No. 618,011. Patented Jan. 17, 1899.

# T. G. MACY.

## SMOKE CONSUMING FURNACE.

(Application filed Mar. 28, 1898.)

(No Model.)

FIG. 1.

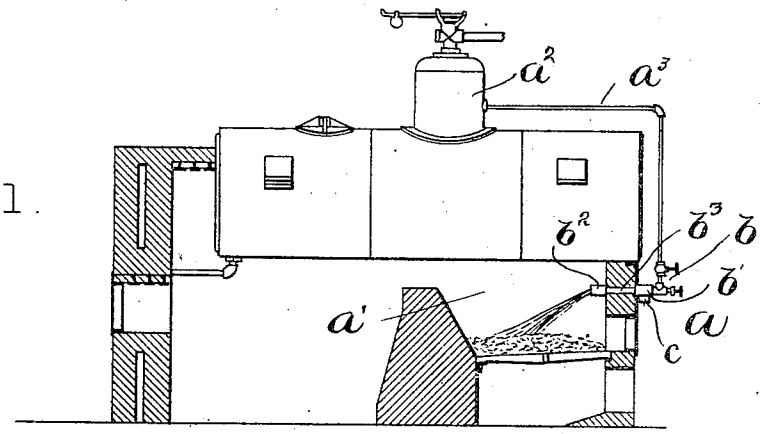
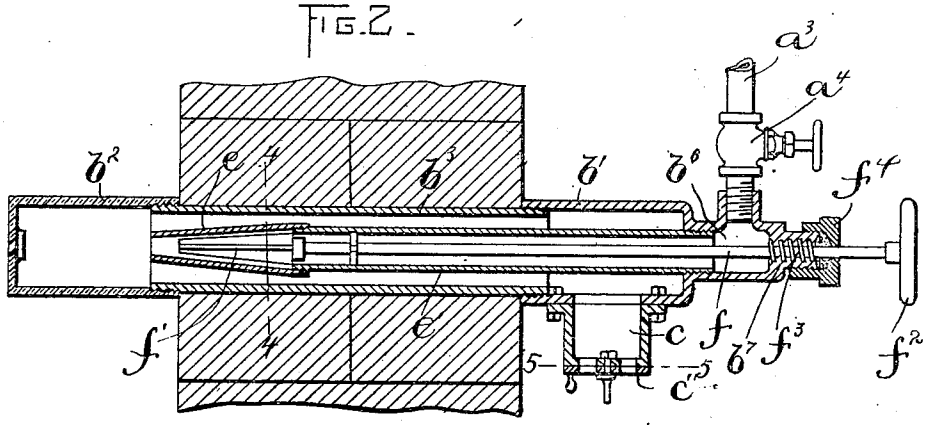



FIG. 2.



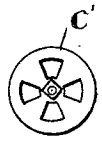




FIG. 5.

FIG. 3.

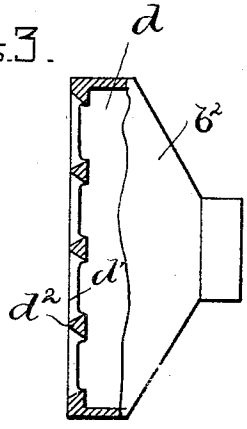
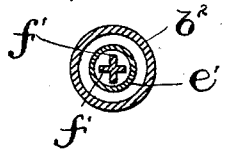



FIG. 4.




WITNESSES:

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# UNITED STATES PATENT OFFICE.

THOMAS G. MACY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO A. W. WORTHLEY, TRUSTEE, OF SAME PLACE.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 618,011, dated January 17, 1899.

Application filed March 28, 1898. Serial No. 675,394. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS G. MACY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention has relation to smoke-consuming furnaces of the class in which steam and air are forced into the combustion-chamber to be commingled with the gases and other products of combustion.

One of the objects of the invention is to provide certain improvements in the apparatus for introducing the air and steam whereby it may be inserted or placed in any style or type of furnace without the necessity of constructing the latter especially to receive the same.

A further object of the invention is to improve the twyer through which the steam and air are delivered, whereby the stream of steam and is are broken and the latter are thrown or forced into the combustion-chamber in a sheet and are so agitated that the gases and other products of combustion are thoroughly commingled, whereby the carbon and smoke are practically entirely consumed.

Still another object of the invention is to provide an improved device for cleaning the injector through which the steam is delivered to force the air into the fire-box or combustion-chamber.

To these ends the invention consists of certain features of construction and relative arrangement of parts, all as I have illustrated upon the drawings and shall now proceed to describe in detail, and then point out in the claims hereunto annexed.

Reference is to be had to the accompanying drawings, and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 represents a furnace equipped with my invention. Fig. 2 represents an enlarged sectional view through the apparatus for forcing the air into the furnace. Fig. 3 represents in plan view, partially in section, the end of the twyer. Fig. 4 represents a section of the injector on the line 4 4 of Fig. 2. Fig. 5 represents a sectional view through the damper on the line 5 5 of Fig. 2.

Referring to the drawings, which portray one embodiment of the invention selected by me for the purposes of illustration, $a$ indicates a boiler-furnace of any approved construction, having a fire-box or combustion-chamber $a'$. Through an aperture in the furnace-wall is passed a twyer $b$, composed of the outer section $b'$, the inner section or end $b^2$, and the intermediate section $b^3$, the latter being of any length necessary to extend through the furnace-wall. The outer sections $b'$ $b^2$ are fitted on the projecting ends of the tube $b^3$ and may be removed for cleansing purposes. The outer section $b'$ is provided with an inlet-duct $c$, on which is fitted a damper $c'$, having openings adapted to register with openings therein, the damper being adjustable to vary the volume of air delivered through the twyer. The inner end of the twyer is flared or distended laterally, as shown at $d$, and is provided with elongated narrow discharge-apertures, the walls of which are downwardly inclined, as shown in Fig. 2, so that the air is thrown downwardly upon the fire in a thin wide sheet.

To break or subdivide up the sheet of air, interrupting devices $d^2$ separate the openings and are triangular in horizontal section. Thus the apertures flare outwardly, as shown in Fig. 3.

The air is forced into the fire-box or combustion-chamber by a steam-injector having a nozzle $e$, which is conical, as shown, and is on the end of a pipe $e'$, extending from the forward end section $b'$ of the twyer. The said end section $b'$ is provided with the reduced portion $b^5$, forming a chamber $b^6$, into which steam is introduced from the dome $a^2$ through the pipe $a^3$. The rear end of the pipe $e'$ is introduced into the chamber, so that steam is delivered in the rear of the openings in the twyer and causes commingled air and steam to be forced into the fire-box, the supply of steam being regulated by the valve $a^4$. To clean out the injector-nozzle $e$, a rod $f$ is passed into the pipe $e'$ through the chamber $b^6$ and is equipped on its inner end with radial wedge-shaped blades $f'$, which are adapted

to fit in the nozzle *e*. The outer end of the rod is provided with a hand-wheel $f^2$, and it is threaded, as shown at $f^3$, so as to be screwed into the end wall $b^7$ of the steam-chamber $b^6$, there being a stuffing-box $f^4$. Now from the foregoing it will be seen that the steam forces the air through the downwardly-inclined flaring slots in the end of the twyer, and that it is so interrupted as to be commingled with the gases and products of combustion, and to furnish sufficient oxygen for the consumption of the carbon and smoke.

When the injector-nozzle becomes foul, the hand-wheel $f^2$ is turned and the blades are advanced and revolved, this scraping the internal walls of the nozzle, whereby the scrapings are blown into the furnace without affecting the passage of the steam through the nozzle.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. An apparatus of the character specified, comprising an injector and a twyer in which said injector is located, said twyer having a laterally-distended end with elongated narrow slots extending from side to side of the same, the walls of said slots being downwardly inclined.

2. An apparatus of the character specified comprising an injector and a twyer in which said injector is located, said twyer having a laterally-distended end with elongated narrow slots and interrupting devices placed in the path of the air.

3. An apparatus of the character specified comprising an injector, and a twyer in which said injector is located, said twyer having a laterally-distended end with elongated narrow slots extending from side to side of the same, said slots being outwardly flaring.

4. In combination with an injector having a nozzle, of a clean-out device comprising a longitudinally-movable rotary rod having radial blades on its ends.

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

THOMAS G. MACY.

Witnesses:
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