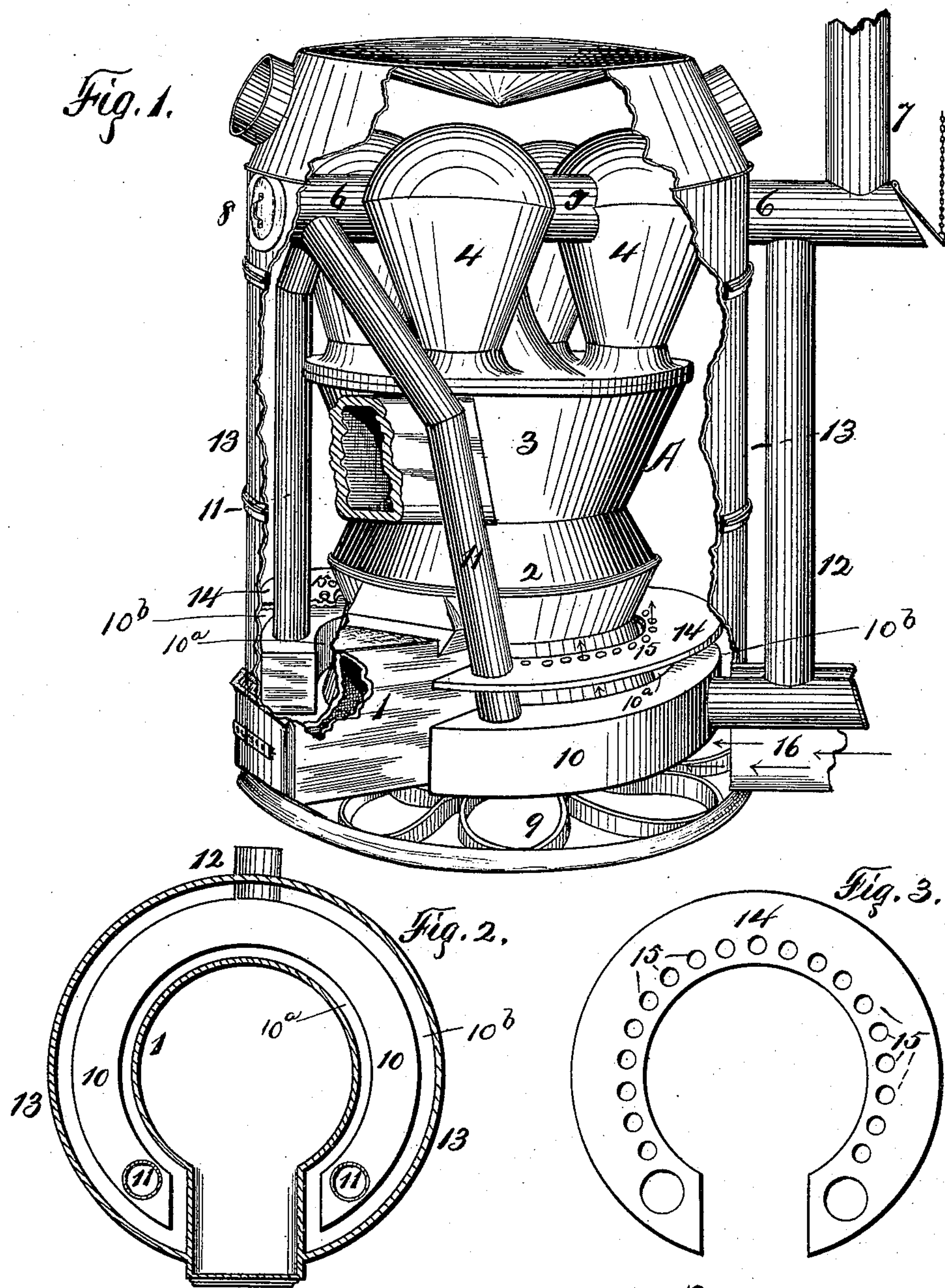


(No Model.)

R. CALDER.
HEATING APPARATUS.

No. 472,940.

Patented Apr. 12, 1892.



WITNESSES:

Robt. H. Bayce
F. Giblin

Robert Calder
INVENTOR

BY
Smith & Benson
his ATTORNEYS

UNITED STATES PATENT OFFICE.

ROBERT CALDER, OF ROCHESTER, ASSIGNOR TO FRANCIS T. GIBLIN, OF
UTICA, NEW YORK.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 472,940, dated April 12, 1892.

Application filed May 21, 1891. Serial No. 393,553. (No model.)

To all whom it may concern:

Be it known that I, ROBERT CALDER, of Rochester, in the county of Monroe, in the State of New York, have invented new and useful Improvements in Heating Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to heating apparatus, and particularly to that class which is known as "hot-air furnaces," or which are combined heaters, as hot air and steam or hot air and hot water.

My object is to provide the apparatus with improved means and appliances by which the air is primarily partly heated before it comes into contact with the exterior of the fire-pot and combustion-chamber, which is the hottest radiating-surface.

My apparatus is provided with two air-heating chambers, one below the level of the grate and the other above, with a partition between them, which retards and distributes the air and is also perforated, so that the air can pass from the lower to the upper chamber, the lower chamber being provided with a tubular radiator, through which the products of combustion are conducted to the smoke-pipe by the indirect draft.

My invention consists in the several novel features of construction and operation hereinafter described, and which are specifically set forth in the claims hereunto annexed.

It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a side perspective view of an hot-air heating apparatus with part of the casing broken out to show the internal construction. Fig. 2 is a transverse section on a line below the partition and parallel with it and above the heat-radiating smoke-box. Fig. 3 is a top plan of the partition, which is located between the casing and fire-pot and substantially below the grate.

A is the body of the furnace, comprising the ash-pit 1, fire-box 2, combustion-chamber 3, and dome 4, shown as subdivided, and having the divisions connected by the pipes 5, which are also connected to the horizontal pipe 6, the rear end of which is the direct-

draft pipe leading to the chimney 7. This pipe 6 extends to the casing in front, and 8 is a removable closure in its outer end, and its removal enables me to clean this pipe from the front.

In the base of the furnace, and resting upon the skeleton bottom 9 thereof, I place my primary air-heating annular radiator 10, the top of which is below the grate and which is of such form as to fit around the ash-pit and having its front ends adjacent to the sides of said ash-pit, the arrangement of the radiator leaving an inner annular space 10^a around the ash-pit and an outer annular space 10^b between the casing and the radiator. 11 11 are pipes connecting the front ends of this radiator to the front end of the indirect-draft pipe 6, and at the rear the indirect-draft smoke-pipe 12 connects this radiator 10 to the chimney-pipe 7. At a little distance above this radiator and closing the space between the casing 13 and the ash-pit on both sides, and having its front ends fitting closely against the clean-out portion of the ash-pit, I place a partition 14, which is provided with perforations 15 of rather small size at its inner edge to direct the air (heated already) against the wall of the fire-box. The air-inlet pipe 16 opens into the chamber below the partition 14 and discharges fresh air directly against the primary radiator 10. This primary radiator is heated by the products of combustion when the direct-draft damper (not shown) in the pipe 6 is closed, forcing the products of combustion through this pipe and downwardly through the pipe 11 into said radiator 10, through which they pass and are conducted by the pipe 12 to the chimney-pipe. In this manner the air is primarily heated by said radiator 10 in this lower chamber and can only escape therefrom through the perforations 15, so that this plate both operates to retard the air and hold it in contact with said radiator and at the same time to cause its distribution all around this partition-plate and through all of the perforations, so that when it enters the upper chamber it is diffused all around the fire-pot and when it encounters the fire-pot and the outer wall of the combustion-chamber and of the

dome also, which constitute my secondary air-heating surface, which is the hottest surface also.

It will be seen from the above that I derive
5 the same benefits from the primary heating
of the incoming air as is derived in the chamber below by primarily heating the feed-water in boiler. It will be seen, further, that
I utilize the heating of the products of combustion to the utmost extent.

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

The combination, with the ash-pit, the fire-box, the combustion-chamber, and the casing,
15 of the skeleton bottom, the annular radiator seated on the skeleton bottom, leaving a space

between it and the ash-pit and also a space between it and the casing, the indirect pipes connecting the combustion-chamber with the radiator, air-inlet pipe discharging against
20 the radiator, and the partition located a little distance above the radiator, closing the space between the ash-pit and the casing and having perforations by which the air is diffused all around the fire-box, substantially as described.

In witness whereof I have hereunto set my hand this 15th day of May, 1891.

ROBERT CALDER.

In presence of—

F. T. GIBLIN,

ROBT. W. BRYCE.