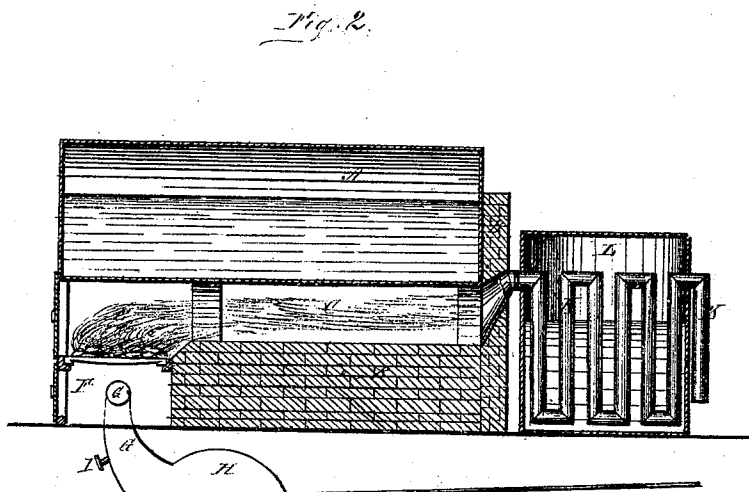
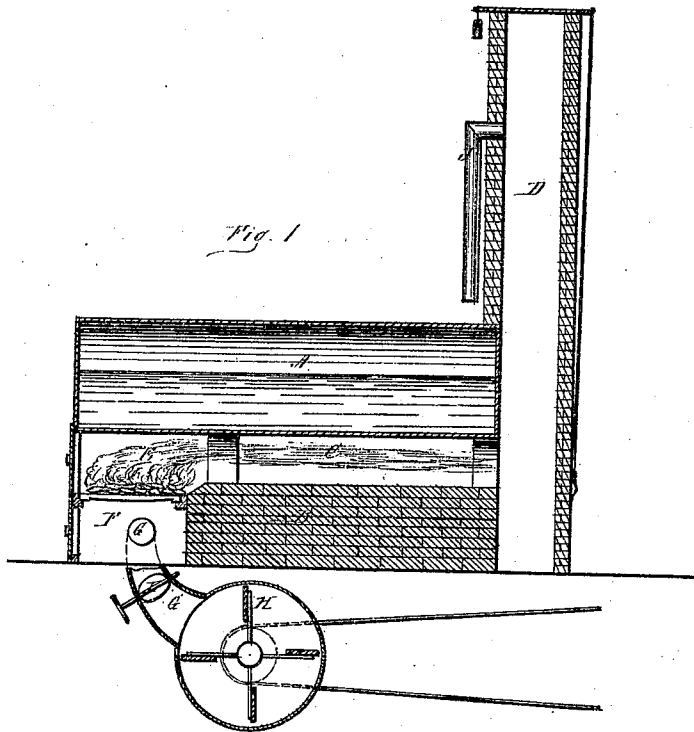


T. S. Speakman,

Boiler Furnace.

No. 100,205,

Patented Feb. 22, 1870.



Witnesses  
H. J. Sutz  
Henry Johnston.

T. S. Speakman  
Inventor.  
by Alex. W. C. Klaunder  
his Attorneys.

# United States Patent Office.

THOMAS S. SPEAKMAN, OF CAMDEN, NEW JERSEY.

Letters Patent No. 100,205, dated February 22, 1870.

## IMPROVEMENT IN FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

### To all whom it may concern:

Be it known that I, THOMAS S. SPEAKMAN, of the city and county of Camden, in the State of New Jersey, have invented a new and improved Method of Preventing the Generation of Smoke incident to Combustion; and I do hereby declare the following to be a full and correct description of the same, sufficient to enable others skilled in the class to which my invention appertains to fully understand and apply the same, reference being had to the accompanying drawings which make part of this specification, and in which—

Figure 1 is a sectional view of a boiler with which a chimney is used with my improvement attached, and

Figure 2 is a similar view of a boiler used without a chimney, also provided with my improvement.

Like letters of reference indicate like parts in both figures.

My invention consists in the arrangement of a downwardly-bent pipe for the exit of the carbonic acid and other saturated gases, unconnected with the fire-place or the fan-case, which latter creates an artificial draught.

A, in the drawings, represents the boiler of an engine resting on the bed B, the flue C, under the boiler, ending in the chimney D.

E is the fire-place, under which the ash-pit F is situated.

A pipe, G, leads a blast from the fan H to just under the fire-place, the fan being situated in any suitable position, and being operated by a belt from any convenient part of the engine.

The pipe G is provided with a damper, I, to regulate the blast from the fan.

The top of the chimney D is provided with a suitable damper, which can be regulated from below by means of a rope, wire, or other suitable means. In the drawings I have shown a hinged damper, but any well-known kind of damper will answer the same purpose.

From a suitable distance above the boiler a tube, J, extends out and downward from the chimney D to a suitable distance from the boiler.

In fig. 2 I have shown my improvement applied to an engine in which no chimney is used. In this case the flue C extends into a tube, K, which latter is bent upward and downward, as shown in the drawings.

I surround this tube K by a barrel, L, in which the tube K may be placed in close coils, if desirable, its end extending through the end of the barrel.

This barrel is to be filled with water, which will be heated to a certain degree by the tube K, and may be used as feed-water for the boiler, saving fuel, as it is already heated.

The operation of my device is as follows:

In starting the fire a few turns by hand of the fan will make a good fire in one-half the time it could be

done without it. The damper on chimney D is of course opened until the fire is strong enough to create steam in the boiler, and the engine has been started, from which time the fan is operated automatically. I prefer to provide the fan-shaft with a fast and a loose pulley, so as to enable me, by shifting the belt, to stop the fan entirely, should this become necessary or desirable. As soon as steam is created and the engine in operation the damper is closed, and a back pressure upon the draught is its immediate result. Were there no exit for the carbonic acid this back pressure would at once put out the fire, but this is obviated by the tube J, which affords an egress for the carbonic acid, while the blast from the fan keeps up the draught. The back pressure in the chimney and flue must be of just sufficient force to keep the products of combustion over the fire until all but the carbonic acid has been consumed, which, when freed, easily finds its way out through the tube J. The force of the back pressure is regulated by regulating the draught created by the blast from the fan.

This is easily and promptly effected by means of the damper I in the blast-pipe G. The same result is effected in the device shown in fig. 2. In this case the back pressure upon the draught is produced by the downward bends of tube K, the carbonic acid escaping through the same, and as it passes through the tube it heats the water in the barrel L, from which the boiler may be fed in any known automatic or other manner, thus effecting a saving in fuel.

I am aware that processes for burning fuel under pressure, by means of a forced supply of air have been in use before, various provisions being in such cases made for the escape of the carbonic acid and other saturated gases. I do not, therefore, claim broadly the providing a mode of escape for such gases under the conditions named, as my invention relates to the specific devices which I employ to this end.

Having thus described my invention,

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

1. The arrangement of the pipe J, bent downwardly, on the chimney D of a furnace, substantially as and for the purposes set forth.

2. The combination of the tube K (fig. 2) with the flue C and barrel L, substantially as and for the purpose set forth.

3. The combination of the fan H, bent pipe J, and the damper on the top of the chimney D, when arranged to operate substantially as and for the purposes herein set forth.

The above specification of my improved method of preventing the generation of smoke incident to combustion signed this 13th day of November, 1869.

Witnesses: THOMAS S. SPEAKMAN.

HENRY J. ARETZ,

HENRY A. JOHNSTON.