

J. M. THATCHER.

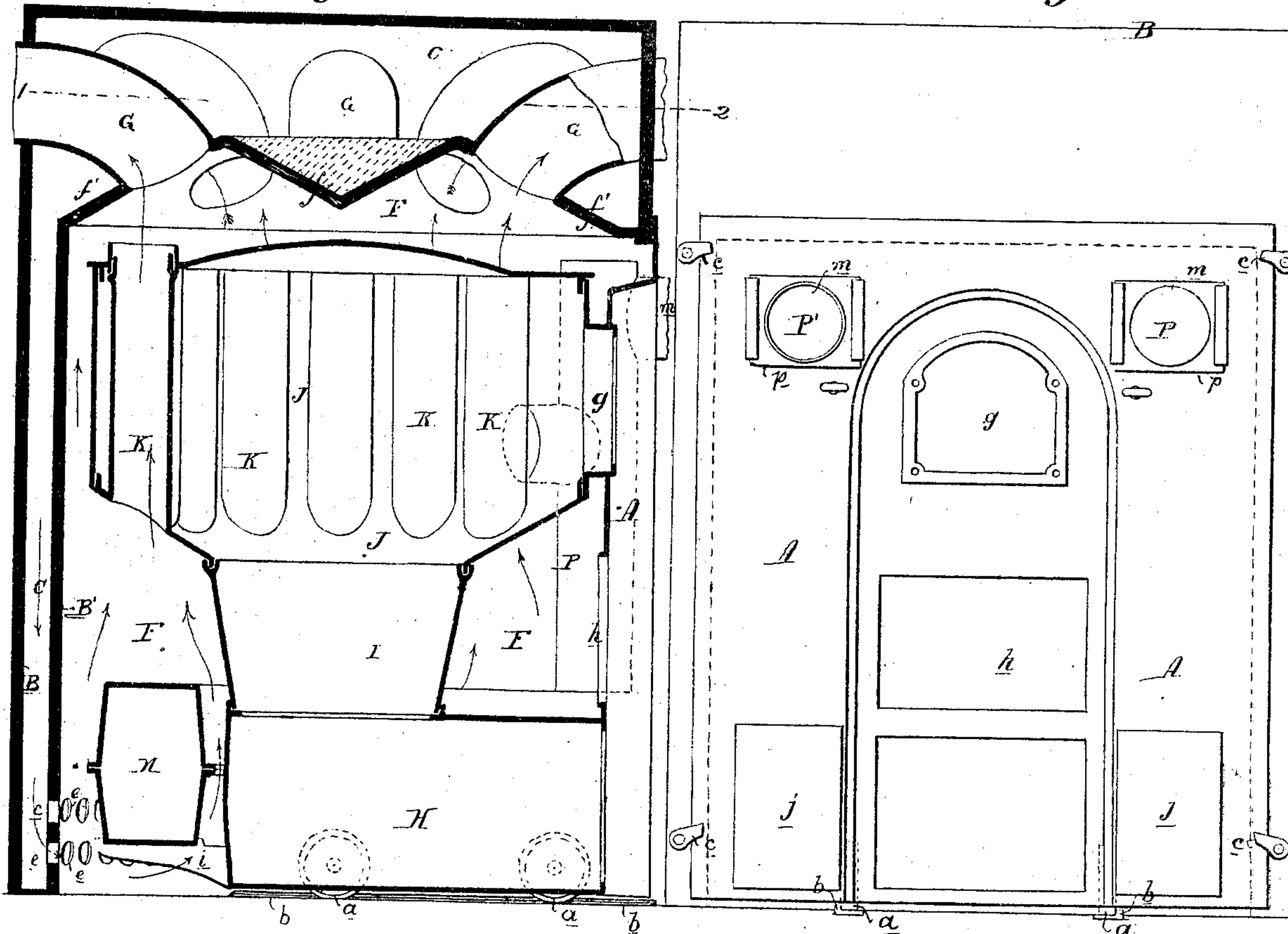
2 Sheets--Sheet  
Hot-Air Furnace.

No. 128,926,

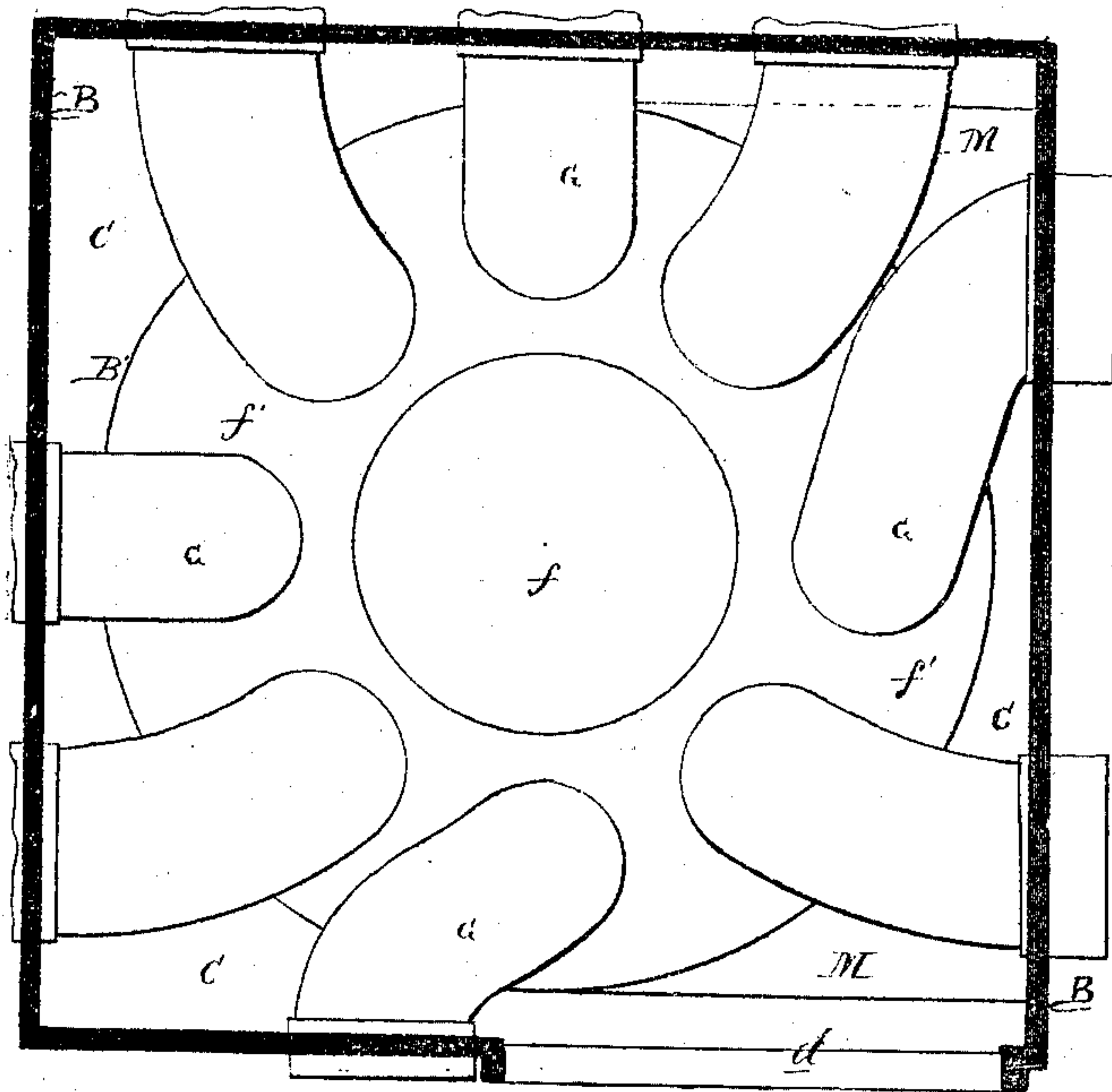
Patented July 9, 1872.

*Fig. 1.*

*Fig. 2.*



*Fig. 3.*



WITNESSES

Jno. B. Harding. J. M. Thatcher  
John Parker by his Atty  
Horsen and Son

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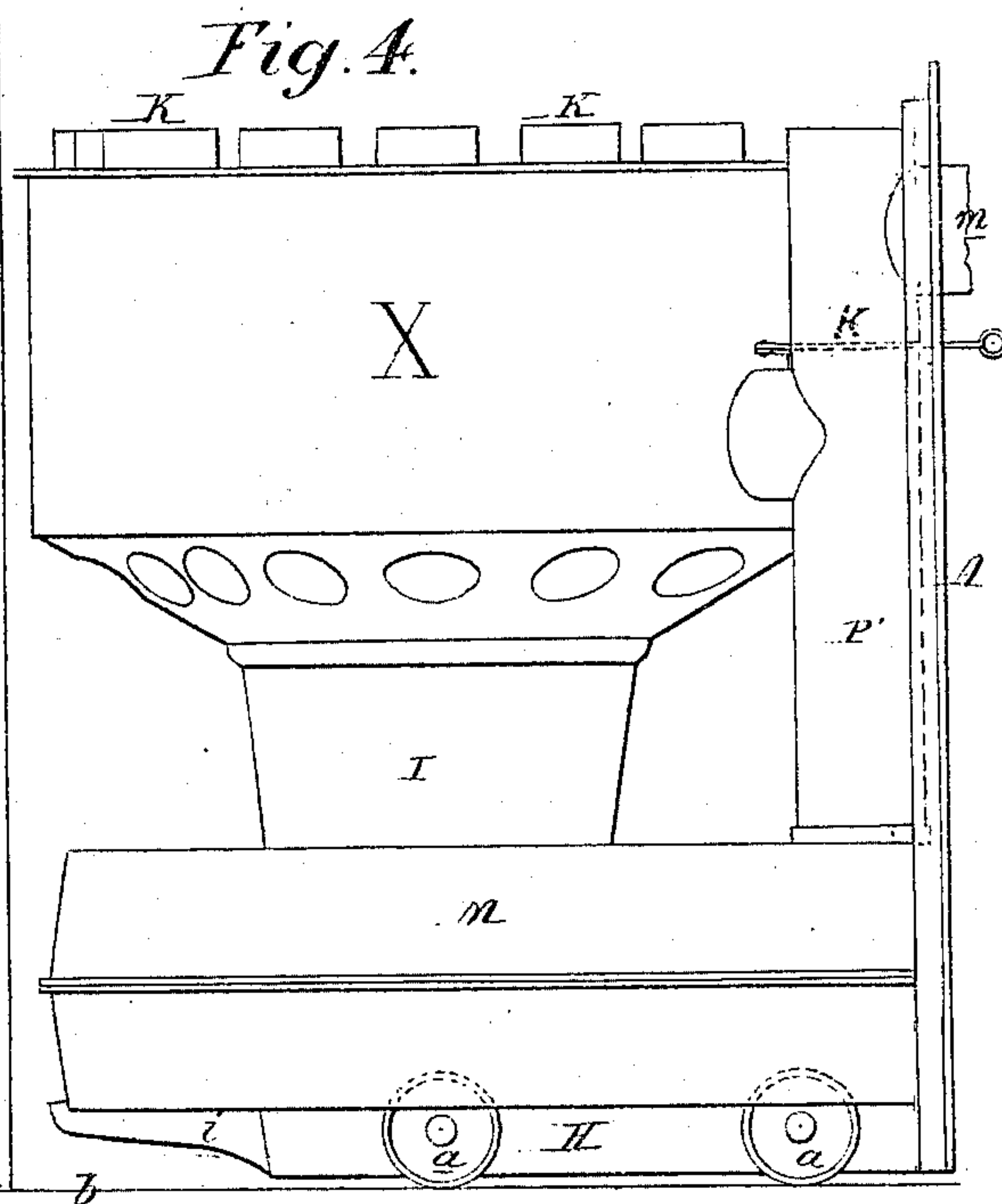
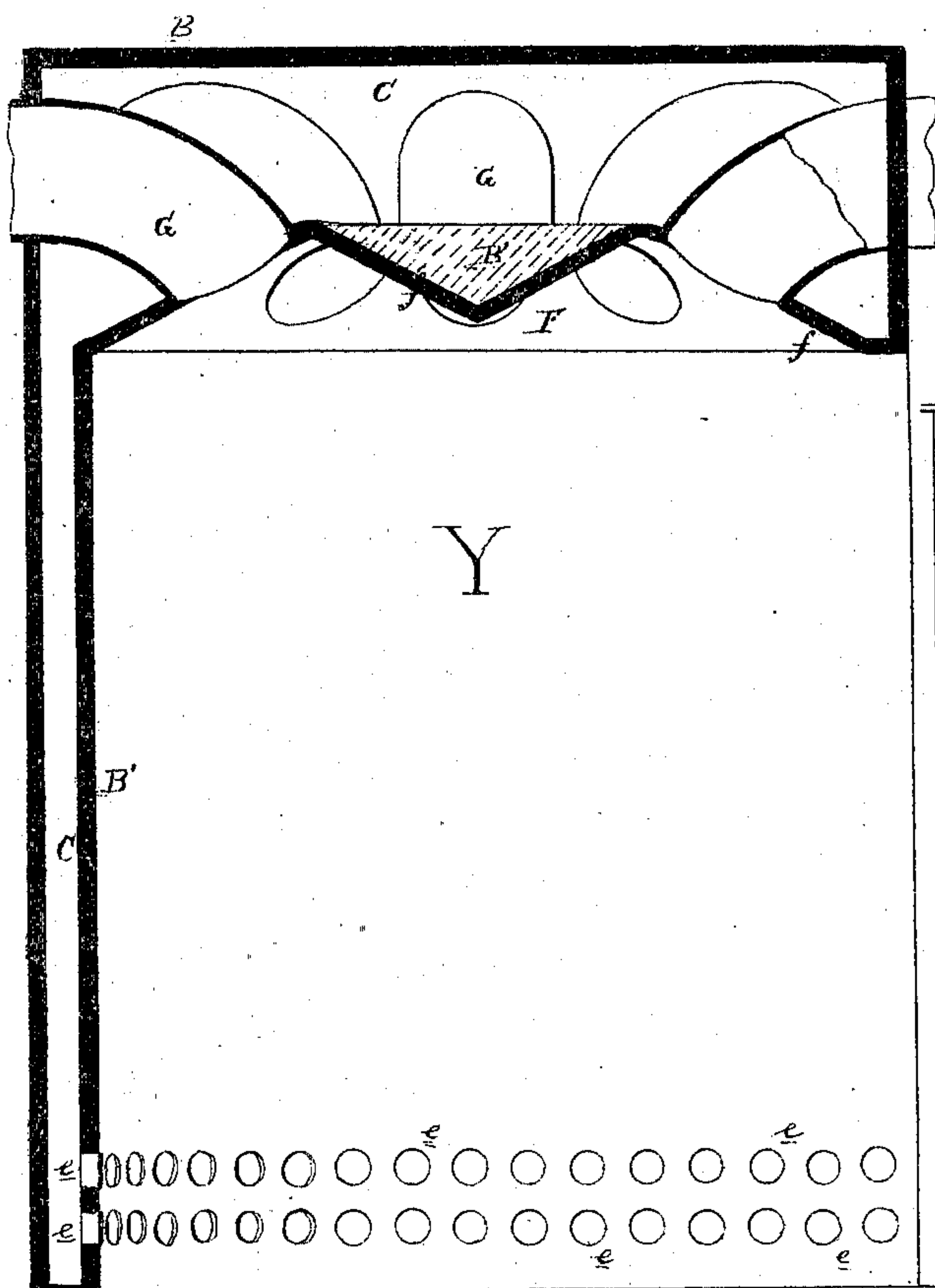


Fig. 5.

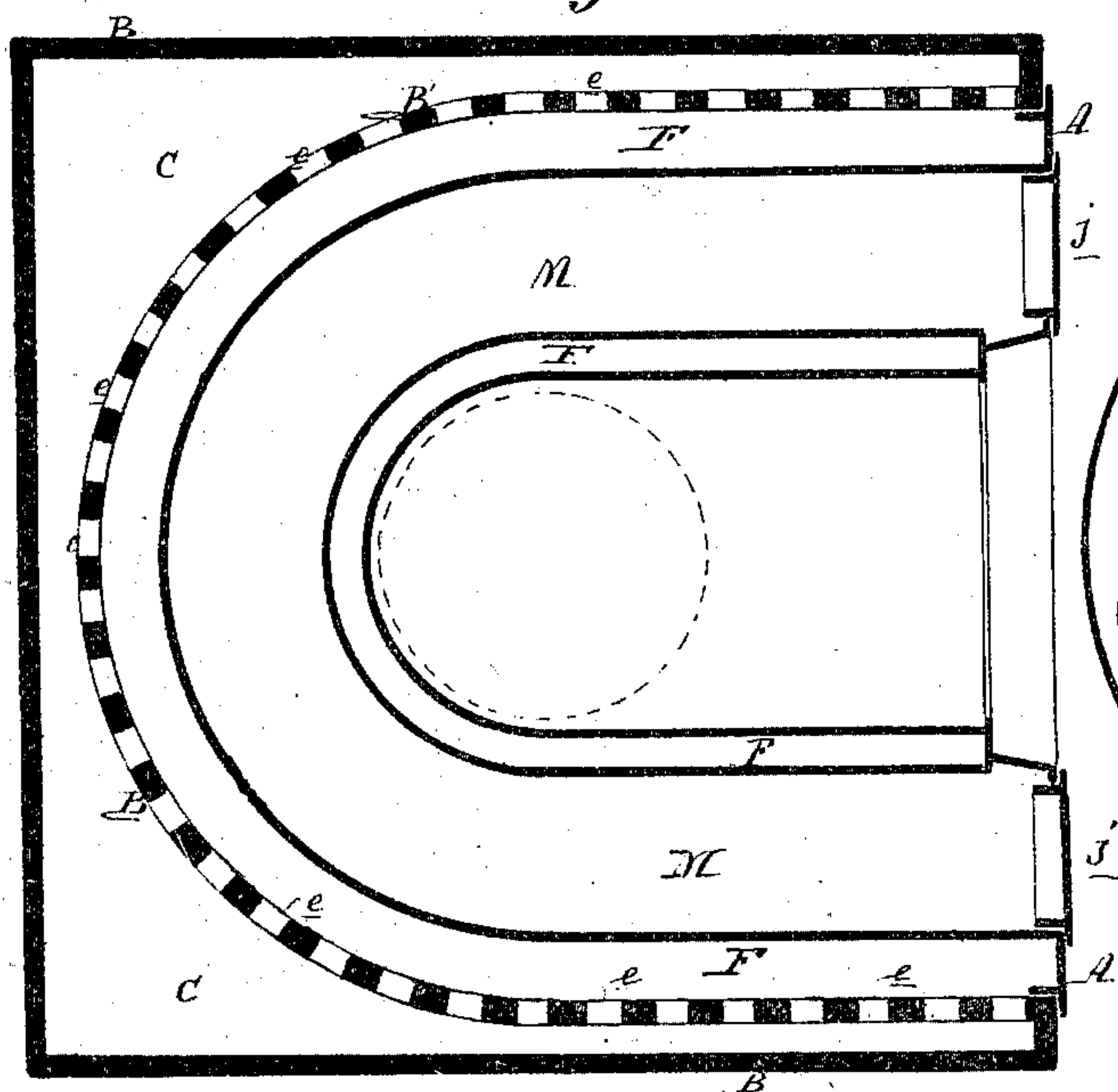
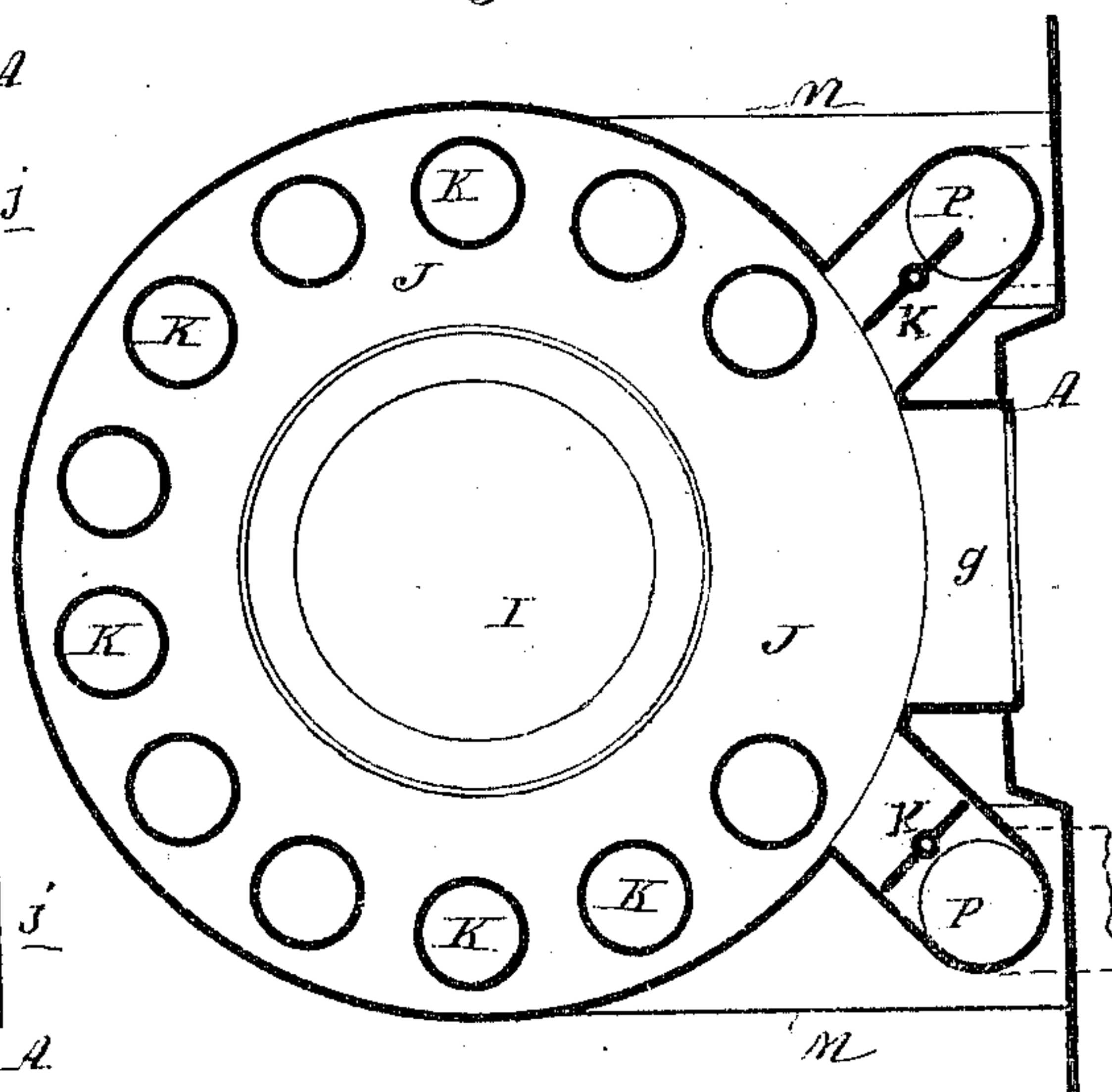


Fig. 6.



WITNESSES

*Ans. B. Harding.*  
*John Parker*

*J. M. Thatcher*  
*by his Atty*  
*Howson and son*



# UNITED STATES PATENT OFFICE.

JOHN MERRITT THATCHER, OF BERGEN, NEW JERSEY.

## IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 128,926, dated July 9, 1872; antedated June 27, 1872.

### SPECIFICATION.

I, JOHN MERRITT THATCHER, of Bergen, county of Hudson, State of New Jersey, have invented an Improved Heating-Furnace, of which the following is a specification:

#### *Improved Heating-Furnace.*

#### *Nature and Object of the Invention.*

My invention consists of certain improvements—too fully explained hereafter to need preliminary explanation—in heating-furnaces; the improvements being such that a thorough heating of large volumes of cold air is insured, and also such as to enable ready access to be had to the various parts of the furnace when it becomes necessary to clean or repair them.

#### *Description of the Accompanying Drawing.*

Figure 1, Sheet 1, is a vertical sectional view of my improved heating-furnace; Fig. 2, a front view of the same; Fig. 3, a sectional plan of the upper portion of the furnace on the line 1 2, Fig. 1; Fig. 4, Sheet 2, a view showing the furnace detached from its masonry or casing; Fig. 5, a sectional plan view on the line 3 4, Fig. 1; and Fig. 6, a sectional plan on the line 5 6, Fig. 4.

#### *General Description.*

The furnace proper, indicated by the letter X in Fig. 4, is completely self-contained and self-supporting, and is arranged to be drawn entirely out of the casing or masonry Y through the open front of the latter, so that access can be readily obtained to all of its parts, as well as to the interior of the casing, for purposes of repairing, cleansing, &c. In order that it may be thus moved with facility the furnace is supported upon four or more wheels, *a*, adapted to rails or ways *b*, which extend back into the casing, and the said furnace has a flanged front plate, A, arranged to fit closely into and against the front of the casing, and to be attached thereto by buttons or other appropriate fastenings. In addition to the above feature I have also made improvements in the construction and arrangement of the parts of both the furnace and casing, which I will now proceed to describe. Between the outer and inner walls B and B' of the casing is a chamber, C, which is supplied with cold air

through an opening or openings, *d*, Fig. 3, in the outer wall. This chamber communicates, through a number of small openings, *e*, extending entirely around the inner wall near to the bottom of the same, with a hot-air chamber, F, which is formed between the said inner wall and the furnace. The roof of the inner wall B' is of the peculiar form best observed in Figs. 1 and 4. It consists of a conical deflector, *f*, arranged directly above the furnace, and of an inclined portion, *f'*, to which the various hot-air conducting-pipes G are connected at points close to the deflector. These conducting-pipes, owing to the inclination of the roof, may be led off at any angle and in any required direction through the outer wall B. The ash-box H of the furnace is rounded at the back so as to conform to the shape of the wall B', and has an opening in front in the plate A provided with a suitable door. The fire-pot I with its grate is supported by the ash-box, and above the fire-pot there is a combustion-chamber, J, of enlarged diameter, at the front of which and in the plate A is the usual fire-door *g*. A number of vertical flues or pipes, K, open both above and below, and, communicating at each end with the hot-air chamber F, extend through the overhanging portion of the combustion-chamber J. (See Figs. 1 and 5.) An opening, *h*, in the front plate A, (Figs. 1 and 2,) permits access to the hot-air chamber for the introduction therein of a water-vessel or for any other purpose. Owing to the extended diameter of the combustion-chamber, and to the fact that the latter is contained entirely within the casing B', there is necessarily a space of considerable width between the latter and the fire-pot and ash-box, which space, in other furnaces of this class, has been usually left vacant. In my improved furnace I utilize a portion of this space for the reception of a radiator, M, which extends around the fire-pot and ash-box at a short distance from the same, it being also comparatively close to the wall B', on a line with or above its apertures *e*. The radiator is supported at the back by a bracket, *i*, of the ash-box, and is secured at its front ends to the plate A, there being in the latter two openings covered by caps *j j*, which can be removed when it is necessary to obtain access to the interior of the radiator for pur-



purposes of cleansing, &c. The radiator communicates with the interior of the combustion-chamber through two descending smoke-pipes, P and P', each furnished with a damper, *k*, arranged to be operated by a rod, *l*, from the front of the plate A, and each of the said pipes has also a branch, *m*, which extends through and is secured to a slide, *p*, so adapted to vertical guides on the front of the plate A that it may yield and adapt itself to the position determined by the degree of expansion or contraction of the fire-box. The branch *m* of the pipe P is closed at the end, and the branch *m* of the pipe P' communicates with the chimney, so that by opening the damper in the latter pipe a direct draught can be produced from the combustion-chamber to the chimney, while, by closing this damper and opening that in the pipe P, all of the heated products of combustion can be caused to descend through the pipe P to circulate in the radiator M, and to then rise through the pipe P' before escaping to the chimney. The damper in the pipe P is not absolutely necessary when the parts are arranged as above described, but I prefer to provide both of the smoke-pipes with dampers, so as to enable the chimney to be connected to whichever of the said pipes may be most convenient. The opening *d*, Fig. 3, for the admission of cold air, may be arranged at any point in the outer wall B. The apertures *e* serve to distribute the air uniformly into the hot-air chamber F, the air as it passes through these apertures being first brought in contact with the highly-heated surface of the radiator, and passing upward in narrow films on both sides of the same, as indicated by the arrows in Fig. 1, and that which passes on the inner side of the radiator being also brought into close contact with the fire-pot.

The arrangement of the radiator in respect to the apertures *e* is an important feature of my invention, as by this means the cold air on first entering the chamber F is brought into immediate contact with the radiator containing the heated products of combustion, so that that the latter are deprived of the greater portion of their caloric, and pass off to the chimney in a comparatively cool state, while the cold air in passing around and in contact with the said radiator is, as above described, considerably heated in the outset. The air, however, is brought to a state of the most intense heat after passing around and in contact with the exterior of the combustion-chamber, and through the tubes K, and the final passage of the hot air into the pipes G, by which it is

conducted to the various apartments to be heated, is facilitated by the deflector *f* and inclined roof *f'* of the inner wall of the furnace.

It will be observed as one of the peculiarities of this furnace that the smoke-pipes do not pass through the masonry or casing, as usual, but through the front plate A, this enabling them to be readily disconnected from the pipe or pipes leading to the chimney when the furnace has to be withdrawn from the casing, as before described.

I wish it to be understood that, although I have illustrated a surface-burning furnace in connection with my invention in the drawing, all of the above improvements are equally applicable to a base-burning or top-feeding magazine-furnace.

#### *Claims.*

1. The radiator M, communicating with the combustion-chamber of the furnace, and arranged within the hot-air chamber in respect to the fire-pot and ash-box of the furnace, substantially as herein described.
2. The said radiator, when arranged in respect to the openings *e* of the inner wall of the casing, substantially as specified.
3. The said radiator, secured at its opposite ends to the front plate A of the furnace, and supported at the rear by a bracket or brackets, *i*, as described.
4. The openings in the front plate A, communicating with the interior of the radiator and covered by detachable caps *j*.
5. The pipes P and P', forming a communication between the combustion-chamber, the radiator, and the chimney, and furnished with valves or dampers so arranged that direct communication can be established between the said combustion-chamber and chimney or indirectly through the radiator, all substantially as herein set forth.
6. The said pipes, when extended through the front plate A of the furnace instead of through the masonry, as usual.
7. The said pipes P and P', or their branches *m*, when fitted to plates *p* arranged to slide in vertical guides on the front plate A, for the purpose specified.

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

J. M. THATCHER.

Witnesses:

WM. A. STEEL,  
F. B. RICHARDS.