J. H. SHOEMAKER.
Hot-Air Furnace.

No. 161,285. Patented March 23, 1875.

FIG. 1.

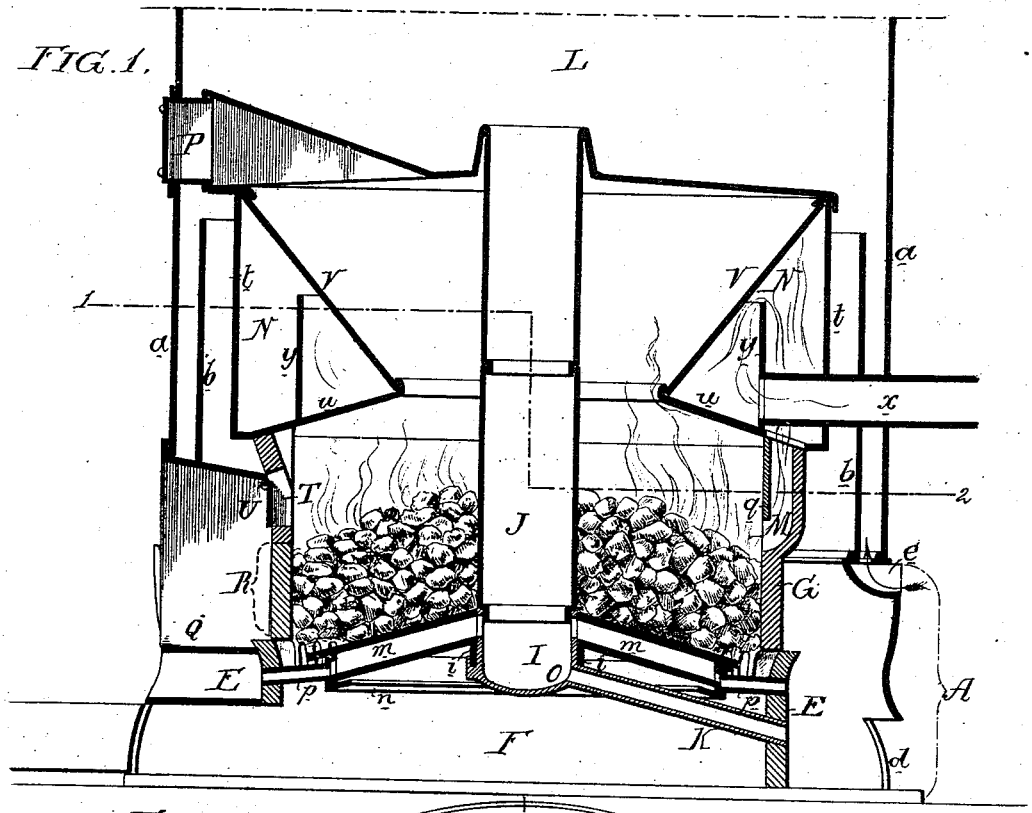

FIG. 3.

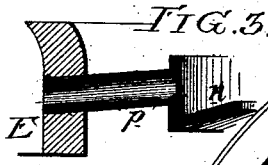

FIG. 2.

Witnesses
Harry Smith
Hubert Howson

Jas. H. Shoemaker
by his Attys.
Howson and Sons

UNITED STATES PATENT OFFICE.

JAMES H. SHOEMAKER, OF WILMINGTON, DELAWARE.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **161,285**, dated March 23, 1875; application filed January 29, 1875.

To all whom it may concern:

Be it known that I, JAS. H. SHOEMAKER, of Wilmington, New Castle county, Delaware, have invented certain Improvements in Heating-Furnaces, of which the following is a specification:

The main object of my invention is to construct a heater of extended air-heating capacity, and this object I attain in the manner I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a vertical section of my improved heater; Fig. 2, a sectional plan on the line 1 2, and Fig. 3 a detached view.

A is the base of the exterior casing of the heater, and to this base is secured the outer casing *a* and inner casing *b*. There are a number of openings, *d*, in the base A for admitting cold air to the space within the inner casing *b*, and there are also recesses *e* in the base for permitting cold air to pass in the direction of the arrow, into the annular space between the two casings. Within the base A is a substantial casing, E, inclosing the ash-pit F, and serving to support the grate and the fire-pot G, the grate and its immediate support being of the peculiar character which I will now proceed to describe.

The grate-supporter consists of the central inverted cup I, which is connected to the casing E by any suitable number of hollow arms or tubes, K, and to the cup is attached the central pipe J, which passes through the fire-place; hence air admitted to the interior of the base can pass freely through the said tubes K, and thence through the central pipe J to the hot-air chamber L.

The grate itself consists of a central hub or ring, *i*, supported by and arranged to turn on the cup I, and from this ring radiate a number of hollow bars, *m*, the outer edge of the grate being supported by a ring, *n*, connected by tubes *p* to the casing E, so that air can pass through the said tubes, through the hollow bars, and through openings in the cup I, into the central pipe J. The grate can be agitated from time to time, by any suitable instrument. The fire-pot G is recessed internally at intervals, each recess forming with a detachable plate, *q*, a passage, M, for the escape of the products of combustion into a chamber, N, which is bounded on one side by the cylindrical casing *t*, on another side by the top *u* of the combustion-chamber, and on a third side by the inclined casing V, which constitutes the coal reservoir or magazine of the heater. The chamber N is separated into two compartments by a vertical partition, *y*, through which extends the smoke-pipe, *x*, so that the products of combustion are compelled to pass over the partition before they can escape through the said pipe. Fuel may be introduced in the magazine, which is closed at the top, through a doorway, P. In front of the furnace there is a casing, Q, extending to the fire-pot, a portion, R, of which within the casing can be detached when it becomes necessary to gain access to and thoroughly cleanse the interior of the said fire-pot. There is also within the said casing Q a hinged door, U, on elevating which the condition of the fire can be observed through an opening, T, in the fire-pot.

It has not been deemed necessary to illustrate the upper portion of the heater, for it will suffice to remark that the heated air may be conveyed through any suitable system of pipes from the hot-air chamber L to any points desired.

It will be seen that different volumes of heated air unite in the chamber L; first, there is the air admitted to the space between the casings *a* and *b*, and heated by contact with the latter casing; second, the air passing upward within the casing *b*, and heated by contact with the fire-pot and the wall *t* of the chamber N; and third, the air passing through the central pipe J, and subjected to the intense heat of the hollow bars of the grate, to that of the grate-supporter, and that of the pipe itself. The heater may be used as a base-burner or surface-burner.

When the plates *q* are in place, the products of combustion must escape laterally into the passage M, the fuel being in the condition illustrated in Fig. 1, but when the plates *q* are withdrawn, the products of combustion will escape directly into the chamber N, in which case a limited amount of fuel should be introduced into the fire-pot. Owing to the partition *y* in the chamber N, and to its relation with the smoke-pipe *x*, such a circulation of

the heated products of combustion takes place in the said chamber as to insure the thorough heating of its wall *t*.

I claim as my invention—

1. The combination, in a heater, of a hot-air chamber L, central pipe J, communicating with said chamber, and a series of hollow radial arms, *m*, forming the grate and conducting air to the said central pipe, all as set forth.

2. The hollow grate-supporter I, and its tubes K, in combination with the central pipe J.

3. The combination of the grate-supporting ring *n*, and its tubes *p*, attached to the casing E, with the grate and its hollow bars.

4. The fire-pot, having internal recesses, in combination with detachable plates *q*, arranged to cover said recesses and form flues M, all as set forth.

5. The combination, in a heating-stove, of the space N and its partition *y*, with the smoke-pipe *x*, connected to said partition *y* at one side of the same, all as and for the purpose set forth.

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

JAMES H. SHOEMAKER.

Witnesses:

JOHN H. DIRKINSON,

JAMES M. WATSON.