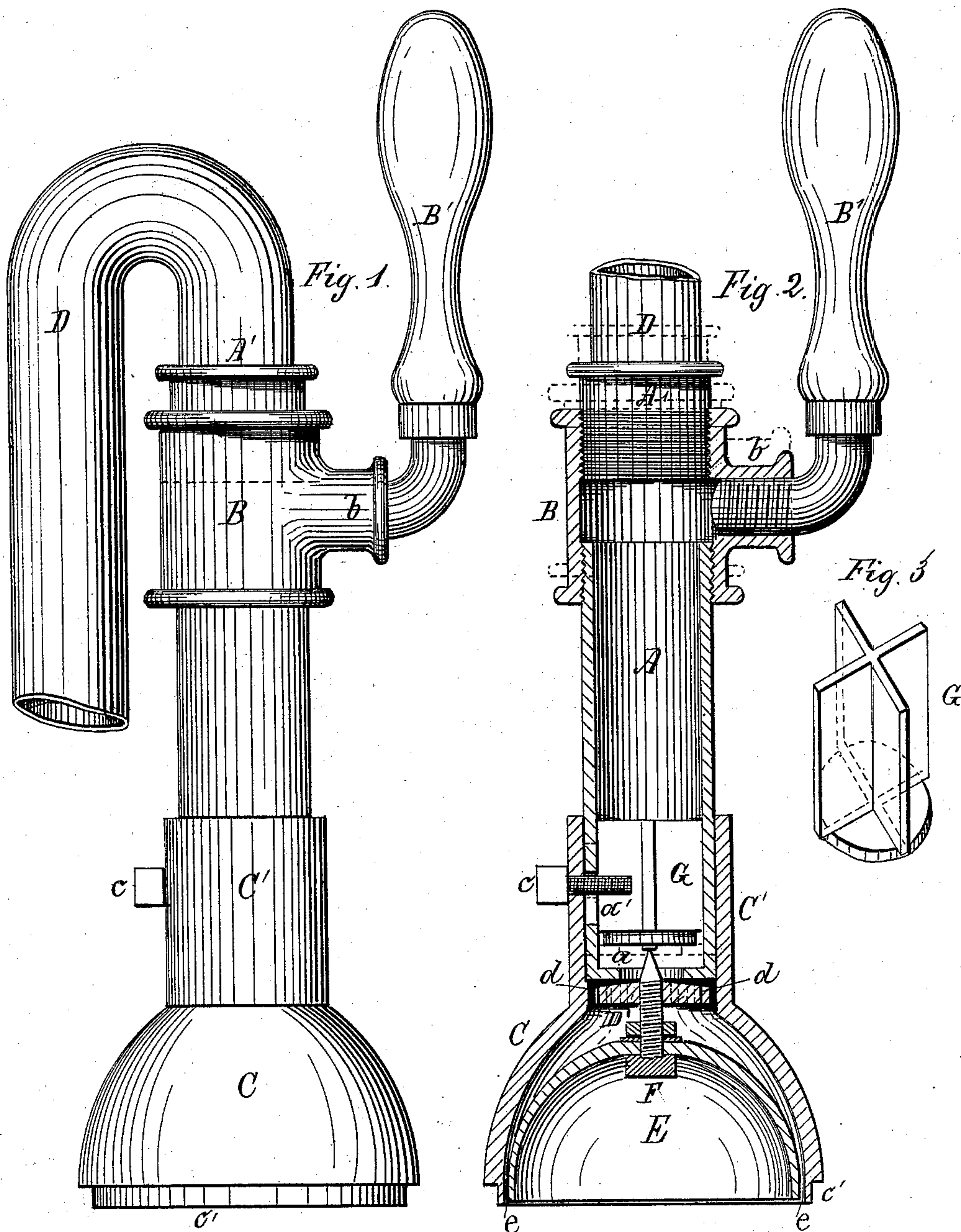


J. S. SMITH.  
Tube-Cleaner.

No. 217,164.

Patented July 1, 1879.



Witnesses  
Henry Orth,  
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att'y



# UNITED STATES PATENT OFFICE.

JOHN S. SMITH, OF JACKSON, MICHIGAN.

## IMPROVEMENT IN TUBE-CLEANERS.

Specification forming part of Letters Patent No. **217,164**, dated July 1, 1879; application filed November 29, 1878.

*To all whom it may concern:*

Be it known that I, JOHN S. SMITH, of Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Tube-Cleaners; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a sectional elevation of my improved tube-cleaner. Fig. 2 is a vertical longitudinal section. Fig. 3 is a view of the valve detached.

In the drawings, A is a short section of a tube—say, about six inches in length and one inch in diameter—having a screw-thread at one end, and provided at the opposite end with an inwardly-turned flange or rim, *a*, forming a seat. B is a coupling, by which tube A is united with another screw-threaded tube, A', to which latter tube is attached a section of hose, D, preferably made of rubber. The coupling B is provided on one side with a socket, *b*, into which is screwed a handle, B'.

C is a flaring cup-shaped nozzle, provided with a sleeve, C', of such inner diameter as to fit closely over and slide upon tube A, to which tube it is secured by means of a screw, *c*, which passes through a slot, *a'*, formed in one side of the tube A.

The larger end of the hollow cup-shaped nozzle C is made with an annular projection, forming a shoulder, *c'*, the size and shape of this projection being such as to adapt it to fit tightly into the open end of the boiler tube or flue.

At the point where the sleeve C' is expanded to form the nozzle C there is a transverse diaphragm or plate, D', rigidly attached to or formed in one piece with the nozzle, and provided with a number of ports, *d d*.

E is a concavo-convex deflector secured to the plate D'. The outer diameter of this deflector is a little less than the inner diameter of the large end of the nozzle, and it is arranged concentric to said nozzle, so as to leave a narrow annular throat or open space between them, as shown at *e*.

F is a screw passing through the deflector and the plate D', securing these parts together, and the inner end of this screw projects to a tapering point within the flange *a* of the tube A, and it regulates the opening of valve G.

The valve G is supported within tube A in such manner as to slide back and forth in the tube.

The valve-seat is formed by the flange *a*, the aperture through which is closed by the valve G.

The operation of my device is substantially as follows: Supposing the parts to be in the position shown, and the hose D to be connected with the steam-boiler, the steam is let into the tube A through the hose by means of a stop-cock located at some convenient point between the tube and the boiler.

As will be readily understood, the steam cannot pass the valve G so long as the valve rests on the flange *a*, which forms the valve-seat *d*. The open end of the nozzle is now introduced into the end of the boiler tube or flue, and, by means of handle B', tube A is pushed into the sleeve C' toward plate D; but valve G, being in contact with the set-screw F, cannot move forward with the tube A; hence the steam passes freely through the opening within the valve-seat or flange *a*, and through the ports *d*; thence through the throat *e* into the flue, from which it drives soot and ashes or other undesired material.

After sufficient steam has been applied to the flue its further escape is prevented by sliding tube A back, which permits the valve G to instantly close the aperture at the end of the tube and check the exit of steam at that end of the tube.

It will of course be understood that the joint between tube A and sleeve C' must be steam-tight.

From the above description it will be seen that from the fact of the end of the boiler-tube being closed by the nozzle C, no cold air will enter the flue at the end so closed while the steam is being injected; and it will also be seen that the inwardly-projecting flange *a* forms a water-trap within tube A, to retain such water as may be formed by the condensation of steam within said tube.

It will be further observed that there is a similar trap formed within sleeve C', the two



traps insuring that but little condensed water shall be discharged through the throat *e*.

I do not wish to be limited to the form of nozzle shown in the drawings, it being apparent that, so far as relates to closing tightly an open end of the boiler tube or flue, a common disk, or a disk with an inwardly-projecting flange or rib, may be employed, attached to the end of the tube, through which steam is admitted; but I prefer the form shown, because, in addition to closing the end of the tube, a nozzle of this shape, when employed in conjunction with the deflector *F*, serves to throw the jets of steam directly against the inner surface of the flues.

A straight tube might be employed in combination with an inner plate or plug of less diameter than the tube to form an annular throat for the discharged steam, which would operate in some respects in substantially the same manner as my nozzle-deflector does; hence it will be seen that many modifications might be employed without departing from the spirit of my invention.

What I claim is—

1. A tube-cleaner provided with a valve which is closed by the steam when the cleaner is withdrawn from the flue or tube, and with mechanism, substantially as shown, constructed to open the valve when the cleaner is pressed against the flue or tube.

2. In a tube-cleaner, in combination with an inner tube provided with a valve-seat and valve, an outer tube in which the inner tube reciprocates, and to which mechanism is secured for opening the valve, substantially as set forth.

3. In combination with the tube *A*, provided with a valve and valve-seat, the nozzle *C*, provided with mechanism adapted to open the said valve by moving backward relative to tube *A*, substantially as set forth.

4. The combination, with the tube *A* and valve *G*, of sleeve *C'* and screw *c*, substantially as and for the purposes set forth.

5. In a tube-cleaner, the combination, with the nozzle *C*, of the sleeve *C'*, the sliding tube *A*, and the valve *G*, substantially as set forth.

6. In a tube-cleaner, the nozzle *C*, provided with the plate *D*, having ports *d*, in combination with the deflector *E*, valve *G*, and set-screw *F*, substantially as set forth.

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

JOHN S. SMITH.

Witnesses:

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