

F. E. Chataud Jr.

Improved Hot Air Furnace.

118195 *Fig. 1.*

PATENTED AUG 22 1871

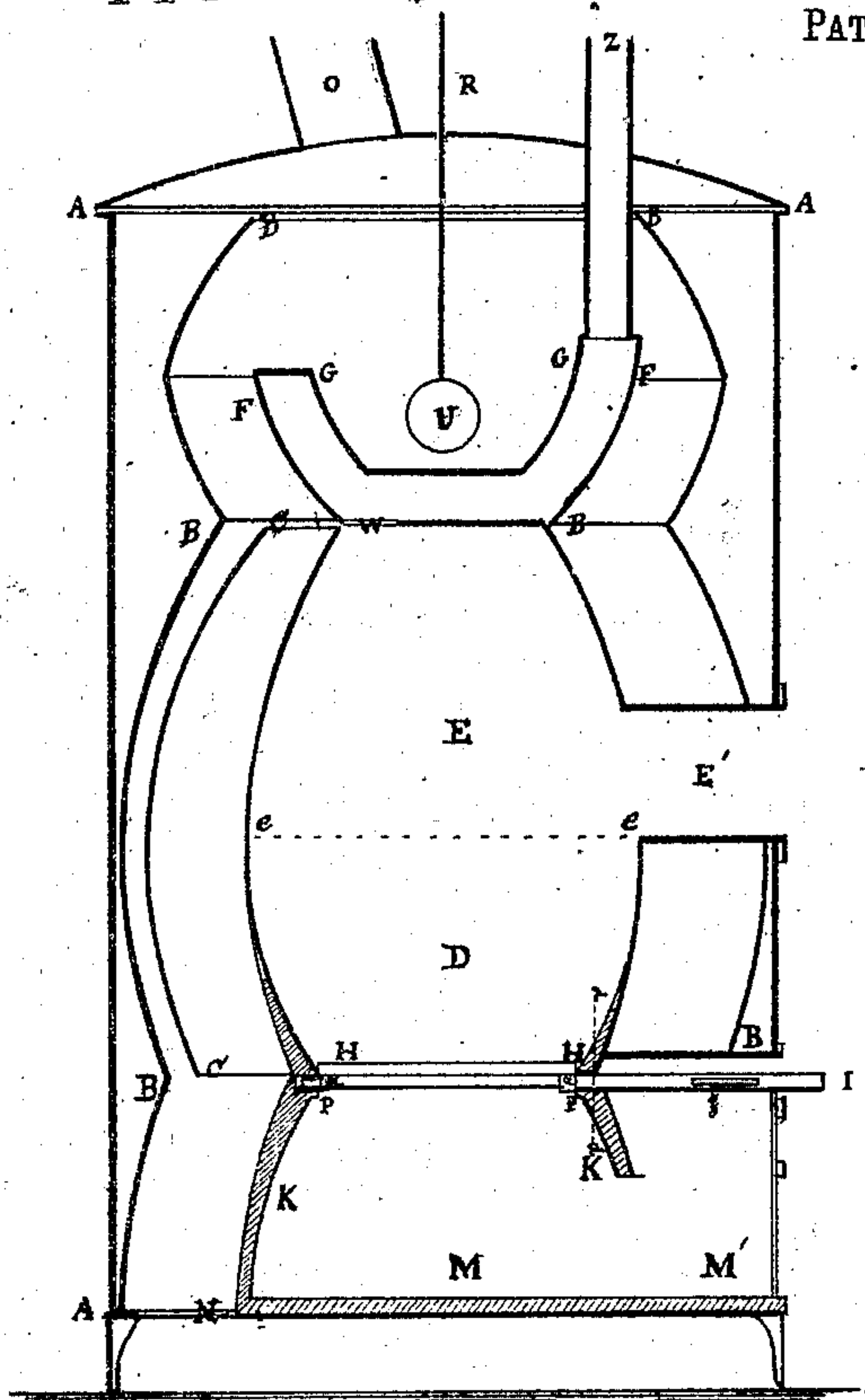


Fig. 2.

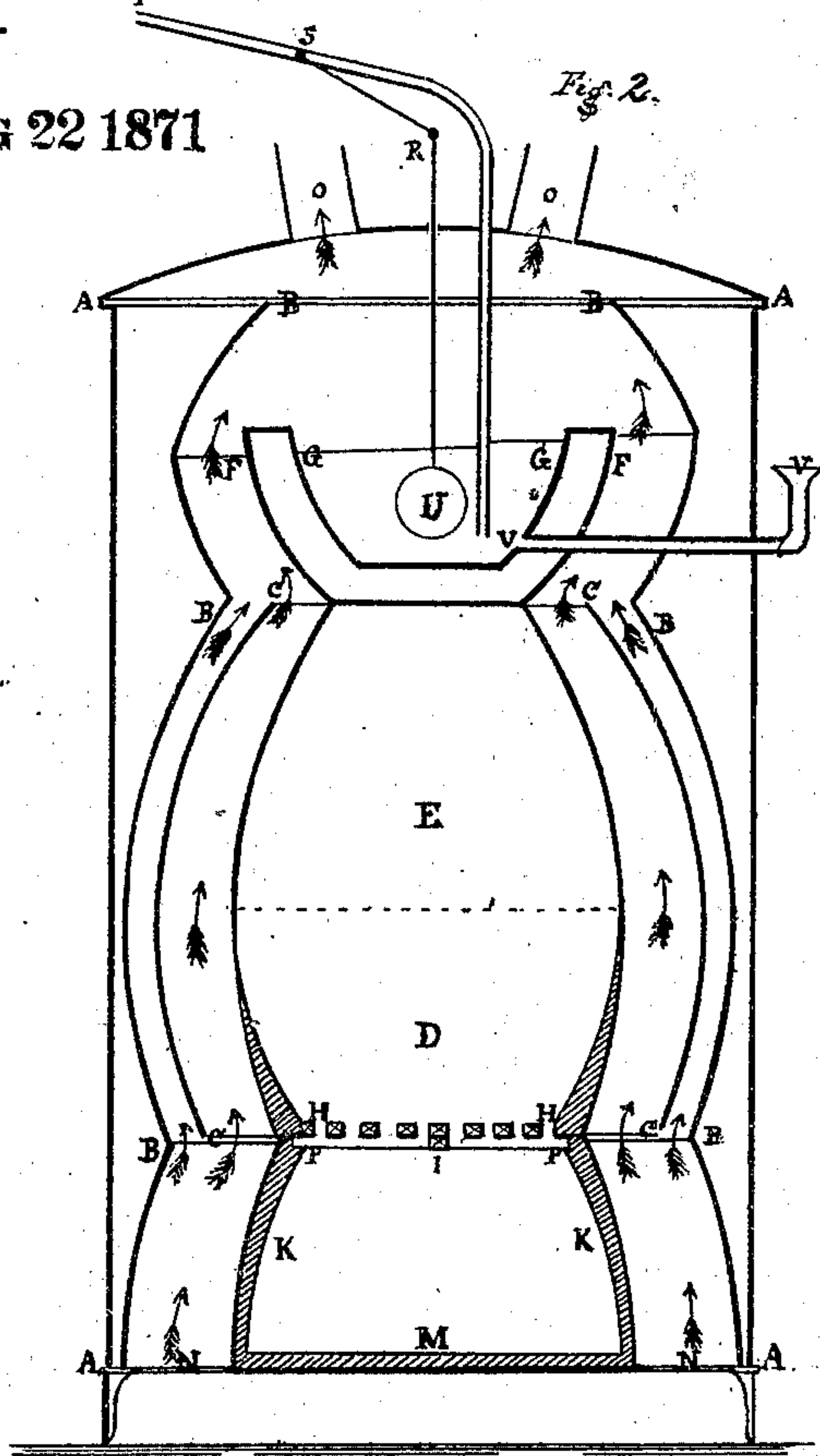


Fig. 3.

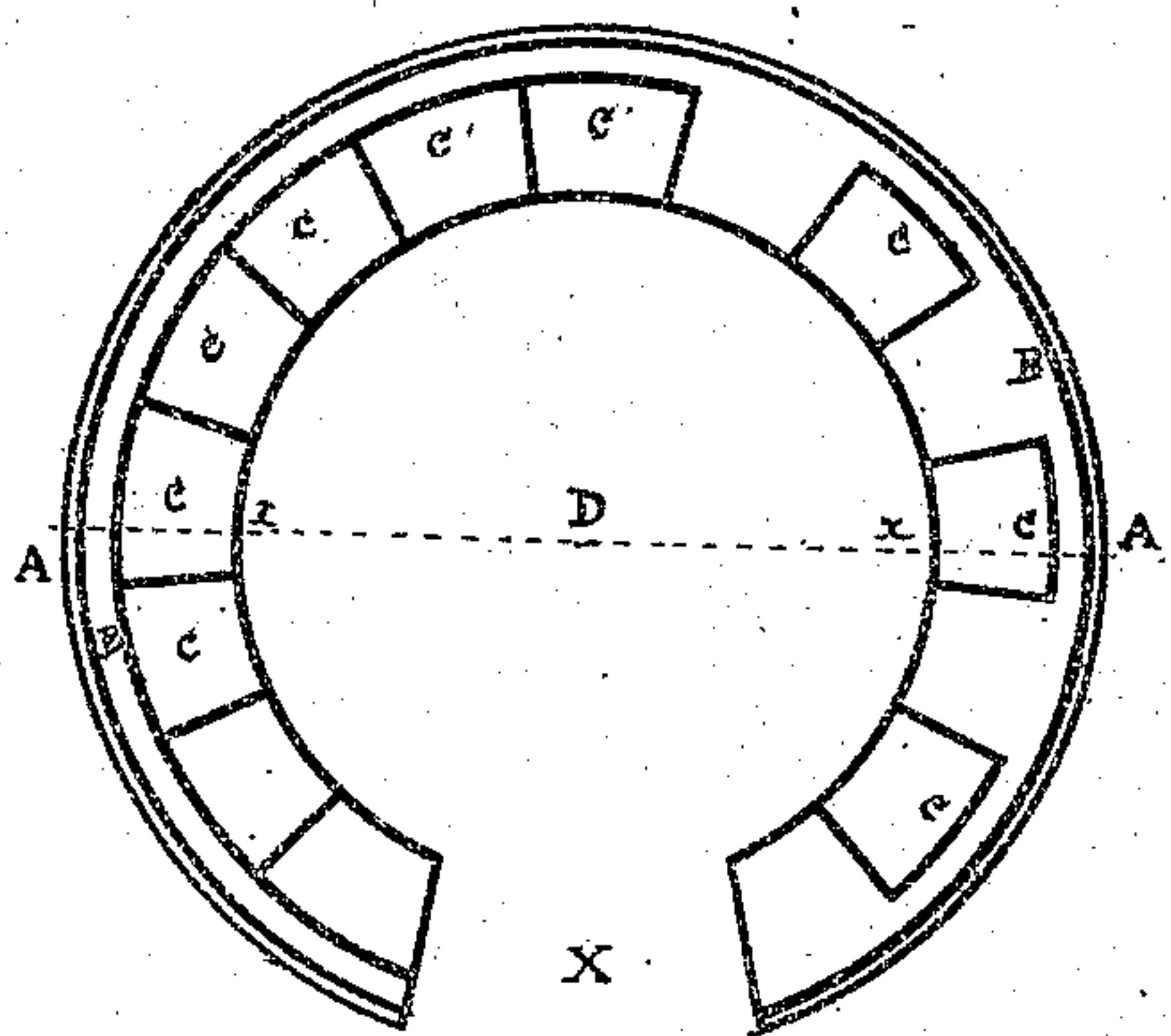
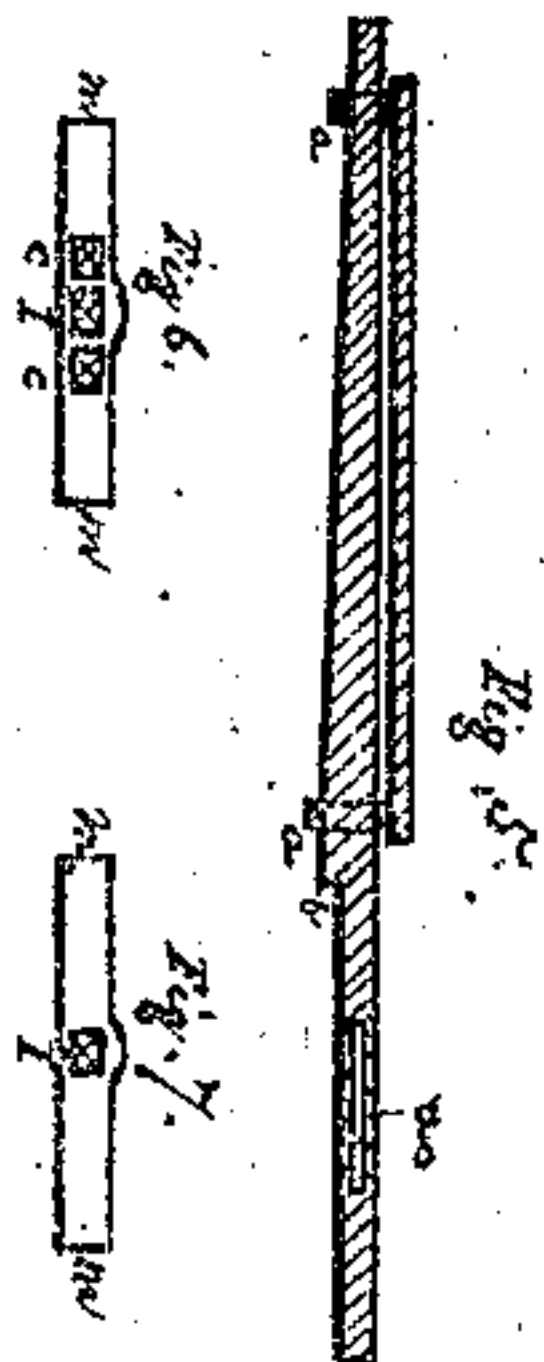
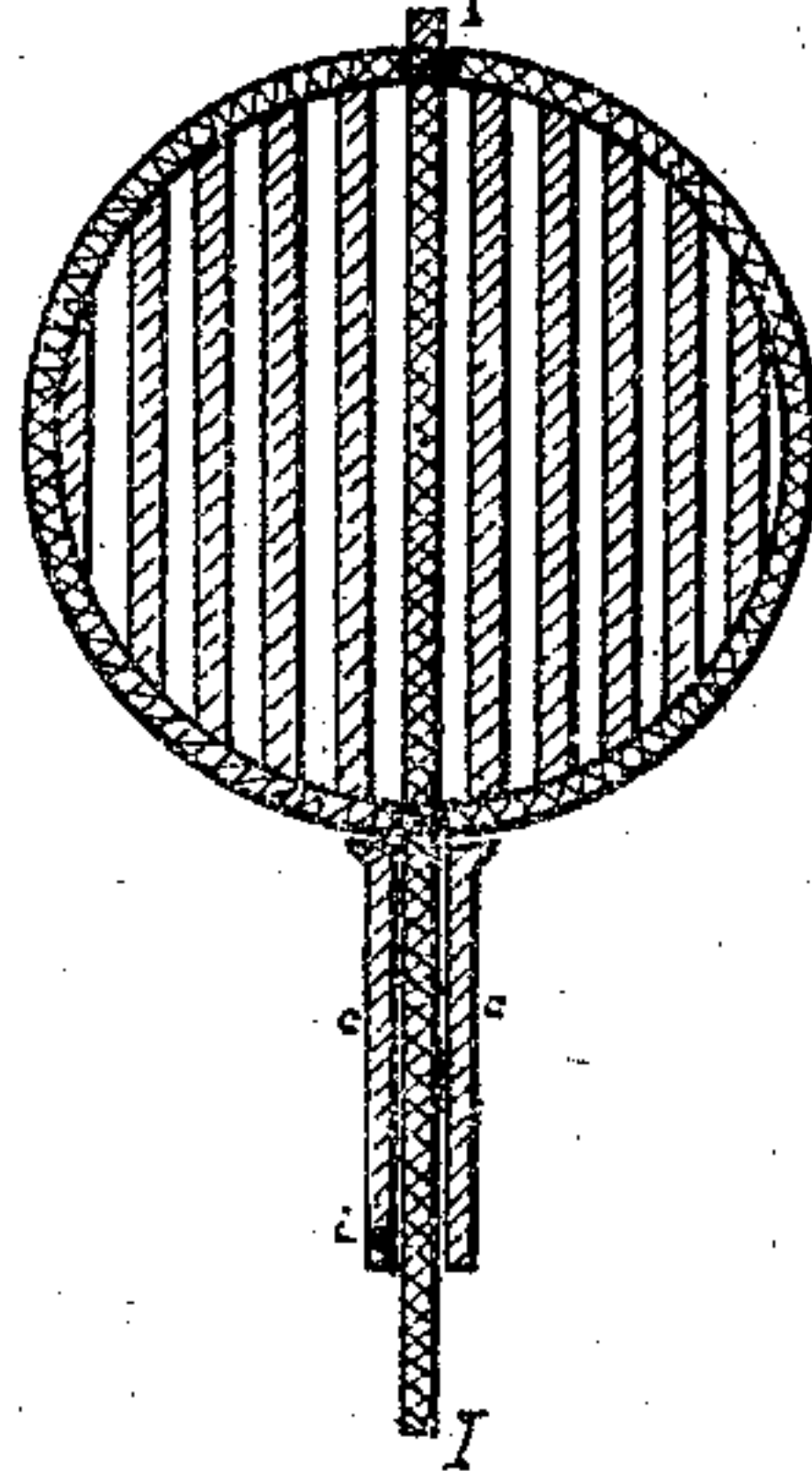


Fig. 4.



Witnesses.

Wm. W. Morgan
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UNITED STATES PATENT OFFICE.

FERDINAND E. CHATARD, JR., OF BALTIMORE, MARYLAND.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 118,195, dated August 22, 1871.

To all whom it may concern:

Be it known that I, FERDINAND E. CHATARD, Jr., of Baltimore, in the county of Baltimore and State of Maryland, have invented certain Improvements in Hot-Air Furnaces, of which the following is a specification:

The first part of my invention relates to an arrangement of the fire-pot and dome of the furnace by which they are surrounded by a series of tubes or flues, either cast with them or cast separately and then attached in a suitable manner, the outside surface of the fire-pot and dome forming one side of these tubes or flues; the object of this being to increase the amount of heating-surface of the fire-pot and dome exposed to the current of cold air, the conducting power of the iron keeping the other three sides of the flues at a high temperature. The second part of my invention relates to the arrangement of the hot-water tank of the furnace, which is placed above the dome of the furnace and surrounded and supported by a cast-iron jacket; the object of this arrangement being to make use of the hot gases, smoke, &c., which escape from the top of the dome and pass between the water-tank and outer jacket before entering the smoke-pipe, to keep the water in the tank at a boiling temperature, and likewise to heat still further the air which has passed through or between the flues. The third part of my invention relates to the arrangement of the outer jacket of sheet metal, which extends from the bottom of the furnace up to and somewhat over the water-tank, and which is curved in such a manner that the air which enters the lower part of the furnace in a cold state is kept as much as possible in contact with the heated surfaces and must ascend in the direction of them, and when it reaches the level of the top of the water-tank it is curved or forced over toward the vapor and steam arising from the hot water in the tank and can take up a sufficient amount of moisture. The fourth part of my invention relates to the form and arrangement of the shaker-bar, which is attached to the grate of the fire-pot, on the under surface of the same, and is supported in such a manner that sufficient lateral motion is allowed for the purpose of shaking the fire, but the grate cannot fall or become jammed; but, when desired to upset the grate and remove the fire, &c., by drawing back the lateral supporting-bars the

grate turns upon the center or shaker-bar as an axis. The fifth part of my invention relates to the water-supply or feed of the tank, which is done either by a pipe connected with the water-supply pipe of the building—in the pipe is placed a stop-cock, opening and shutting by means of a lever acted on by a hollow ball floating in the water in the tank—or by filling the tank through a pipe which commences at the lower part of the water-tank, passes through all the external coverings of the furnace, and ends in an external conical opening, so that the level of the top of this external opening is below the level of the top of the water-tank. This latter pipe may also serve as a discharge-pipe for any excess of water that might flow into the tank from imperfect working of the floating ball, levers, or stop-cock.

Figure 1 is a vertical section of furnace through the center of fuel-opening. Fig. 2 is a vertical section of furnace on the line *x x*, Fig. 3, showing water-supply. Fig. 3 is a transverse section at top of fire-pot on line *e e*, Fig. 1. Fig. 4 is a plan of grate and shaker-bar, seen from below, showing lateral supporting-bars. Fig. 5 is a vertical section of grate and shaker-bar. Fig. 6 is a section of furnace, shaker-bar, and lateral supporting-bars on line *d d*, Fig. 1. Fig. 7 is same with lateral supporting-bars drawn back, leaving center or shaker-bar in position for upsetting the grate.

A A is the outermost jacket or wall of furnace, made of either sheet metal or brick-work. B B is the inner jacket of sheet metal, which surrounds the entire furnace up to and somewhat above the top of the water-tank, and which serves to give direction to the current of cold air which enters at N, so as to cause it to keep in contact with the heating-surfaces and the vapor of water at top of water-tank. C C are the tubes or flues, which serve to heat the air, and which are arranged around the fire-pot and dome, as in Fig. 3, either flues C C separated by an intervening space, Fig. 3, or in a series of tubes or flues, C' C' C', Fig. 3, placed side by side and in direct contact. One side of these flues is formed by the outside surface of the fire-pot or dome, and they are either cast in one piece with them or are cast separately and then suitably attached. Between the flues C C or C' C', Fig. 3, and the jacket B B is a space through which air may also pass, receiving heat from the

outermost side of the flues. D is a fire-pot, of usual form. E is the dome, of a form similar to the fire-pot, though of greater height, with fuel-opening E', Fig. 1, and exit W, Fig. 1, for smoke, gas, and the products of combustion. F F is a cast-iron jacket, which supports the water-tank G. The outer surface of F gives additional heat to the air which has passed through or around the flues. The water-tank G is heated by the smoke, &c., which come through W, pass around G, and have exit through the smoke-pipe Z. H H represent the grate at the bottom of the fire-pot; I I', the center or shaker-bar, which is supported on the ledge P cast on K, the support of the fire-pot. When the grate is moved in the process of shaking, the end I', Fig. 4, moves along the ledge P. The bar I I', Figs 4 and 5, is connected with the grate H H by passing through square openings in the two ears cast on the grate H H. These ears are represented in section by *a a*, Figs. 1 and 5. *c c*, Fig. 4, are two bars of iron enlarged toward the end nearest the grate, which bars are united by a flat piece working in the slot *g*, Figs. 1 and 5. These bars serve as lateral supports to the center or shaker-bar, as in Fig. 6. When bars *c c* are drawn back by the pin at *i*, Fig. 4, the center bar I, Fig. 7, is left free to rotate in the space *m m*, which is the anterior opening between K and the fire-pot D on the line of section *d d*, Fig. 1, and upon this bar I, as an axis, the grate turns and upsets. Upon returning the grate H H to the horizontal position and pushing inward the bars *c c*, the grate is held in this position, allowing motion only in the plane of the grate. *b*, Fig. 5, is a projection from the shaker-bar, which falls below and within the edge of the ledge P P, and serves to prevent the bar I I' from being drawn out of place in withdrawing the lateral supporting-bars *c c*. T S, Fig. 2, is the water-supply pipe, to be connected with the supply-pipe of the building. S is the stop-cock, which is opened and shut by the lever S R, acted on by the bar going from R to the hollow ball

U, which floats in the water of the tank G. When the water rises to a certain level, the ball rising with it moves the rods and turns off the water by means of the cock S. When the water-level falls S is opened by the falling of the ball U. V, Fig. 2, represents the overflow-tube, which enters the water-tank at its lower part and passes from the tank through all the coverings of the furnace to the outside, where it is bent upward and the orifice enlarged, the level of the top of this orifice being always below the level of the top of the water-tank, so that any excess of water may escape by it should the stop-cock at S fail to function properly, so no overflow into the furnace can possibly occur. This pipe V V may also be employed to fill the tank with the necessary amount of water, if desired. In Figs. 1 and 2, M represents the floor of the furnace, with an external opening, M', for the removal of ashes, &c. O O are the exit-tubes or pipes for the heated air. X, Fig. 3, is the floor of the fuel-opening E' in the dome.

I claim as my invention—

1. The series of flues C, one side of which is formed by the outside surface of the fire-pot and dome, when constructed and arranged to operate substantially as shown and described.
2. The arrangement of water-tank within the cast-iron jacket, with space between the water-tank and cast-iron for the passage of the products of combustion.
3. The outer jacket of thin metal or other material, which directs the current of air and keeps it in contact with the heating-surfaces and forces it over the water-tank.
4. The combination of center-supporting or shaker-bar for the grate with the lateral supporting-bars, substantially as and for the purposes hereinbefore set forth.

FERDINAND E. CHATARD, JR.

Witnesses:

HAMMOND DUGAN,
S. A. MORSE.