

J. WESTERMAN.

Furnaces for Steam-Boilers, &c.

No. 136,948.

Patented March 18, 1873.

Fig II

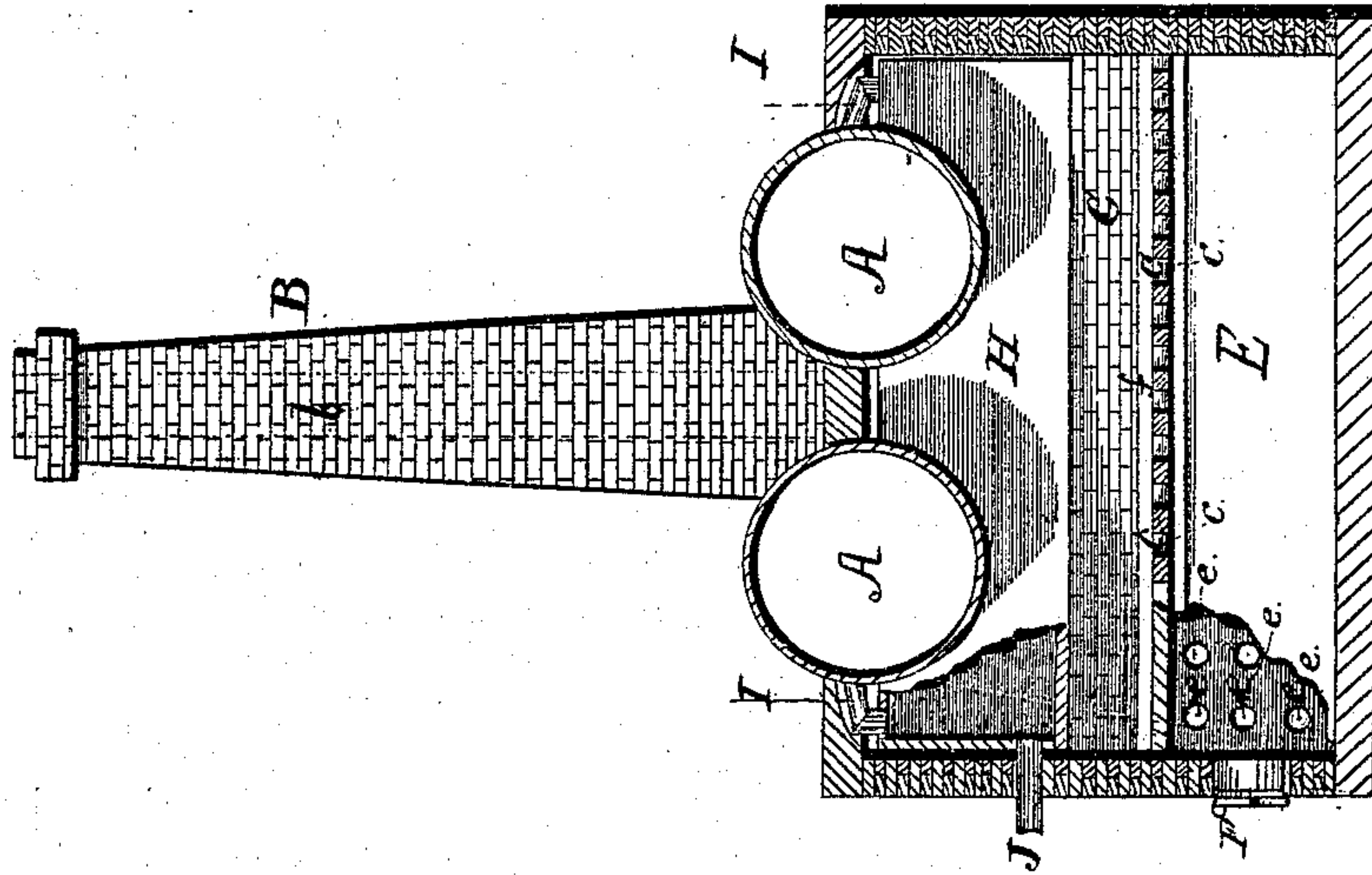
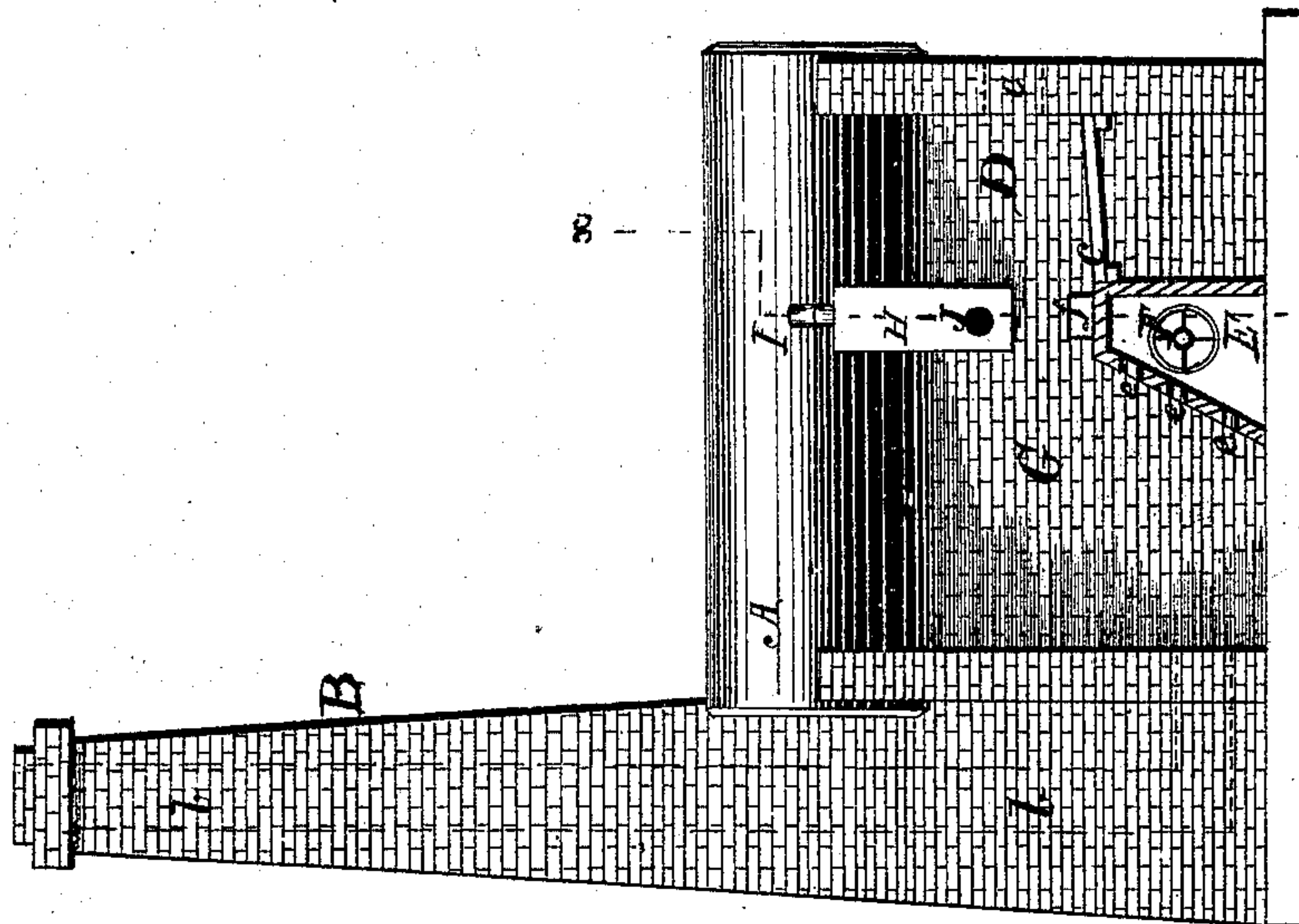


Fig I



Witnesses.

Will S. Antrim  
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# UNITED STATES PATENT OFFICE.

JAMES WESTERMAN, OF SHARON, PENNSYLVANIA.

## IMPROVEMENT IN FURNACES FOR STEAM-BOILERS, &c.

Specification forming part of Letters Patent No. 136,948, dated March 18, 1873.

*To all whom it may concern:*

Be it known that I, JAMES WESTERMAN, of Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces for Steam-Boilers, &c; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing and to the letters of reference marked thereon which form a part of this specification.

My invention relates to improvements in furnaces for heating steam-boilers, and other similar purposes; and the invention consists in the construction and arrangement of devices whereby the smoke is consumed, and a thorough combustion and utilization of the fuel effected, without injury to the boilers, or to the devices by which the desired result is accomplished; and also by means of which the water may be rapidly heated in the furnace as it is fed or forced into the boilers.

In the accompanying drawing, Figure 1 is a side elevation of my improved furnace with portions of the walls cut away to show the interior. Fig. 2 is a transverse sectional view on the line *x x*, Fig. 1.

A represents the boilers. B the smoke-stack, the flue *b* leading from the furnace being shown by dotted lines in Fig. 1. C represents the grate-bars. D is the fuel-chamber of the furnace, the fuel being introduced through doors of the ordinary description, the position of which is indicated by dotted lines *e*, Fig. 1. E is a hollow bridge, provided with registers or valves F at either or both ends. The rear wall of the bridge E slopes diagonally from the base to the top and is perforated or pierced with a number of holes or air-passages, *e*, leading from the hollow interior to the combustion-chamber of the furnace G. The top of the bridge is also provided with an elevation or ridge, *f*, which prevents the fuel falling over into the combustion-chamber. H is a hollow wall or chamber, traversing the width of the furnace, projecting downward from the boilers in a line with the top of the bridge. This wall or chamber H, with the bridge E, separates the fuel-chamber from the combustion-chamber, only a narrow opening being

left between them for the passage of the smoke and other products of combustion. The width of this opening or distance between the bridge and downward projection H may be varied as found desirable or necessary to suit different sized furnaces and different conditions of construction with relation to draft, &c, the object being to deflect the smoke and gases arising from the burning of fuel and cause them to pass into the combustion-chamber in a concentrated volume or current, for the purposes hereinafter more fully set forth. The hollow wall H is made of malleable iron, and is connected with the interior of the boilers by means of pipes I, so that the water in the boilers fills it, and circulates freely through both the boilers and the hollow wall, the latter being thereby protected from burning through the direct action of the flame on its surface. J is a pipe, leading from the outside of the furnace into the hollow wall H. Through this pipe the water fed to the boilers may be injected, and being held in a narrow column exposed on all sides to the direct action of the flame, it is rapidly heated before passing into the boilers, thereby preserving an equable temperature of the water in the latter, more conducive to the generation of steam. If desirable, both ends of the hollow wall may be furnished with feed-pipes J.

It will thus be seen that the hollow wall or chamber H, as a feeder and heater, forms an important adjunct to the boilers; but it has another and distinct function to perform, which I will now set forth.

When the fire in the fuel chamber is supplied with green fuel the smoke and gases of combustion will rise, and after filling the chamber and striking against the wall H will be thereby deflected and made to pass through the narrow opening or passage between the bottom of the wall H and top of bridge E. At this point, as the current of smoke and gas enters the combustion-chamber G, it is met by a diffused supply of air admitted through the openings *e* leading from the hollow bridge. The oxygen combining with the carbon gases causes the latter to ignite and burst into flame, which completely consumes the smoke and gas, thereby utilizing all the heat-producing elements of the fuel. When the fire has become bright less oxygen is required, and the volume



of air is decreased or shut off altogether by means of the registers or valves F. In this way the smoke nuisance, so common in cities where bituminous coal is used, may be obviated in a great measure, while at the same time a great saving of fuel is effected.

When the boilers are fed by other means than that which I have described, the feed-pipe J is omitted and the pipes I I alone are used for the purpose of keeping the hollow wall full of water as a protection against burning; and it will be obvious that this hollow metallic wall or chamber may be used in reverberatory and other furnaces where the consumption of smoke is an object, as well as for steam-boilers, the only additional requirement in such cases being supply and outlet pipes to insure the filling of the chamber with water and the escape of any steam which may be generated therein.

Having thus described the functions of my combined water-heater and combustion-chamber wall or shield, what I claim as new, and desire to secure by Letters Patent, is—

1. The hollow metallic wall or chamber H, filled or supplied with water, in combination with the hollow bridge E having air-passages, substantially as and for the purpose specified.

2. The hollow metallic wall or chamber H, supplied with water, in combination with the bridge E, fuel-chamber D, and combustion-chamber G, constructed and arranged substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 20th day of December, 1872.

JAMES WESTERMAN.

Witnesses:

A. B. RICHMOND,

J. NEWTON McCLOSKEY.