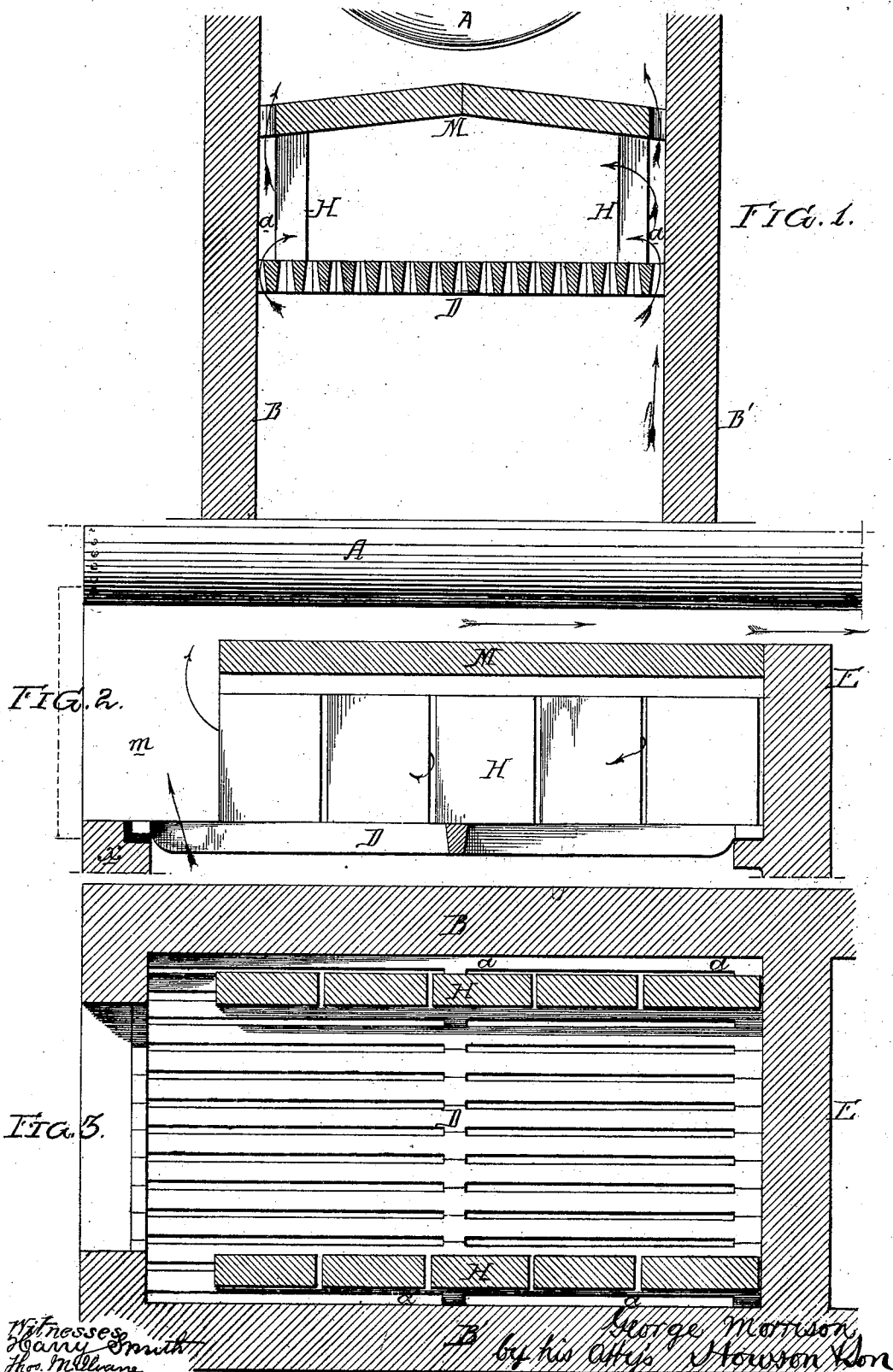


G. MORRISON.

FURNACES FOR STEAM BOILERS.

No. 179,042.

Patented June 20, 1876.



UNITED STATES PATENT OFFICE.

GEORGE MORRISON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF, H. C. CAREY, ABRAHAM HART, AND ELIZABETH S. RICH, (ADMINISTRATRIX OF J. T. RICH,) OF SAME PLACE.

IMPROVEMENT IN FURNACES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **179,042**, dated June 20, 1876; application filed November 30, 1875.

To all whom it may concern:

Be it known that I, GEORGE MORRISON, of Philadelphia, Pennsylvania, have invented an Improvement in Furnaces and Fire-Places, of which the following is a specification:

My invention relates to that class of furnaces or fire-places in which the products of combustion, in passing forward from the bridge-wall beneath a roof or partition, are intimately mixed with air before they pass rearward above the partition to the flues of the boiler or other object to be heated, as shown in the Patent No. 108,935, granted to J. T. Rich, November 1, 1870, my invention being an improvement on the smoke-consuming furnace described in the said patent; and the object of my improvement being to more effectually ignite the unconsumed gases emanating from the fuel, and to readily alter any old furnace or fire-place to meet the requirements of my invention.

In the drawing, which illustrates my invention as applied to a steam-boiler, Figure 1 represents a transverse vertical section; Fig. 2, a longitudinal vertical section; and Fig. 3, a sectional plan.

A represents part of a steam-boiler; B and B', the opposite side walls of the furnace; D, the grate-bars; and E the usual bridge-wall.

These parts may be the same as in ordinary furnaces for steam-boilers; in fact my improvement may be carried into effect without any alterations other than the addition of the simple structure, which I will now proceed to describe.

At a short distance from the inside of each side wall, and on the grate-bars, is built a wall, H, of fire-brick, or of slabs of baked fire-clay, there being in the said walls openings, which may be made by chipping away portions from the ends of the bricks, or by arranging the same a short distance apart from each other. Air admitted to the ash-pit below the grate must have free access to the spaces *a a*, between the main walls and supplementary walls H, which extend from the bridge-wall E to within a short distance from the front ends of the bars, as shown in Fig. 2. In-

to the furnace, above the grate, I introduce a partition or roof, M, extending from the bridge-walls to the outer ends of the walls H, this roof consisting of two inclined slabs of fire-clay meeting each other in the center of the furnace, bearing on the said walls H H, and abutting against the main side walls B B.

It is preferable for the bars to extend toward the front of the furnace beyond the walls H H and the roof, so that there may be a free passage of air from the ash-pit into the space *m*, through which the products of combustion must pass in turning upward from the combustion-chamber into the flue above; hence, in building a new furnace, I prefer to dispense with the usual wide dead-plate, and to substitute therefor a narrow girder, *x*, built in the walls of the furnace for the front ends of the bars to rest upon. In altering old furnaces, however, the dead-plate may remain, but from the rear end of this plate to the front ends of the walls H H and the roof, the distance should be such that there shall be free and direct passage for the air through the bars into the space *m*.

In building a new furnace, the walls H may be carried down to the foundation, providing there are openings in them for the passage of air from the ash-pit into the spaces *a a*.

When the furnace is in operation, the smoke and other gaseous products of combustion, which, in ordinary furnaces escape directly into the flues of the boiler, must pass beneath the roof M over the surface of the fuel from the rear toward the front of the furnace, in doing which they must be met by and intermingled with the jets of air passing through the openings in the supplementary walls H H, and the gases intermixed with this air will, on passing into the space *m*, be met with other volumes of air passing directly through the grate-bars into the said space, so that before gaseous products of combustion reach the upper flue they will be thoroughly ignited, and pass in a flame of intense heat beneath the boiler.

The walls H H and the roof may be built in a comparatively loose state without the as-

sistance of fire-proof cement, for in a few hours after the fire has been burning, the bricks and slabs will be connected by vitrification wherever they are in contact with each other.

In some instances I recess the edges of the inclined slabs, where they bear against the side walls, so as to present openings for the passage of air into the flue, this air serving to intensify the heat of the flame.

I claim as my invention—

1. The combination, with a furnace, of inner perforated walls H H, the roof M, composed of inclined slabs abutting against the main walls, bearing on the said walls H H, and extending with the latter to the bridge-wall, and the space *m*, between the ends of the walls H H and roof and front of the furnace, all substantially as set forth.

2. The combination, in a furnace, of the

supplementary perforated side walls H H, the air-spaces *a a*, between the latter and the main walls, and the roof M, composed of inclined slabs bearing on the said supplementary walls and abutting against the main walls, all substantially as set forth.

3. The combination, in a furnace, of a partition or roof, M, extending to the bridge-wall, the space *m*, between the front end of the said roof and the front of the furnace, and the grate extending beneath the said space, all substantially as and for the purpose herein specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE MORRISON.

Witnesses:

HARRY HOWSON, Jr.,
HARRY SMITH.