

J. D. HALL.
Hot-Air Furnaces.

No. 137,838.

Patented April 15, 1873.

Fig. 1.

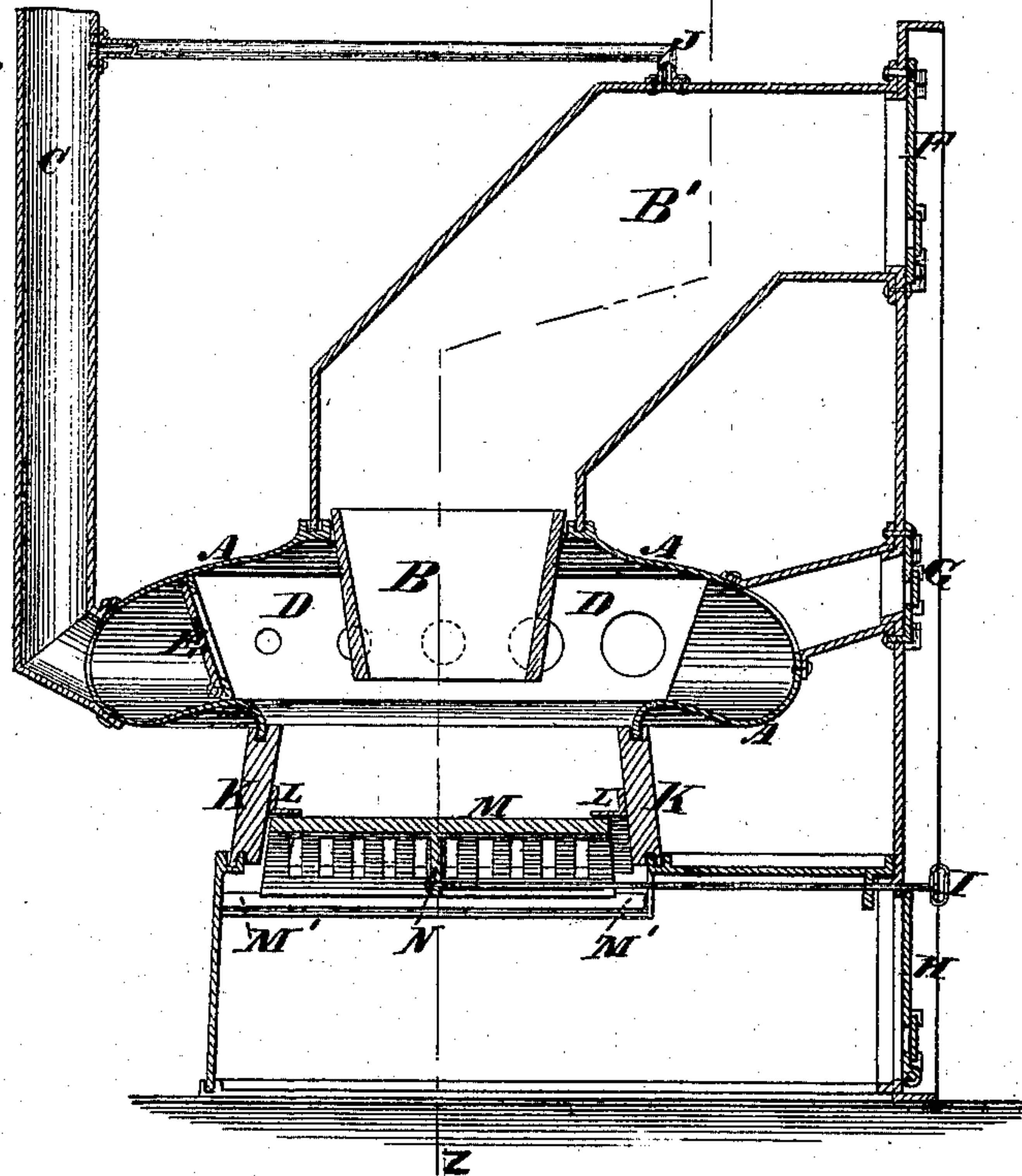


Fig. 2.

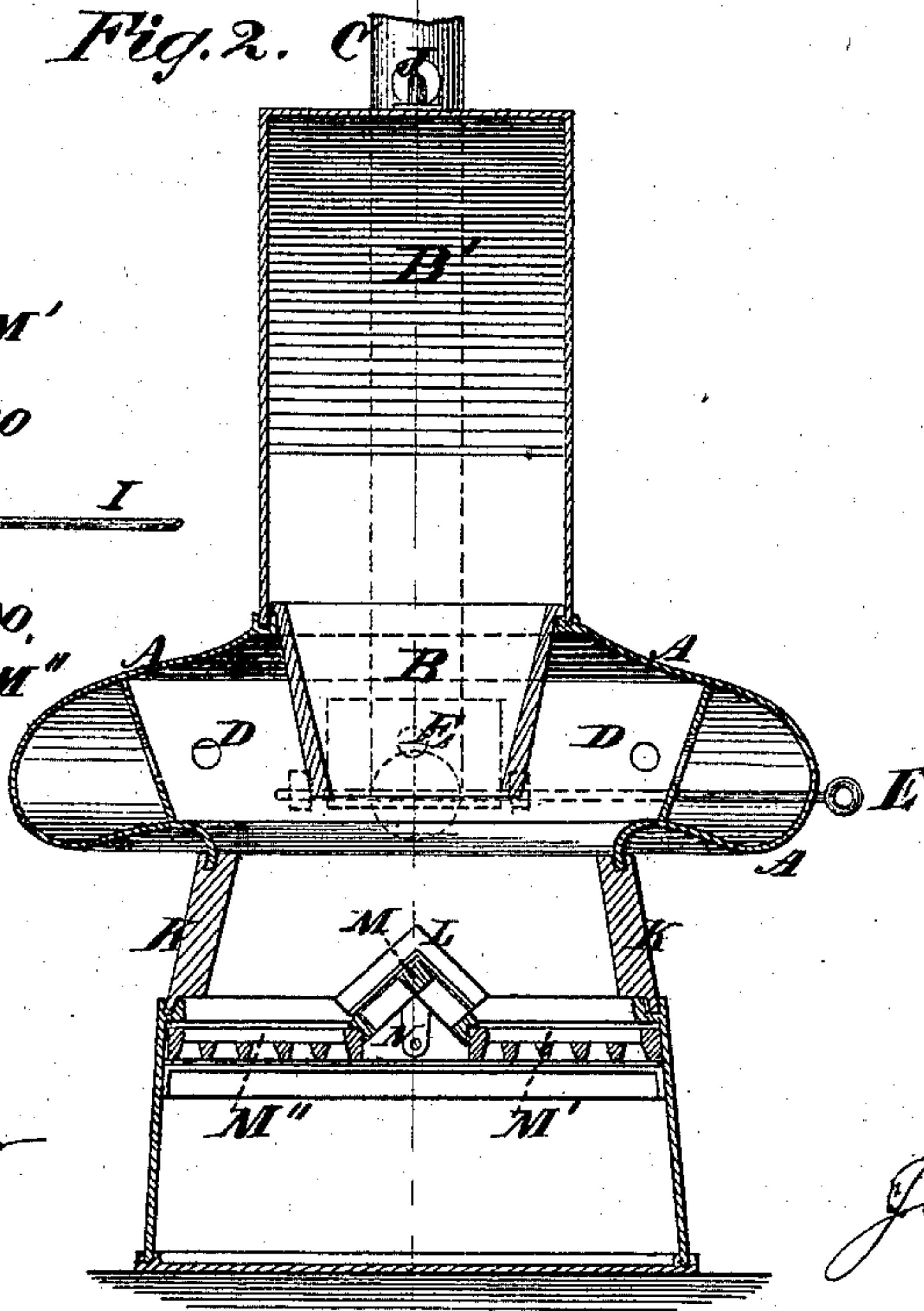
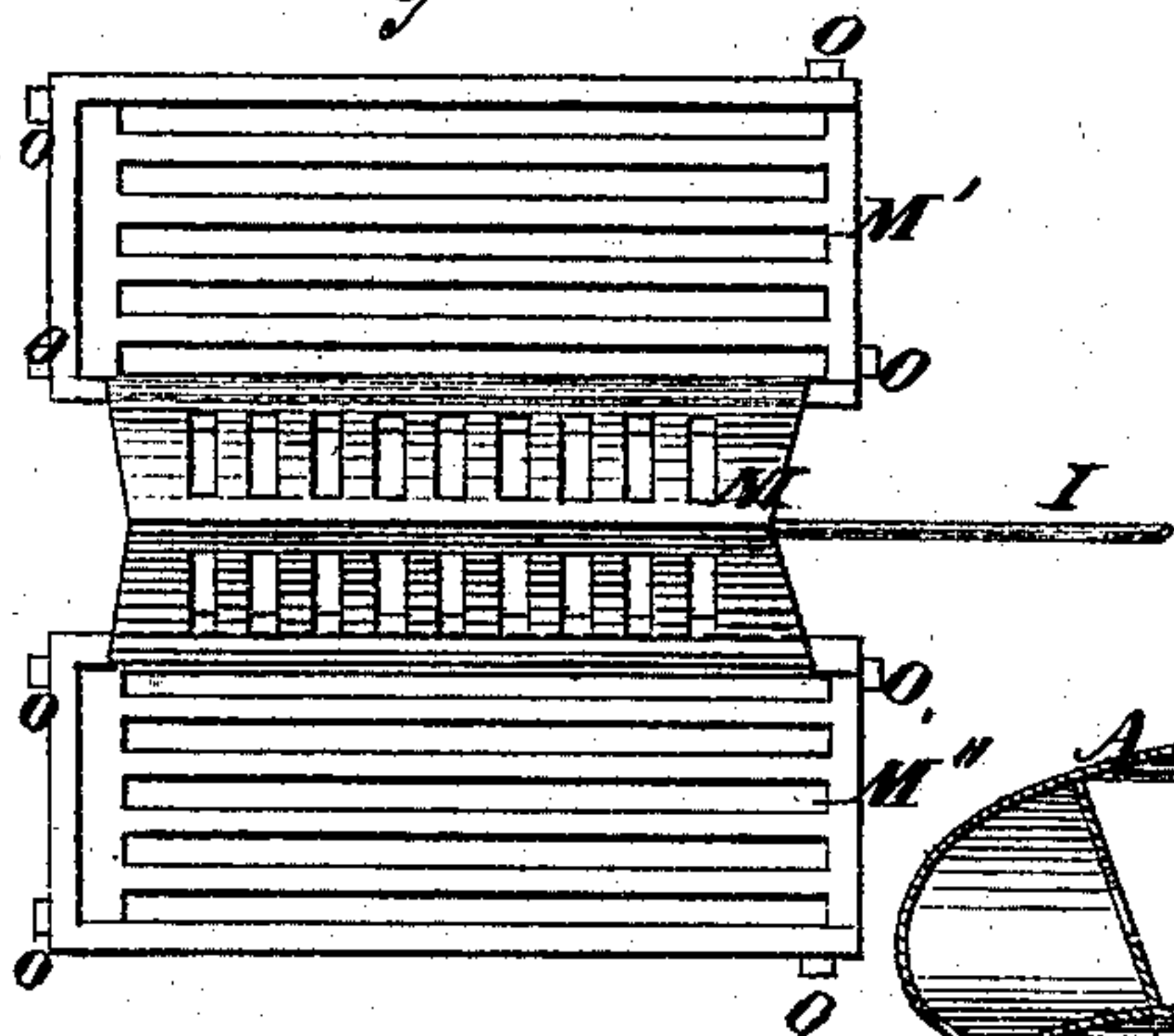


Fig. 3.



Witnesses
John Becker
Michael Ryan

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UNITED STATES PATENT OFFICE.

JOHN D. HALL, OF BROOKLYN, NEW YORK, ASSIGNOR TO MARY E. J. HALL,
OF SAME PLACE.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **137,838**, dated April 15, 1873; application filed
February 13, 1873.

To all whom it may concern:

Be it known that I, JOHN D. HALL, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Hot-Air Furnaces, of which the following is a specification:

The first part of my invention relates to the construction of the principal radiator and fire-pot in such form as will best utilize the heat produced by the fuel consumed. The second part of my invention relates to the employment, in combination with the several other parts of the furnace, of a grate or combination of grates constructed in such form and upon such a plan as will secure a large amount of open-grate surface and the greatest convenience and economy in freeing the same from ashes and other refuse matter, and hence the most perfect combustion of the fuel used.

Figure 1 is a central vertical section of the complete furnace from front to rear. Fig. 2 is a transverse section of the same on the line xz . Fig. 3 is a top view of the grates.

A is the principal radiator; B and B' combined form the magazine or feeder; C, smoke-pipe; F, feed-door; G, observation-door; H, ash-pit door; I, grate-shaker; K, fire-pot; E, damper; L, flanges on inside of fire-pot; J, gas-escape pipe; D, lateral draft-plates.

It will be observed that all the horizontal sections of the various parts, excepting the smoke-pipe, are quadrilateral in form. This form is preferred when the furnace is to be set in masonry, for the reason that this is a more convenient form for the grates and that a given quadrilateral wall will in this form inclose a considerably more radiating-surface; but for setting in sheet metal, in what is known as the "portable" style, I sometimes adopt the circular plan, but retain substantially the same vertical sections. It will also be understood that this furnace is designed to be entirely inclosed within a wall or casing of brick or sheet metal, substantially in the same manner as the various hot-air furnaces now in the market, my improvements being embraced in the peculiar form and combination of the several parts of the furnace itself.

The radiator or combustion-chamber A I

propose to construct sometimes of cast-iron and sometimes of sheet or wrought iron. When constructed of cast-iron it should be cast in one piece, but when made of sheet or wrought iron it can best be made in two parts, upper and lower, the same being first "struck" or "pressed up" into proper form and then attached together by means of a lapped and riveted seam.

The ash-pit does not differ materially from that of furnaces now in the market.

The grate I usually construct in three parts, M M' M'', the middle, M, being movable or "shaking," while the other two parts, M' and M'', are stationary, the lugs O simply resting on similar lugs cast on the inside of the ash-pit. The part M is shaken to and fro by means of the rod I. The flanges L cover the spaces at either end of the grate M, and thereby prevent cinders from wedging in between it and the fire-pot so as to interfere with its vibration.

It will be seen that on the two sides and back end of the grates M' and M'' there is a flange or band projecting upward. This projection I make in a working-grate from one and a half to two inches in height above the top surface of the bars, the bottom of the fire-pot resting on or about in contact with the top of said projection, and thereby leaving an opening in front one and one-half to two inches in height by the width of the grate. The object of this opening is the discharge of the slag and cinders as they accumulate by means of my improved "fire-rake," for which I am now about applying for Letters Patent. Instead, however, of said upward projection or band, I sometimes form said opening in the bottom edge of the fire-pot; also, in certain cases, said opening may be advantageously formed in the rear part of the grate or fire-pot.

The fire-pot I construct with the sides sloping inwardly like those of a pyramid or cone for the several following reasons, viz: larger proportionate grate-surface, and hence freer draft and more perfect combustion of the fuel, is thereby secured; second, the ashes and cinders fall away from the inside surface of the fire-pot, thereby leaving said surface clean and more fully utilizing the heat evolved.

The peculiar form given to the radiator A is

of great value, as by it the upper portion thereof is brought down near the surface of the fire and in such shape that the rays of heat impinge directly against it; also, the plates D are an advantage in that they tend to produce lateral draft through the round openings in them.

The object of the damper E is to give direct draft when required in starting or increasing a fire.

The part B of the magazine is so hung in its place by flanges on two opposite sides that it may be conveniently replaced by a new one whenever required.

The pipe J is intended to carry off any gas that may accumulate in the magazine.

Each of the doors F, G, and H is furnished with draft-openings.

It will be observed that all the joints in the furnace that might leak gas into the air-chamber are of the kind known as "sand-joints," and are very few in number and small in extent. In this important respect, also, this furnace is superior to any now in market. This form of radiator A is also well adapted to the surface-burning principle, in which case the magazine is dispensed with and the observation-door G used as the feed-door.

What I claim as my invention is—

1. A hot-air furnace radiator or combustion-chamber A having its upper central portion brought down near to and about parallel with the surface of the fire and its sides or perimeter sufficiently extended laterally to admit of the formation of a horizontal smoke-flue therein by means of the plates D, substantially as set forth.

2. The combination of the lateral draft-plates D and the damper E with the herein-claimed radiator, substantially as shown and described.

3. The combination of the herein-claimed radiator with a fuel or feeding magazine, B, substantially as described.

4. The combination of a fire-grate, M' M'', having an elevated vibrating central part, M, with the radiator A, substantially as shown and described.

5. The combination of the upwardly contracted fire-pot K with the herein-described radiator.

JOHN D. HALL.

Witnesses:

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DAVID MISELL.