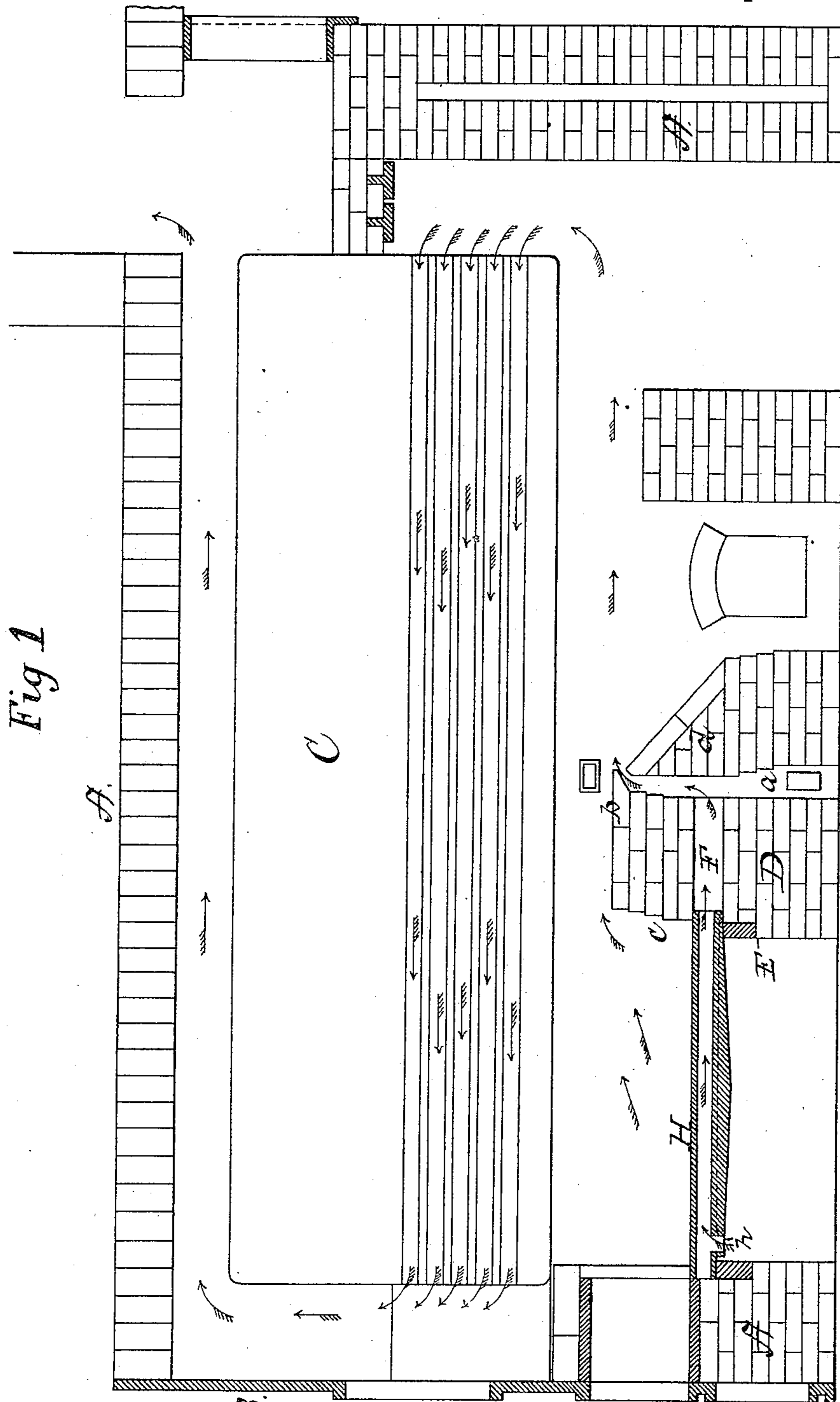


(No Model.)

2 Sheets—Sheet 1.

O. B. MORSE.  
FURNACE AND HOLLOW GRATE BAR.  
No. 284,652. Patented Sept. 11, 1883.



Witnesses:  
A. R. Luray.  
J. C. Lang.

Inventor:  
Otis B. Morse,  
by Heyburn & Kang  
Attorneys

O. B. MORSE.

FURNACE AND HOLLOW GRATE BAR.

No. 284,652.

Patented Sept. 11, 1883.

Fig 2

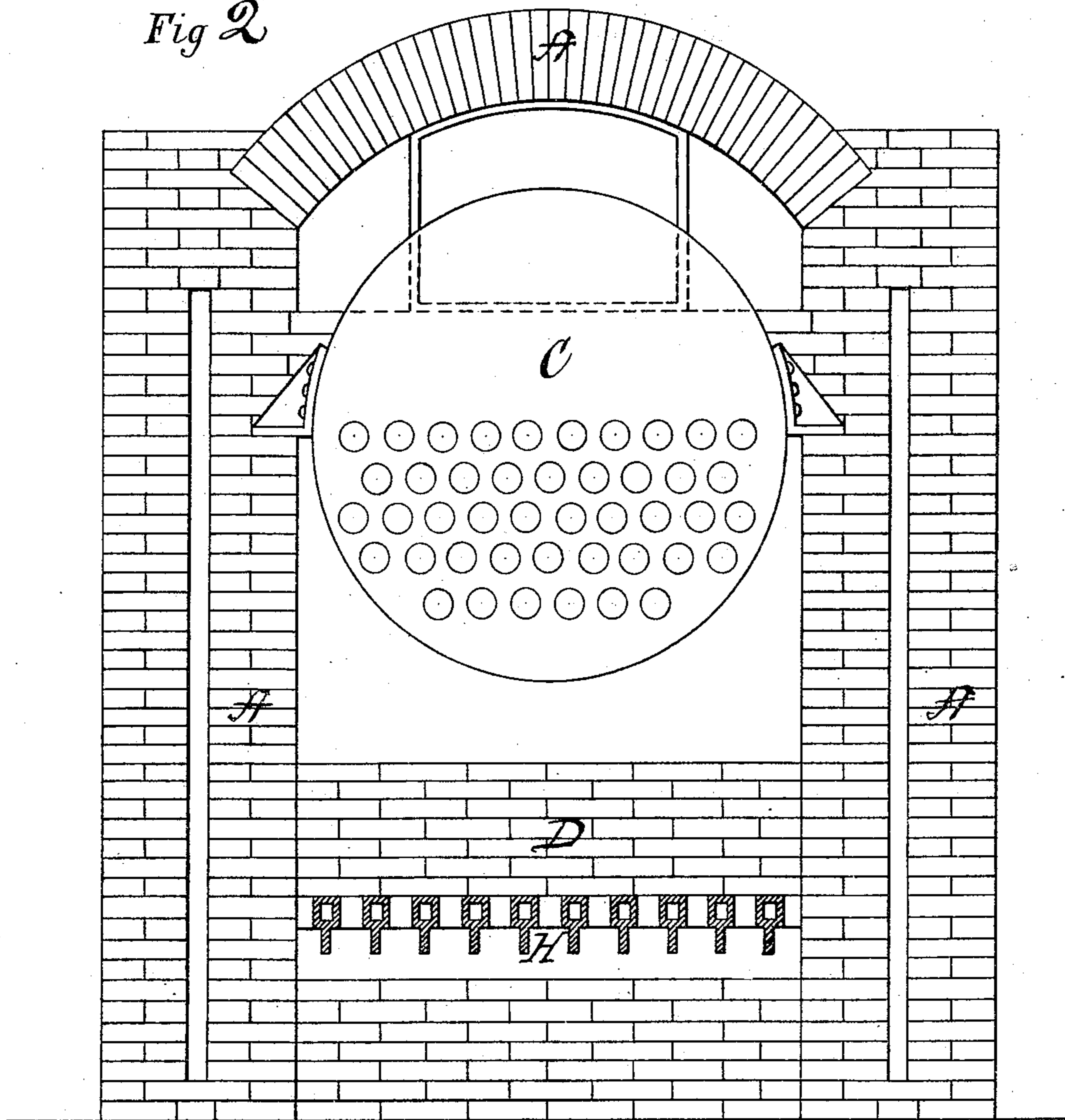


Fig 3

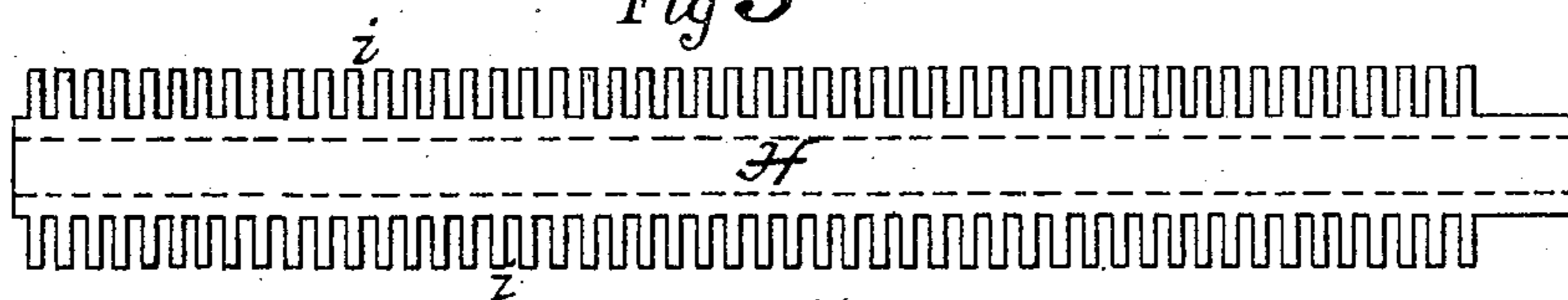
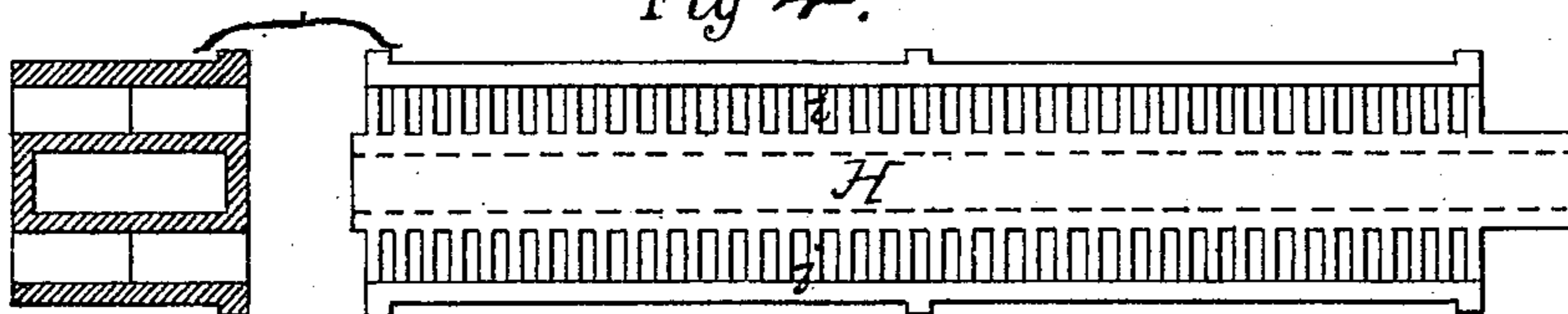


Fig 4.



Witnesses:

A. R. Sawyer.  
J. Chang.

Inventor:

Otis B. Morse  
by Heyburn & Kang.  
Attorneys.

# UNITED STATES PATENT OFFICE.

OTIS B. MORSE, OF GREAT FALLS, NEW HAMPSHIRE.

## FURNACE AND HOLLOW GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 284,652, dated September 11, 1883.

Application filed March 23, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, OTIS B. MORSE, a citizen of the United States of America, residing at Great Falls, in the county of Strafford and State of New Hampshire, have invented certain new and useful Improvements in Furnaces and Hollow Grate-Bars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain useful improvements in furnaces and hollow grate-bars for the same; and the objects of the invention are to construct a cheap, durable, and practical furnace for directing and distributing currents of heated air in such manner as will aid in more perfect combustion of the gas or unconsumed carbon from the fuel and utilizing the same.

My invention consists in the novel construction and combination of parts, as will be hereinafter more fully set forth.

Figure 1 of the drawings is a longitudinal sectional view of my improved furnace and grate-bars in connection with a longitudinal boiler. Fig. 2 is a transverse sectional view of the same. Fig. 3 is a plan view of a grate-bar, showing the exterior construction of the same; and Fig. 4 is a plan and transverse sectional view of the grate-bar with parallel side pieces.

In the annexed drawings, A indicates the masonry at the sides, top, and end of the furnace, B the front of the furnace, and C the boiler, of the usual constructions.

The letter D represents the bridge-wall, with an air-chamber, *a*, as shown in Fig. 1 of the drawings. This air-chamber is about five (5) inches wide at the base or bottom, or such width as to conveniently clean the same, and tapering gradually upward to the top, where it is about one-half ( $\frac{1}{2}$ ) inch wide, and it extends the entire width of the fire-box.

The top bricks, *b*, of the front wall, *c*, of the bridge-wall D are made at one edge, next the outlet-opening of the air-chamber, beveled or inclined, and so arranged as to give an ample air-exit and a direction to the heated air, and at

the same time to prevent ashes and dirt from falling into the air-chamber. This wall is also formed with a ledge, E, and a plurality of longitudinal passages, F, corresponding with the number of grate-bars to be employed, for the support and reception of hollow grate-bars H, as indicated in Fig. 1 of the drawings. The upperside of the rear wall, *d*, of the bridge-wall is made sloping, preferably at an angle of about thirty-nine degrees, for shedding the ashes, &c., that fall upon the same. I prefer that the top corner of the bricks on this wall *d* be set perpendicularly under the beveled upper corner of the front wall over the air-chamber, and be arranged under the projecting inclined corner of the uppermost layer of bricks in the front wall, *e*, substantially as shown in Fig. 1 of the drawings, so as to cause the currents of heated air to be discharged at an angle into the combustion-chamber, for the intimate mixture of the same with the unconsumed carbon from the coal as it passes over the bridge-wall. This mixture of the unconsumed carbon or gas and heated air beyond the bridge-wall causes a more complete combustion, and thereby a saving of fuel. By this construction and organization of a bridge-wall for a furnace, comparatively no ashes or dust falls into the air-chamber, and the possible clogging up of its exit is prevented.

The grate-bar H, as already stated, is made hollow, and is also provided with an air-induction opening, *h*, on the under side, near the front end.

On each side of the main body of the grate-bar projects a series of short bars, *i*, about one and one-half by one-half inch thick and two and one-half inches deep, with intervening air-spaces one-half, more or less. The ends of these short bars *i* are connected by bars on each side running parallel with the main central bar, thus giving more strength for long bars. The grate-bars are intended more especially for bituminous coal, and they should be made sufficiently strong to withstand the weight of the fuel and heat. On the sides, when conditions will admit, doors will be attached to gain access to the air-chamber, the top of the bridge-wall, and combustion-chamber.

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

In a furnace of the class described, the combination of the bridge-wall, formed with an air-chamber, and having its front wall provided with a ledge, E, and a plurality of horizontal passages, F, leading into the air-chamber, and the upper layer of bricks with beveled ends overhanging the exit of the air-chamber, and  
10 the hollow grate-bars opened at both ends, and

provided with the air-induction *h*, arranged near the front end, on the under side, substantially as described.

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

OTIS B. MORSE.

Witnesses:

L. D. CASLER,

M. A. MOORE.