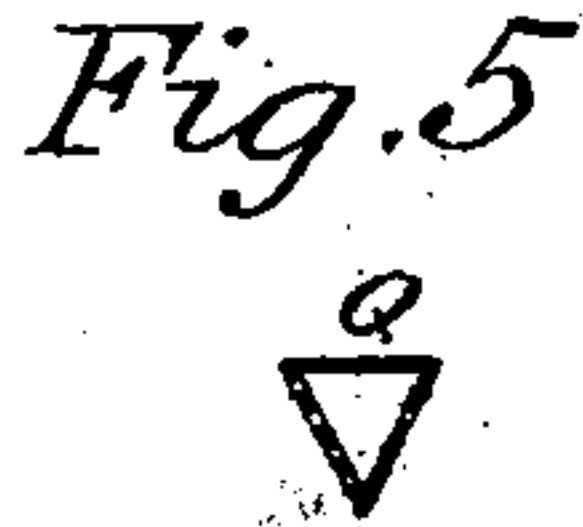
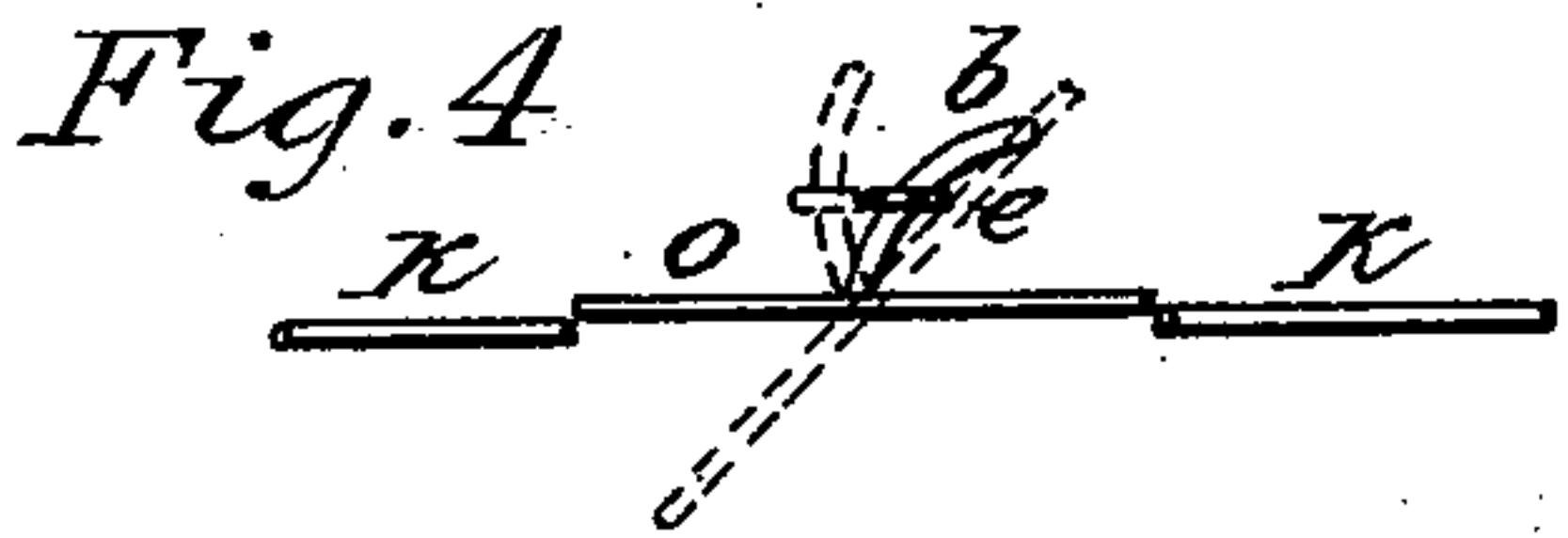
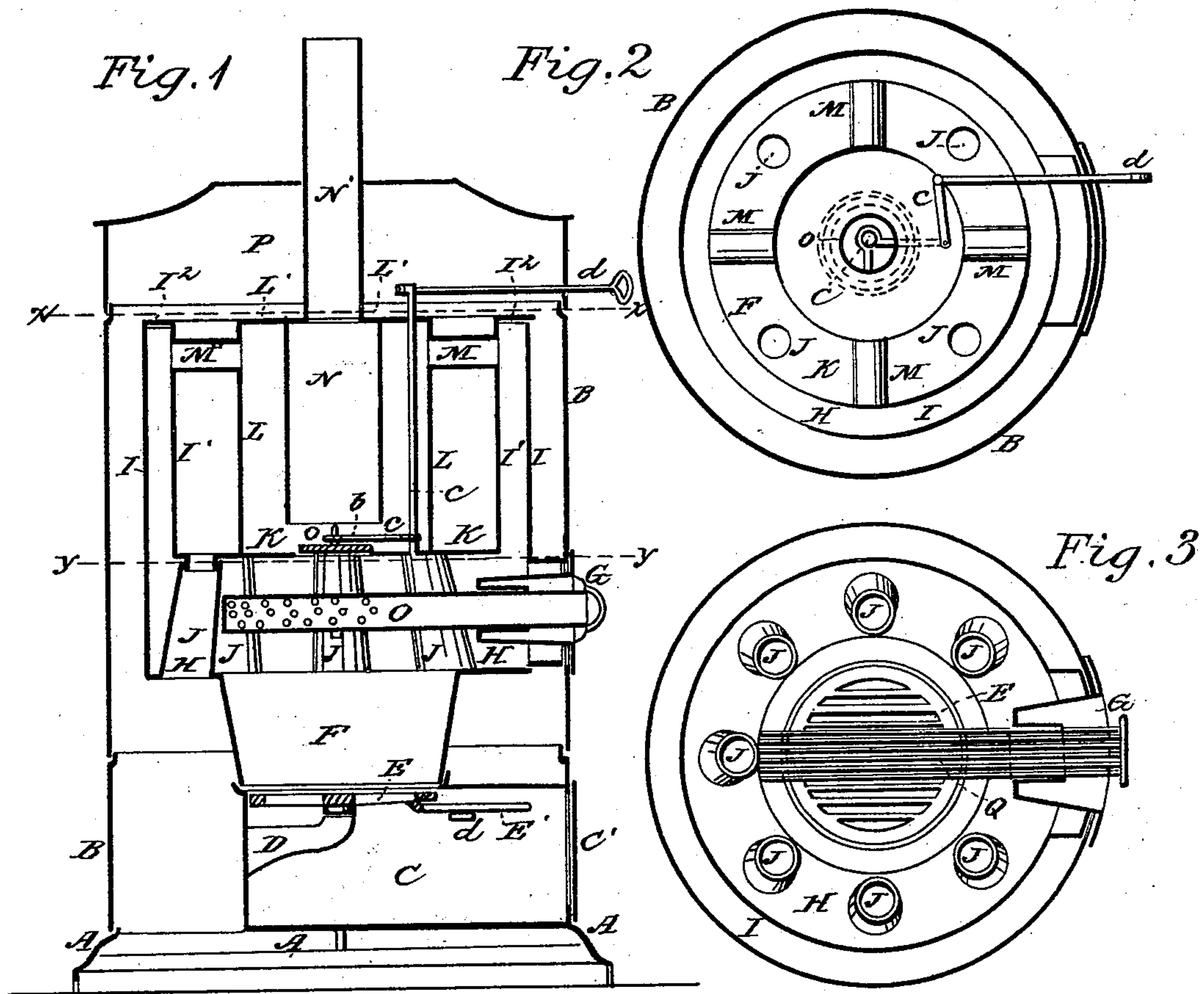


**R. F. BROWN.**  
**Hot-Air Furnace.**

No. 108,754.

Patented Nov. 1, 1870.



*Witnesses:*

Harry S. Sprague.  
Frederick Eberts.

*Inventor:*

Royal F. Brown  
Per Attorney  
Thos. S. Sprague



# United States Patent Office.

ROYAL F. BROWN, OF CHICAGO, ILLINOIS.

Letters Patent No. 108,754, dated November 1, 1870.

## IMPROVEMENT IN HOT-AIR FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern :*

Be it known that I, ROYAL F. BROWN, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Hot-air Furnaces; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon, and being a part of this specification, in which—

Figure 1 is a vertical section of my improved furnace;

Figure 2 is a cross-section on the line *x x* in fig. 1;

Figure 3 is a cross-section on the line *y y* in the same figure.

Figure 4 is a detached elevation of the damper, enlarged, to show the method of operating it; and

Figure 5 is a cross-section of the gas-burner.

Like letters indicate like parts in each figure.

The nature of this invention relates to an improvement in the construction of hot-air furnaces, and consists in the improved construction and arrangement of its several parts, as more fully hereinafter set forth.

In the drawing—

A represents an open annular base, supported by proper feet.

B is a sheet-metal casing, whose lower end covers the vertical flange of the base.

C is the ash-pit, to which access is had through the door C' in the casing.

In the rear end of the ash-pit is a bracket, D, on which is mounted the circular grate E, provided with a handle, E', projecting toward the door, and supported by a hook, *a*, depending from the top of the ash-pit.

The grate is also supported at one side by a lug cast in the side of the ash-pit, and its pivot, after passing down through the bracket, is curved, so that, by partially rotating the grate, until the handle is out of the hook, the grate may be turned up edgewise, to dump the contents of the fire-pot.

F is the fire-pot, which is supplied through the feed-door G in the case.

H is annular plate resting on the edge of the fire-pot.

I is the exterior wall of the smoke-chamber, rising from the outer periphery of said plate, from which rise also the air-pipes J, inclined inwardly.

K is a diaphragm-plate, provided with a central opening. The plate K rests on the air-pipes which pass through it.

L is the inner wall of the smoke-chamber, with its lower end resting on the periphery of the plate K.

The annular smoke-chamber is inclosed at the top by an annular plate, L', laid on the top ends of the walls I I'.

L is a cylindrical radiator, placed on the plate K, within the circle formed by the mouths of the air-pipes J, and is closed at the top by the plate L'.

M are smoke-ducts, connecting the upper part of the smoke-passage with the upper part of the interior of the radiator, into which the products of combustion are discharged.

N is a flue, depending from the top plate L' nearly to the bottom of the radiating-chamber, directly over the damper O, pivoted in the opening in the plate K.

At the top of the flue N is a discharge-flue, N', through which the remaining products of combustion finally escape to the chimney, passing through the hot-air-chamber P, from which suitable pipes conduct the heated air to the points needed.

The damper is provided, on its upper side, with a curved arm, *b* the curve being perpendicular to its axis, and having the eye of the lower arm of the bell-crank *c*, with which engages a rod, *d*, passing through the casing of the furnace, so that, by drawing out or pushing in this rod, the damper may be opened or closed.

The door G is sunken deeply inward, extending nearly to the fire-pot, and through it is inserted a triangular cast-iron pipe, closed at the inner and open at the outer end, forming a gas-burner, Q. This gas-burner may be inserted at the edge, or near the fire-pot, from any other part of the furnace, if desired, and the burner may be of any convenient form, although the triangular form shown is the preferable one.

The flat side of the pipe is uppermost, and the remaining sides, at the inner section, are perforated with a series of small holes, through which air enters the combustion-chamber, and its oxygen, mingling with the unconsumed gases of combustion, ignites them.

The operation of the furnace is as follows:

The fire-pot being supplied with fuel, and ignited, a direct-draught is obtained by opening the damper O, which allows the smoke and gases of combustion to pass to the chimney, through the flues N N'. When the fuel is fully ignited the damper is closed, when the gases, which are ignited by the air introduced through the perforated gas-burner, pass into the annular chamber between the walls I I', thence through the ducts M, into the radiating-chamber L, being reverted to the bottom thereof before finding exit through the flue N, the cold air entering the heater through the open base. A portion passes up around the walls I, which impart to it the heat of the gases within them. Another portion passes up through the air-pipes J, being highly heated by the flames passing around them. The air from the pipes passes into the space between the internal walls of the smoke-

passage and the walls of the radiator, where it is still further heated by radiation from each, thus obtaining all the available heat from the products of combustion before they issue from the furnace.

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

The improved construction and arrangement of the several parts of the furnace described, consisting of the base A, casing B, ash-pit C, door C', bracket D, grate E, handle E', and look a, fire-pot F, feed-door

G, plate H, smoke-chamber I I', air-pipes J, diaphragm K, plate I<sup>2</sup>, radiator L, and plate L', smoke-ducts M, flues N N', damper O, with arm b, bell-crank c, and rod d, chamber P, and detachable gas-burner Q.

ROYAL F. BROWN.

Witnesses: •

HARRY S. SPRAGUE,  
SAMUEL E. JONES.