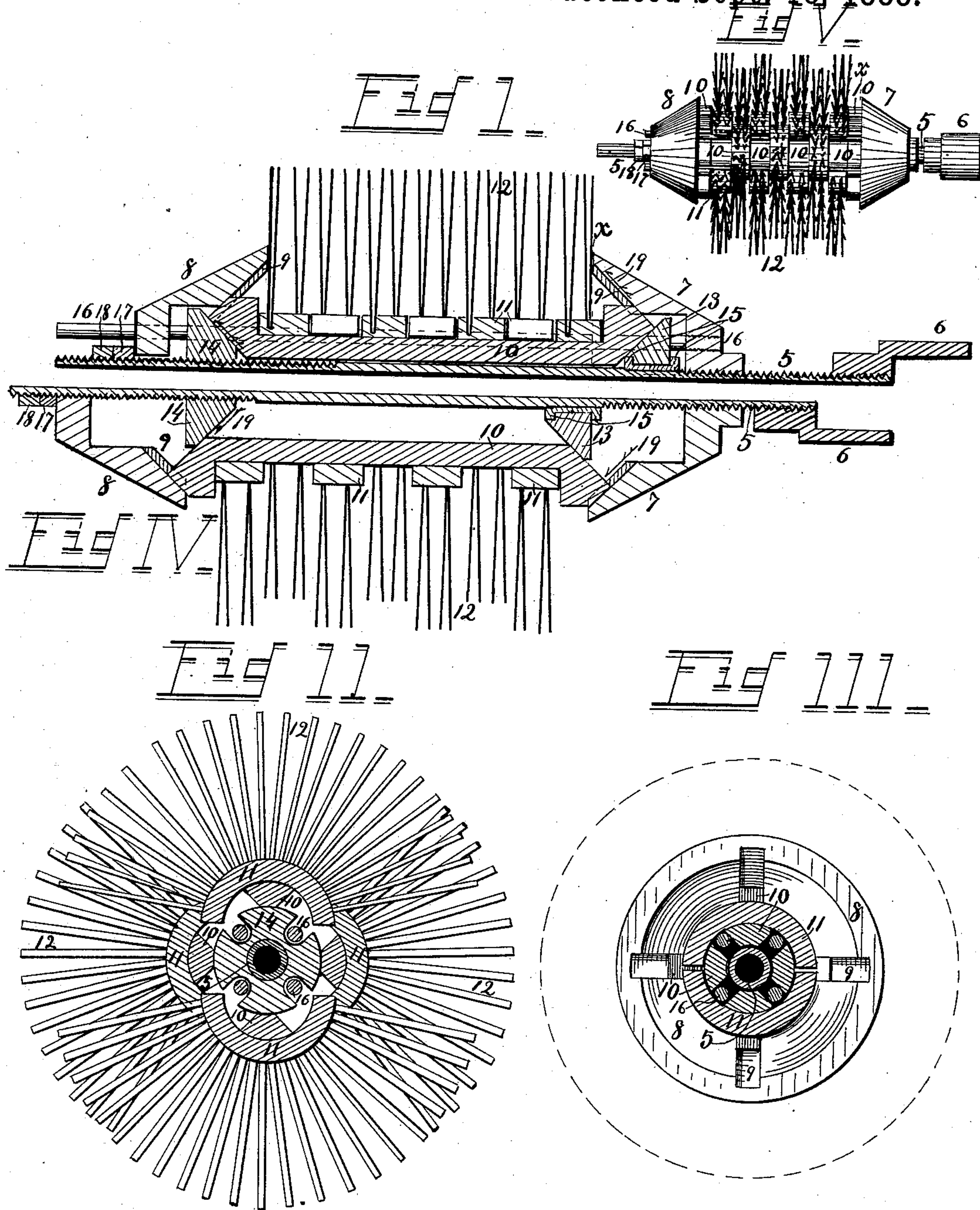


(Model.)

G. W. BERKSHIRE.
FLUE CLEANER.

No. 389,634.

Patented Sept. 18, 1888.



Witnesses
S. E. Stevens
P. C. Stevens

Inventor
George W. Berkshire.
By his Attorney W. A. Stevens.

UNITED STATES PATENT OFFICE.

GEORGE WASHINGTON BERKSHIRE, OF LOUISVILLE, KENTUCKY.

FLUE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 389,634, dated September 18, 1888.

Application filed October 10, 1887. Serial No. 251,576. (Model.)

To all whom it may concern:

Be it known that I, GEORGE WASHINGTON BERKSHIRE, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Flue-Cleaners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to that class of flue-brooms which are designed to be forced through the flues of boilers and to be reciprocated longitudinally therein for the purpose of removing therefrom accumulations of soot and other refuse products of combustion; and the object of the invention is to provide means for rapidly expanding and contracting diametrically a broom made up of a series of segmental brushes.

To this end my invention consists in the construction and combination of parts forming a flue-broom, hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the upper half of a flue-broom closed, illustrating my invention. Fig. 2 is a transverse section midway of the brush, illustrating the principle of expansion. Fig. 3 is a transverse section of the same at the dotted line *x* of Fig. 1. Fig. 4 is a longitudinal section of the other half of my flue-broom opposite to the half shown in Fig. 1, and showing relatively thereto the change of positions of the parts which has taken place by expanding the broom; and Fig. 5 is a side elevation on a smaller scale of my flue-broom expanded.

5 represents the central shaft, which for the sake of lightness may be a pipe screw-threaded along each end and provided at its rear end with a socket, 6, into which a handle of any length may be secured. The broom is provided with two heads, 7 and 8. The head 7 is screw-threaded upon the shaft 5, and the head 8 is free upon the shaft, permitting the latter to revolve in it and to pass through it without contact. The interior of each head is conical, opening toward the other, and each head is provided with four radial grooves, 9, to receive ribs upon the slanting ends of

staves 10. Upon these staves are secured the brushes comprising the segmental rings 11 and the steel spring-wires 12. Each stave has a series of these segmental brushes on its length, and the brushes on one stave alternate with those of the next stave.

13 represents one expander journaled between collars 15 upon the shaft 5, and 14 the other expander screw-threaded upon the shaft 5. Both expanders are conical on their inner ends to engage inclines on the undersides of the staves 10 at their ends.

16 represents four slide-bars rigidly fixed at one end of each in the head 7 and lying parallel with the shaft 5 and circumferentially between the staves 10. The head 8 and the expander 13 are free to slide longitudinally upon the bars 16; but they are both held by the bars from revolving with the shaft 5 when the latter is screwed either way through the head 7.

17 represents a collar fixed upon the shaft 5 to bear against the outer end of the head 8. As here shown, this collar is a common nut screw-threaded upon the shaft and secured in the desired position by a check-nut, 18, also screw-threaded upon the shaft.

The operation is as follows: By revolving the shaft 5 to the right and holding the head 7 stationary the said shaft will be screwed through the head 7 and the expander 14 and advance the expander 13. This expander crowds the staves 10 forward, forcing them in the direction of the arrows 19, guided by the stationary head 7 at one end and by the stationary expander 14 at the other end. The head 8 is crowded constantly to its bearings 17 by the staves 10, which are constant intermediates between this head and the journaled expander 13.

Theoretically there should be an interior shoulder to the head 8 opposite to the shoulder 17; but the staves holding the said head constantly up to the shoulder 17 obviate the necessity for an interior shoulder, and the shoulder 17 is made a screw-nut to adjust the head 8 to the length of the staves when setting up the parts of this broom and to readjust the parts in case of wear. Thus screwing the shaft to the right expands the broom by forcing the staves and the segmental brushes 11 12 thereon away from the center. The reverse motion of the shaft 5 screws it outward through the head

7 and the expander 14, while by pressing the shoulder 17 against the head 8 forces the staves inward down the inclines in reverse direction to the arrows 19. It may be seen that the screws on the body 5 through the head 7 and the expander 14 being both the same number of threads to an inch and both the same handed, either right or left, and the bars 16 keeping the said head and expander circumferentially in a fixed relation to each other, their distance apart will not be varied by revolving the screw-shaft 5 either way. It may be further seen that the collars 15 and the shoulder 17 are both fixed to the same shaft, 5, thereby maintaining a fixed distance between the head 8 and the expander 13. Thus all parts are maintained mechanically in any position without the aid of springs.

Each segment 11 is a semicircle secured midway upon its supporting stave and extending its ends beyond the said stave over the adjacent bars 16 and to the center of the adjacent staves when the expanders are closed and the perimeter of the outer ends of the brush-wires 12 is a perfect circle, and when the broom is expanded the overlapping of alternate segments of the brushes maintains the whole broom in so near a cylindrical form (see Fig. 3) as to produce the effect of a perfect cylinder in service.

Some of the advantages of this flue-broom are its simplicity, its mechanical action without springs, its internal adjustability, and its quickness and facility of operation.

Having thus fully described my invention, what I wish to secure by Letters Patent is the following:

1. The combination of the shaft 5, screw-threaded along each end, the head 7, and the conical expander 14, screw-threaded thereon, the conical expander 13, journaled on the said shaft, collars 15, fixed upon the shaft at both sides of the expander 13, the head 8, mounted freely upon the shaft 5, the shoulder 17, fixed upon the said shaft outside the head 8, the heads 7 and 8 being internally conical and radially grooved, staves 10, slanted above at their ends and provided with ribs to fit the said grooves and slanted below to fit the conical ends of the said expanders, and slide-bars 16, fixed in one of the said heads and fitted to slide freely through the other head and through one of the expanders, substantially as shown and described.

2. The combination of a shaft having on it two screws of the same thread, an internally-conical grooved head threaded upon one of the said screws and a conical expander threaded upon the other, another internally-conical radially-grooved head mounted freely on the said shaft opposite to the first-named head,

and an outer shoulder therefor fixed on the said shaft, and another conical expander journaled between collars on the said shaft opposite to the first-named expander, substantially as shown and described, whereby a staved brush-broom may be expanded, as set forth.

3. The combination of the shaft 5, provided with the fixed collars 15 and the adjustable shoulders 17, and having screw-threads along its ends, the head 7, screw-threaded upon one of the said ends, and the expander 14, screw-threaded upon the other end, the expander 13, journaled between the collars 15, and the head 8, loosely mounted upon the shaft against the shoulder 17, the staves 10, fitted to engage the said heads and expanders, and brushes upon the staves, substantially as shown and described.

4. The combination of a central shaft, 5, the heads and the expanders mounted thereon, and staves loosely held between the heads and expanders, and the slide-bars 16, fixed in one of the heads and passing between the staves parallel with the shaft, substantially as shown and described, whereby certain parts at a distance from the said one head are kept in fixed rotary relation thereto.

5. The staves 10 and the segmental brushes 11 12, mounted thereon, each segment being secured midway on its own stave and overlapping the adjacent segments, and the segments on adjacent staves alternating longitudinally, substantially as shown and described.

6. The combination, in flue-brooms, of a stave and a series of brushes having bodies formed as circular segments secured at the center of each at a distance apart upon the said staves and projecting at each side thereof, the said stave being adapted to be held upon a shaft, substantially as shown and described.

7. The combination of the screw-threaded shaft, the heads and the expanders mounted thereon, and the bars 16, fixed in one head parallel with the shaft and loosely fitted through the said expanders and the other head, substantially as shown and described.

8. The combination of the screw-threaded shaft, the heads and expanders mounted thereon, the segmental brushes mounted on staves between the said heads, and the bars 16, fixed in one head and passing freely through the said expanders and the other head and located between the said staves when the latter are closed, substantially as shown and described.

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

GEORGE WASHINGTON BERKSHIRE.

Witnesses:

BENONI MARSHALL,
SAMUEL STETSON.