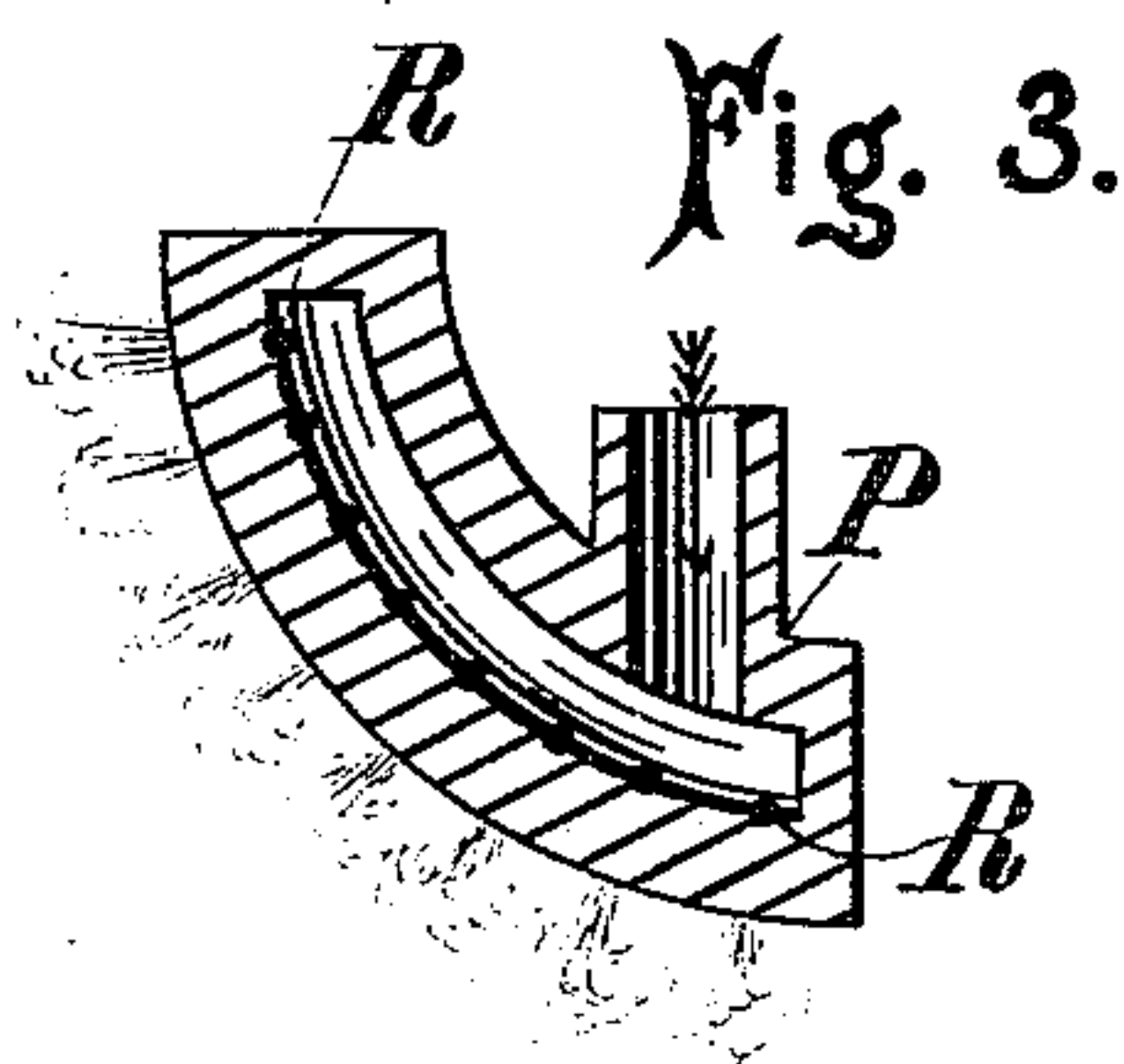
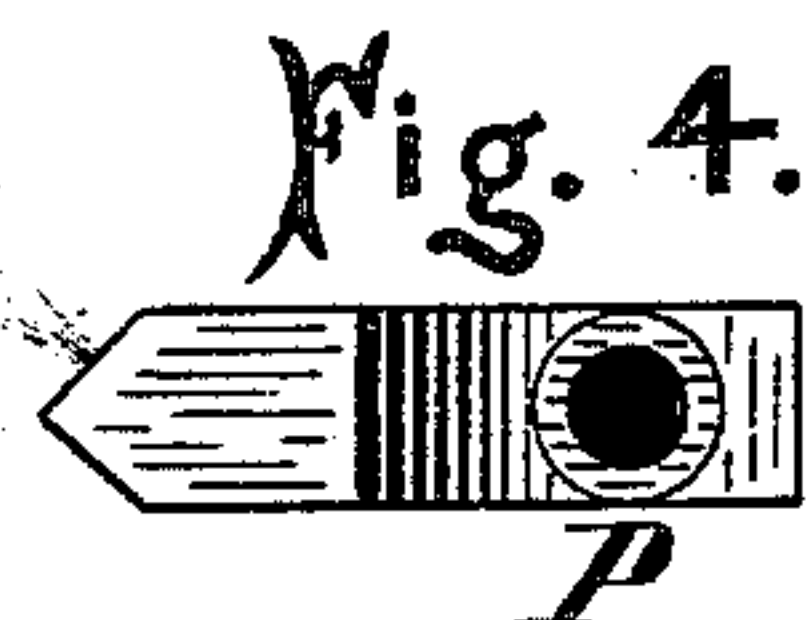
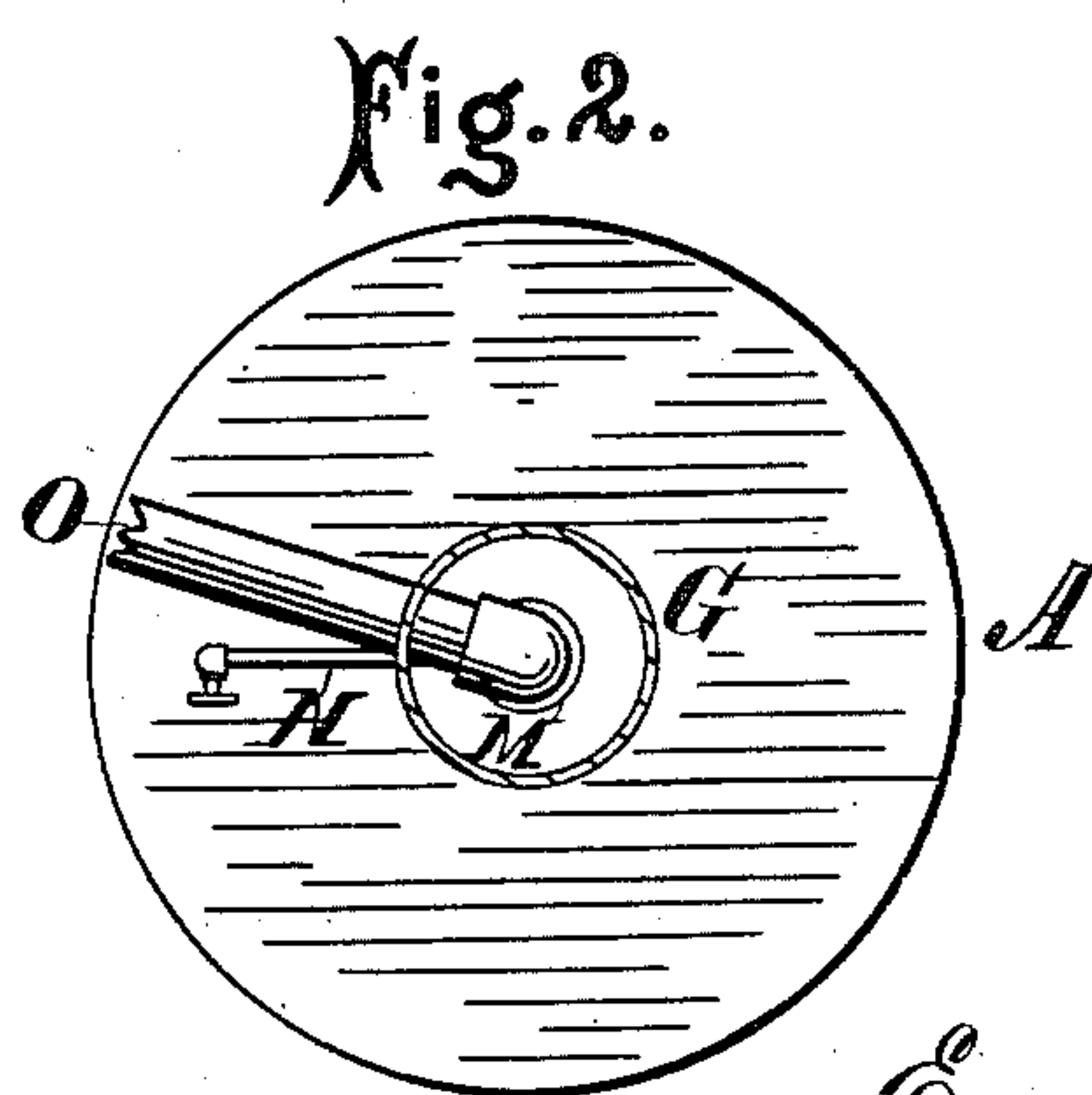
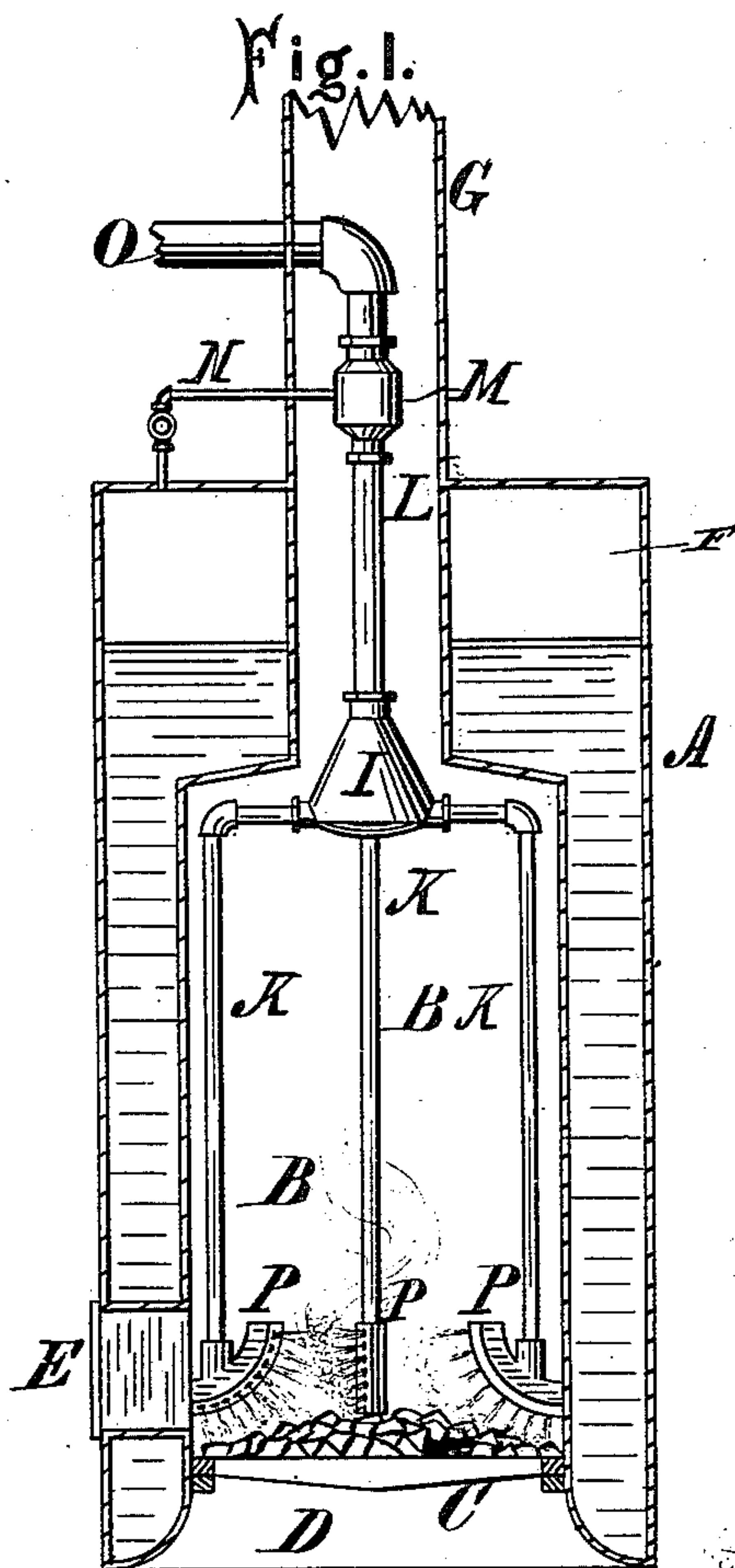


(No Model.)

E. W. VANDUZEN.  
SMOKE CONSUMING FURNACE.

No. 259,609.

Patented June 13, 1882.



Test  
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Inventor  
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# UNITED STATES PATENT OFFICE.

EZRA W. VANDUZEN, OF NEWPORT, KENTUCKY.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 259,609, dated June 13, 1882.

Application filed January 10, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, EZRA W. VANDUZEN, a citizen of the United States, residing at the city of Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

My invention relates to an improvement in upright boilers.

A serious difficulty has hitherto been experienced in attempting to apply a steam and air blast to the furnace-chamber of upright boilers, because this has been done by piercing holes through the boiler and inserting through them steam-nozzles, resulting in both the weakening of the boiler and imperfectly supplying the blast-currents upon the fuel. My invention overcomes both of these objections. Besides, it can be readily attached to the boiler without piercing it.

My invention is clearly illustrated in the description of the accompanying drawings, in which Figure 1 is a central vertical section of the boiler with my improvement properly attached. Fig. 2 is a top plan view of the same. Fig. 3 is an enlarged elevation of my improved nozzle. Fig. 4 is a top plan view of the same.

A represents an ordinary vertical boiler; B, the fire-chamber; C, the grate; D, the ash-pit; E, the door; F, the steam-space; G, the flue or smoke-stack. K represents hollow pipes. I represents a hollow air and steam distributing chamber, suspended near the bottom of the flue G and principally within the fire-chamber B. K represents diffuser-pipes tapping the air and steam distributor I. L represents a common supply-pipe leading from injector M to the air and steam distributor I. N represents a steam-pipe operating the injector M, and O the air-supply pipe. P represents segmental nozzles attached to diffuser-pipes K, and provided with a series of orifices for distributing the blast over the fuel or grate C.

It is obvious that when dry steam alone is used the blast-injector M and pipe O would be

dispensed with. The air in such cases should be supplied through a series of small perforations in the doors or by air-pipe terminating in close proximity with the nozzle P. Pipe O may also be provided with openings inside of the flue P, so as to carry back unconsumed gases; but this will not be necessary, as the diffuser in conjunction with the blast, effects a very perfect combustion.

The function of the hollow air and steam distributor I is very important, as it checks the rapid escape of gases up the flue. It provides suitable means for distributing the blast through two, three, four, or any number of pipes. It may be made of cylindrical form, of larger area than the flue and suspended entirely below it, and still accomplish the desired results.

By suspending the pipes within the furnace-chamber and flue, as here shown, the currents of air become very highly heated and require a very small amount of steam to produce perfect combustion.

What I claim as my invention is—

1. In combination with the hollow air and steam distributor I, suspended near the bottom of the flue of a vertical boiler by a depending supply-pipe inserted in the flue from a point above the boiler, one or more diffuser-pipes, K, tapping in and suspended by the diffuser and suspending pipe, and having nozzles P for distributing the air in a furnace-chamber, substantially as herein set forth.

2. The combination of the air-distributing pipe O, steam-pipe N, suspending-pipe L, injector M, and series of distributing-pipes K, and nozzle P, suspended in the flue and furnace-chamber of a vertical boiler, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EZRA W. VANDUZEN.

Witnesses:

HERBERT P. COOK,  
J. H. CHAS. SMITH.