

D. Culver.

Hot-Air Furnace.

No. 5,114.

Patented May 15, 1847.

Fig. 1.

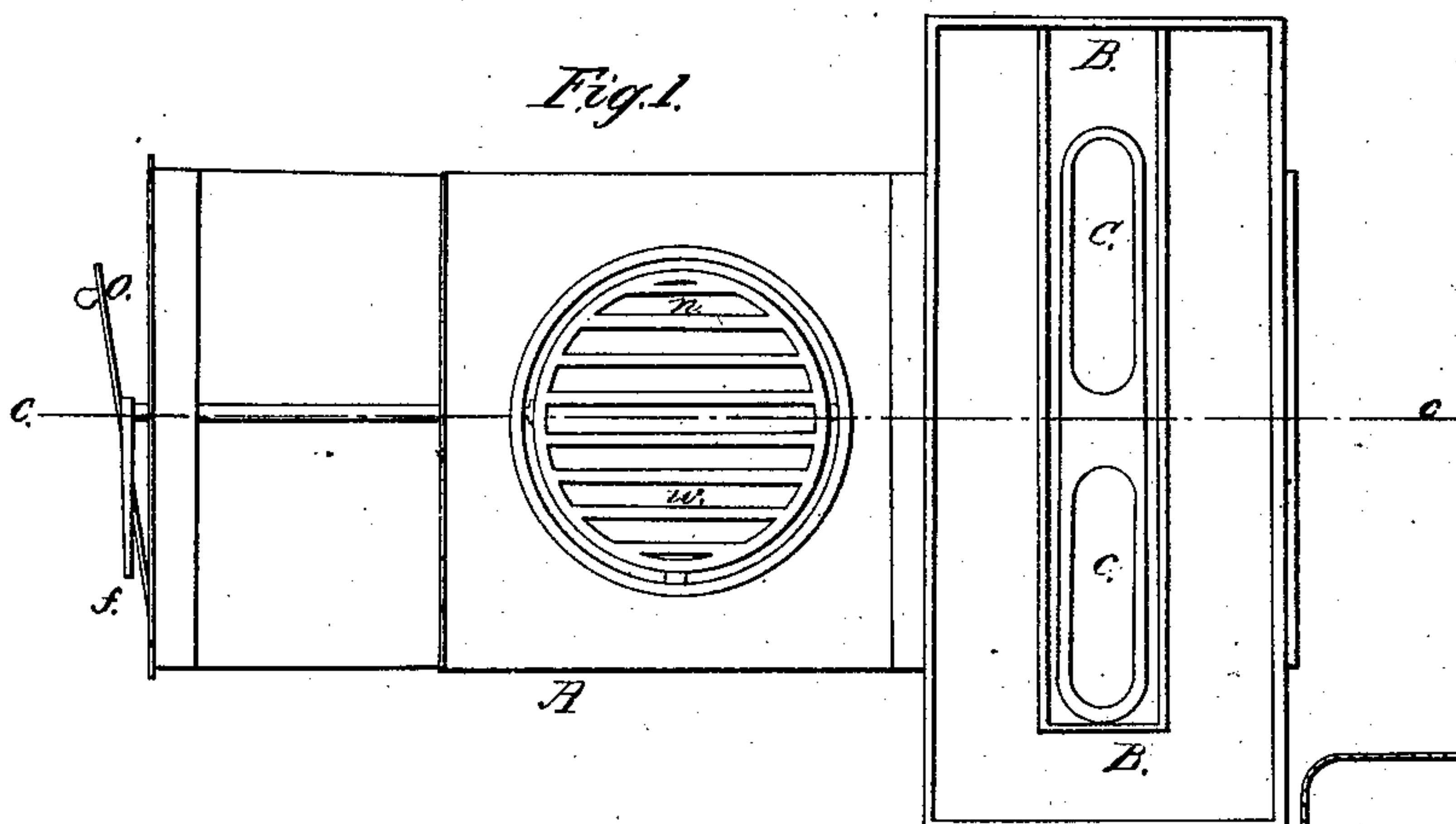


Fig. 3a.a.

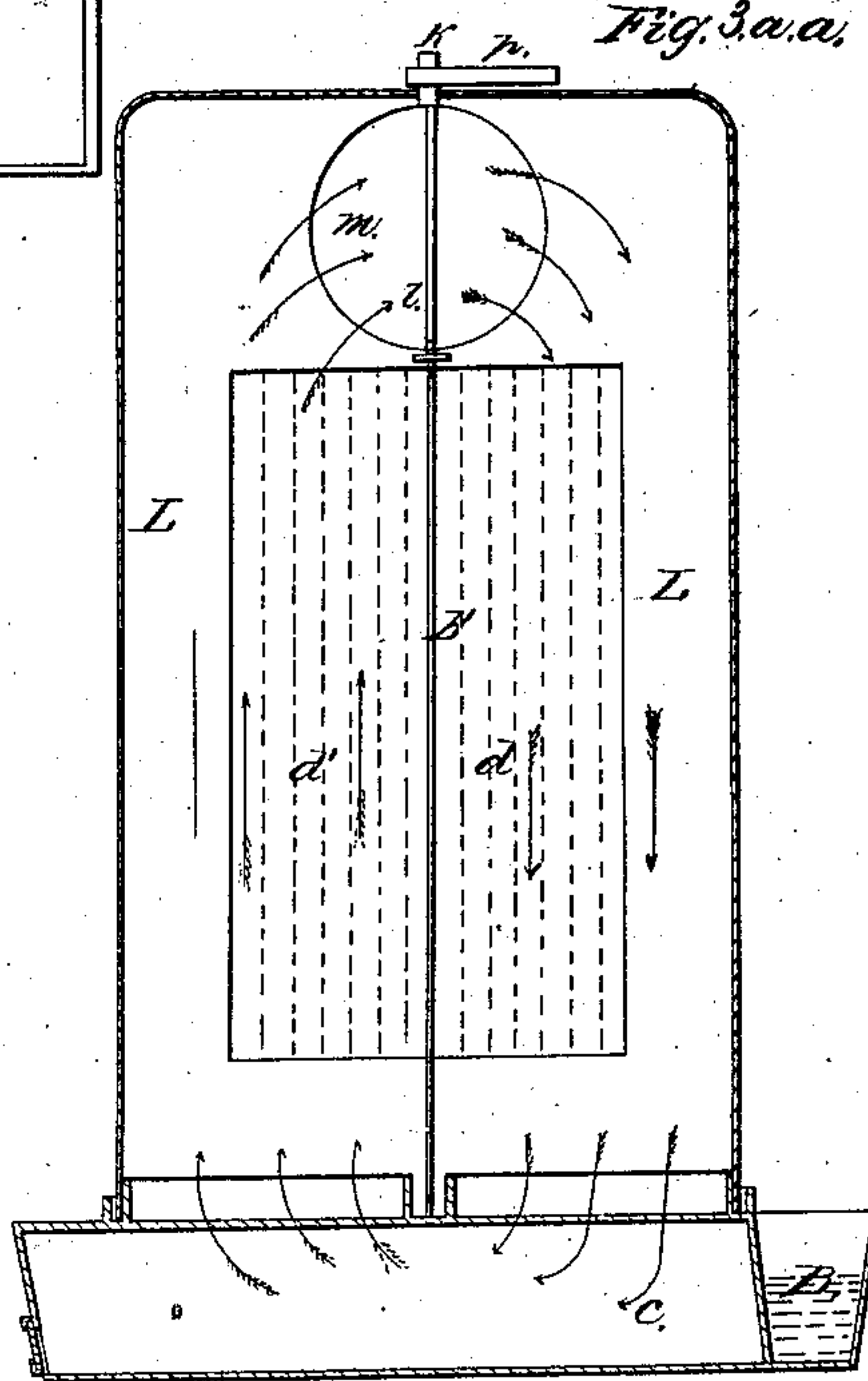
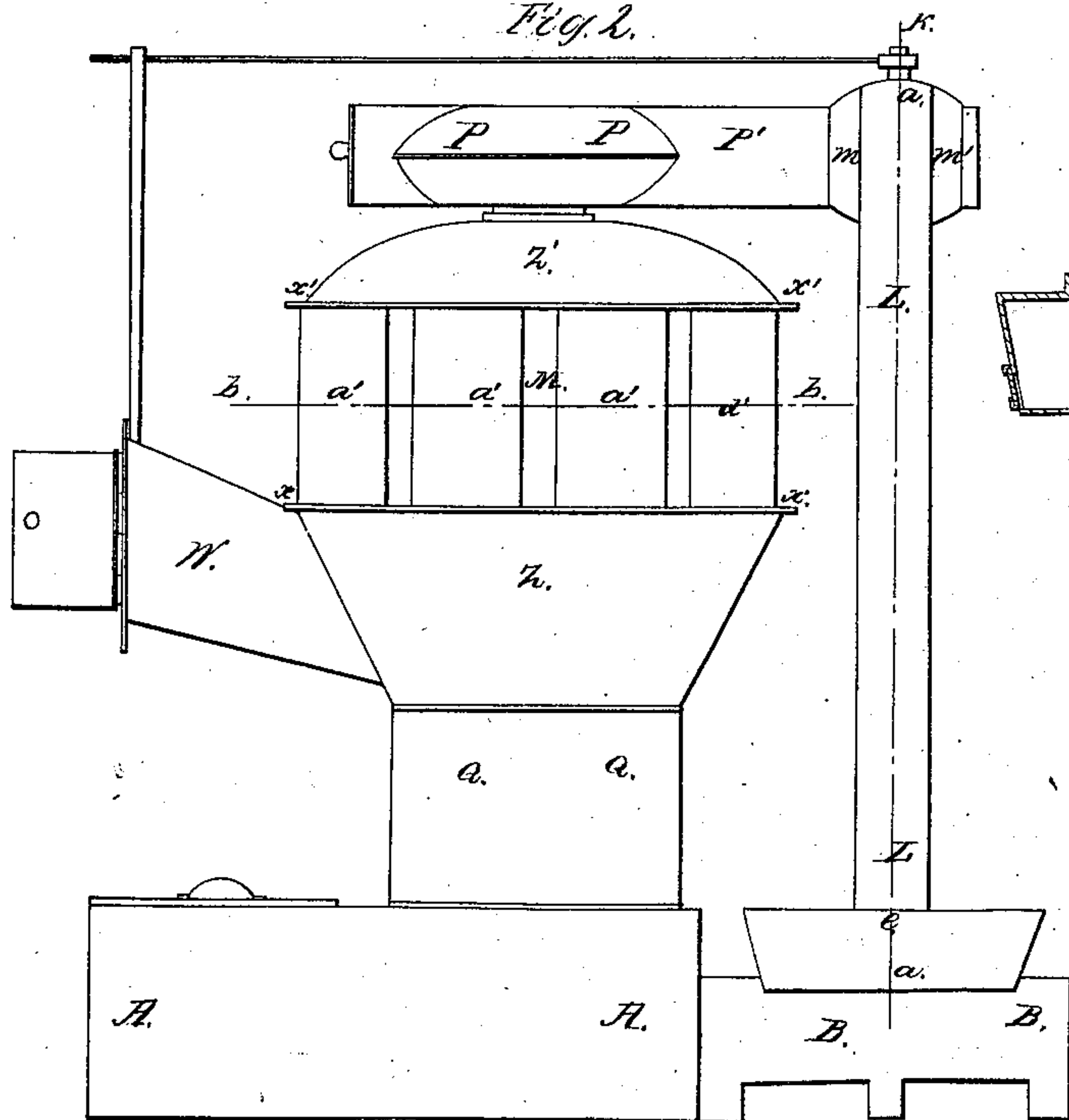


Fig. 2.



D. Culver.
Hot-Air Furnace.

N^o 5,114.

Patented May 15, 1847.

Fig. 6.

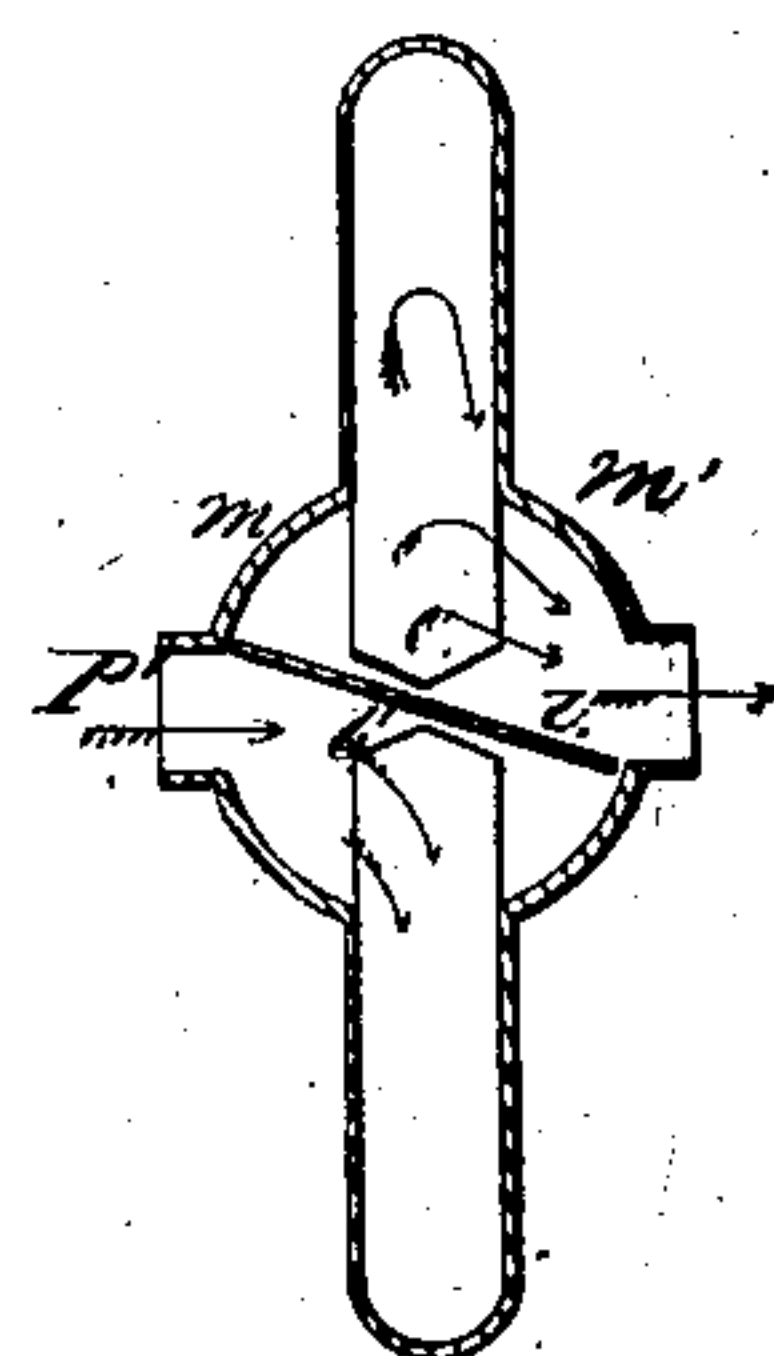


Fig. 5.c.

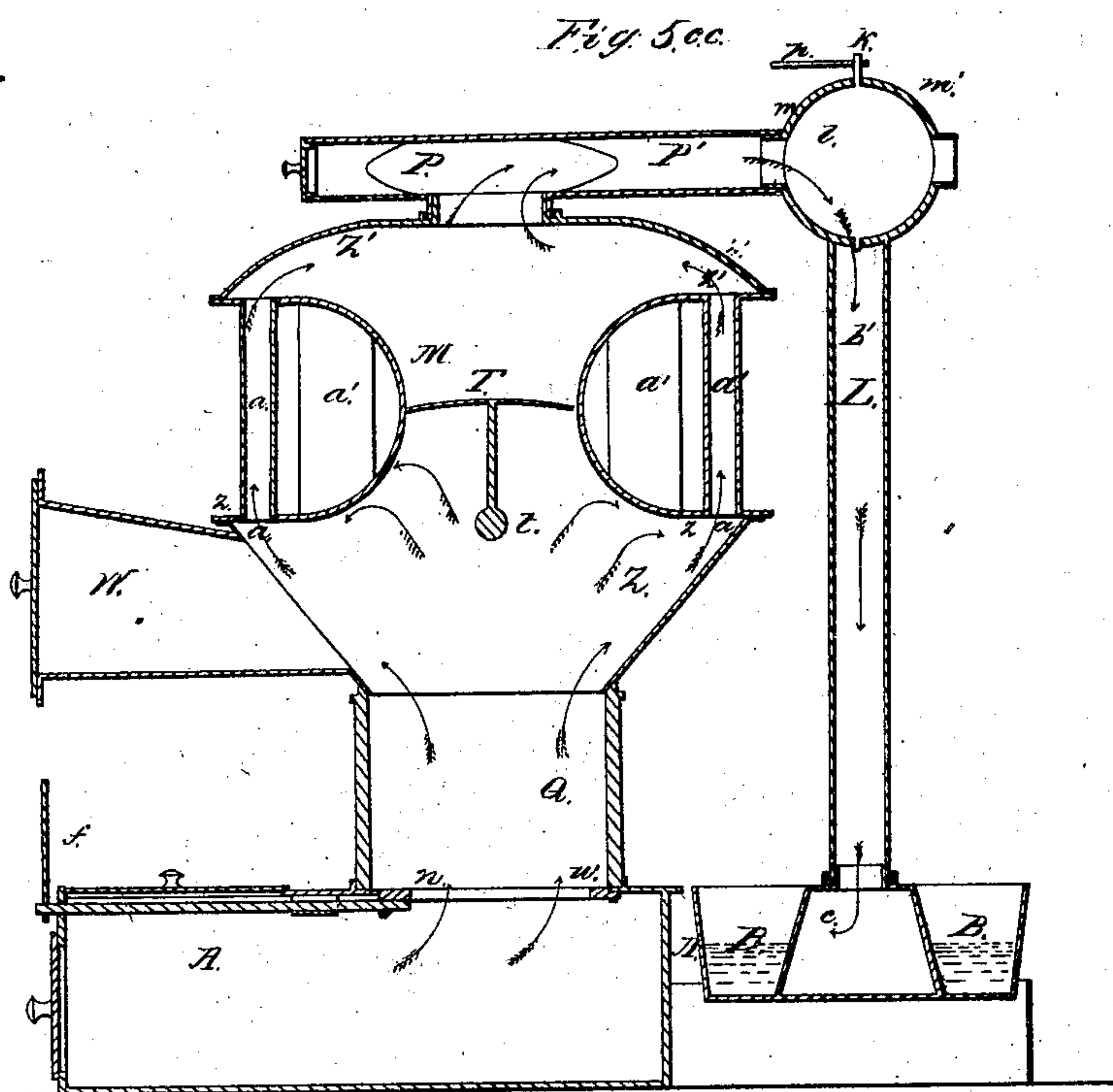
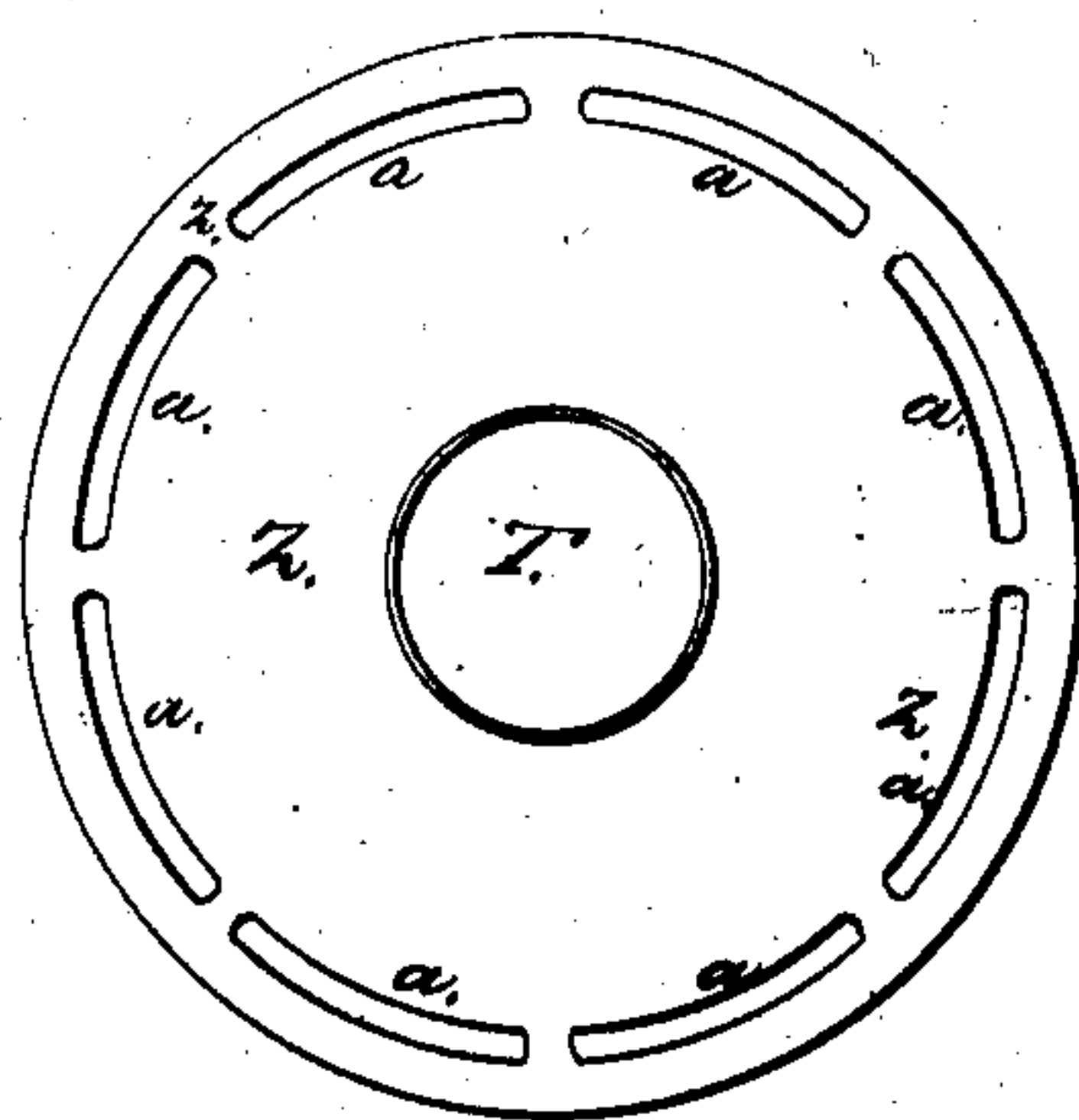


Fig. 4.b.



UNITED STATES PATENT OFFICE.

DAVID CULVER, OF HARTFORD, CONNECTICUT.

AIR-HEATING FURNACE.

Specification of Letters Patent No. 5,114, dated May 15, 1847.

To all whom it may concern:

Be it known that I, DAVID CULVER, of the city and county of Hartford and State of Connecticut, have invented new and useful
5 Improvements in Hot-Air Furnaces for Heating Buildings, &c., and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before
10 known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the base of the furnace taken at a plane just above the grate; Fig. 2, is an elevation; Fig. 3, a cross section taken at the line (*a, a*) of Fig. 2 (and represented in the drawing as lying down); Fig. 4, a horizontal section of the main radiator taken at the line (*b, b*) of Fig. 2; Fig. 5, a longitudinal vertical section taken at the line (*c, c*) of Fig. 1, and Fig. 6, a top view of the exit pipe and flat radiator, the pipe and radiator being indicated by
25 red lines to represent the internal arrangement.

The same letters indicate like parts in all the figures.

The object of my invention is to obtain a
30 large radiating surface with the view to get the greatest amount of heat with a given amount of fuel, and so to arrange the parts that the inside may be kept clear of soot and ashes during the operation of the furnace; and the nature of my invention consists in making the drum, placed immediately over the fire, in the form of an hour glass, surrounded with a series of pipes the lower ends of which open into a chamber
40 formed by an inverted hollow frustum of a cone that forms the connection between the fire pot and the drum, and their upper ends opening into a dome that extends over them and the drum. And my invention consists
45 also in placing a disk valve or swinging partition in the smallest part of the drum, the valve being properly balanced and hung on journals and provided with a weight attached vertically to its underside to act like
50 a pendulum, or provided with any other means by which to keep it closed except when vibrated to discharge the soot and ashes which may accumulate on its upper surface. By this arrangement of parts the
55 products of combustion in rising from the fire pot impinge on the curved surface of

the drum, (which as stated above is formed like an hour glass to present a large surface), and against the valve, (which is kept closed by the pendulous weight), and finding no escape they are deflected and pass up
60 the vertical pipes into the upper part of the drum and dome, which they heat, depositing the soot and ashes onto the valve or swinging partition, and then pass through
65 a horizontal pipe into one division of a flat radiator down to the base thereof and thence up the other division and out into the exit pipe, the arrangement of this flat radiator in combination with the circular radiator
70 constituting the third part of my invention. And the last part of my invention consists in uniting the horizontal and escape pipe with the top of the flat radiator by means of a globe or sphere in combination with a
75 round disk valve by means of which spherical enlargement and disk valve the aperture for the passage of the products of combustion is always of the full capacity of the pipe.
80

In the accompanying drawings (*A, A*) represent the ash pan and base of the furnace. The top of this has a circular hole in which is hung a circular swinging grate
85 (*n, w*) the spindle of which passes out through the front and is there provided with a handle (*f*) by means of which the grate can be operated to discharge the contents of the fire chamber into the ash pan, or to shake out the ashes. Over this grate is properly fitted the fire cylinder (*Q*) from the
90 upper part of which extends a hollow inverted frustum of a cone (*Z*) to the side of which is fitted an inclined feeder (*W*) through which coal is supplied to the grate.
95 To the upper edge of this inverted cone is fitted a flat ring (*z*) pierced all around near its outer periphery with holes (*a, a*) to which are fitted vertical pipes (*a', a'*) the upper ends of which are fitted to holes in a
100 corresponding ring (*z'*) over which is placed a dome (*Z'*). And to the inner periphery of these rings is fitted and secured a drum (*M*) made in the form of an hour glass, and to the smallest part of this is hung or swung
105 a horizontal disk valve (*T*) from the under surface of which hangs a weight (*t*) that keeps the valve in a horizontal position and therefore closed, but as it is hung on journals the swinging of this weight by means of
110 a poker through the feeder will swing the valve and discharge any soot or ashes that

may have accumulated on the surface in consequence of the direction of the currents of the products of combustion, which pass up from the fire cylinder, as indicated by the arrows, impinge on the curved surface of the drum (M) and the disk valve (T), and being deflected, pass up the pipes (a') into the dome, and out through a hole at the top into the enlargement (P) of a horizontal pipe (P') depositing soot and ashes in the upper part of the drum which settles onto the top of the disk valve (T), from which it will be discharged readily by simply vibrating the valve, a result that could not be attained by a fixed partition instead of the valve.

The end of the horizontal pipe (P') connects with a flat vertical radiator (L) by an enlargement (m) a similar enlargement (m') from the back of the radiator opens into the exit pipe. These two enlargements are segments of a sphere or globe and in this is fitted a disk valve (l) hung on a vertical spindle (k) provided with a lever or handle (p) at top by which it can be turned. By locating the disk valve in this globe formed enlargement the apertures for the passage of the products of combustion are always retained of the same size, and therefore do not impede their passage as in other furnaces or stoves. When this valve stands in the plane of the axis of the horizontal pipe (P') and the exit pipe the draft is directly out into the chimney, but when it is turned in the position represented in Fig. (6) then the products of combustion pass down on one side of a vertical partition plate (b') into a case (c, c) surrounded by water in a vessel (B, B) to produce a slight evaporation to moisten the air of a building, and then the smoke, gases, &c. pass up the other side of the partition and out into the chimney, the diagonal position of the disk valve in the globe having the apertures of the pipes &c. of their full capacity. This flat radiator is made in two parts separated at the line (a, a) of Fig. 2, so that each half may be cast separately, and then put together in any desired manner. And to enlarge the radiating surface the two plates constituting this flat radiator are made with flutes (d', d').

This apparatus may be used as represented in the drawings to answer the purposes of a stove, but when used as a furnace for heating air to be carried off for heating other apartments, it must then be surrounded by a wall of masonry provided with pipes for admitting cold, and for discharging hot air, and as the mode of surrounding

the furnace for this purpose which I employ is similar to plans in general use it is deemed unnecessary to describe it.

It will be evident from the foregoing that the disk valve or swinging partition (T) in the drum, over the fire place, may be vibrated by the pendulum in the manner described, or by extending the spindle to which it is attached through to the outside of the drum that it may be vibrated from the outside, or an arm may extend up from the upper surface of the valve and connected with a sliding rod passing to the outside, in short any desired plan of operating this valve may be substituted for the pendulum which I prefer. If desired the products of combustion instead of being carried out through a hole in the top of the drum, may be discharged through a pipe extending out from the drum just above the disk valve or partition. And I wish it to be distinctly understood that some of the advantages arising from the use of this valve or swinging partition may be retained without the hour glass form of the drum, as this (the drum) may be made cylindrical or of any other desired form, and yet retain the valve as a means of discharging the soot or ashes, which in any such arrangement, under any of its modifications, could not be effected without taking the apparatus apart—but the hour glass form of the drum presents a much larger surface for the radiation of heat than any other form heretofore given and therefore is preferable to the cylindrical.

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

1. Making the drum which is placed over the fire pot in the form of an hour glass to present a large amount of surface to the action of the flame and for radiation, as described, when this is combined with the vertical pipes surrounding the drum, as described.

2. I claim the employment of the disk valve or swinging partition within a vertical drum placed over the fire for the discharge of soot and ashes from the compartment above the swinging partition, as described.

3. And finally I claim the globe formed enlargement at the junction of the pipes and the flat radiator in combination with the circular disk valve or damper by means of which enlargement, in combination, the apertures for the passage of smoke &c. are retained of their full capacity.

DAVID CULVER.

Witnesses:

CHS. M. KELLER,

JOHN P. VAN TYNE.