

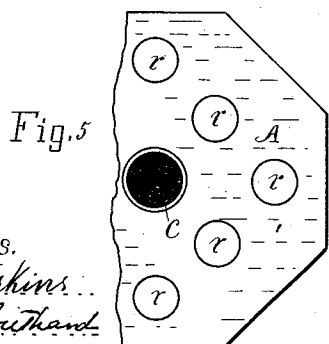
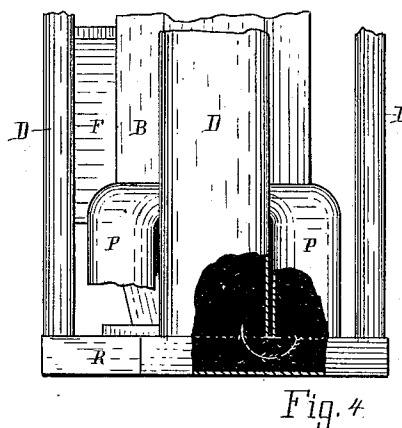
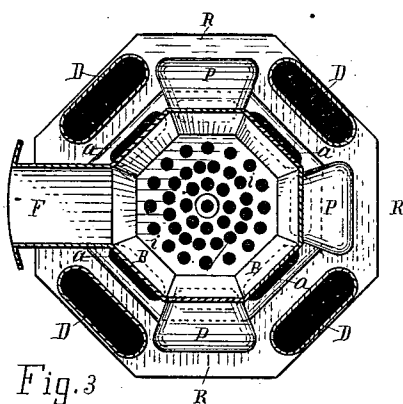
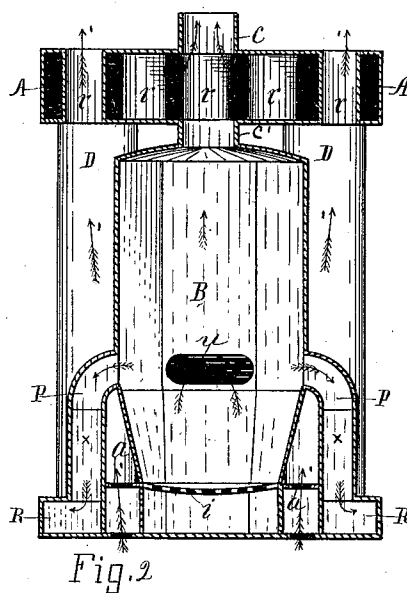
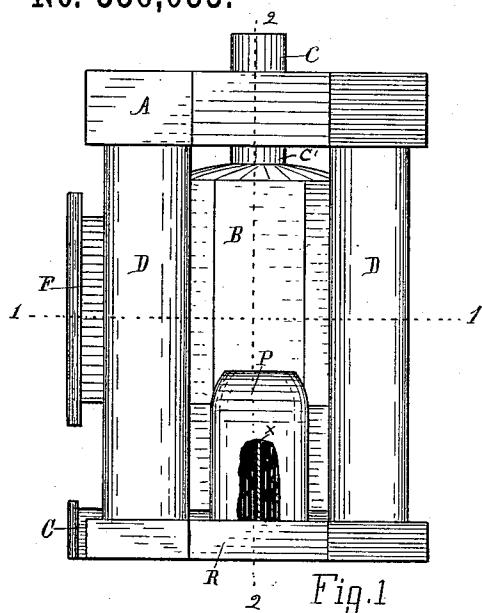
(No Model.)

S. D. BURLINGAME.

HOT AIR FURNACE.

No. 336,033.

Patented Feb. 9, 1886.



Witnesses.
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UNITED STATES PATENT OFFICE.

SIMON D. BURLINGAME, OF BERRIEN SPRINGS, MICHIGAN.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 336,033, dated February 9, 1886.

Application filed March 2, 1885. Serial No. 157,597. (No model.)

To all whom it may concern:

Be it known that I, SIMON D. BURLINGAME, a citizen of the United States, residing at Berrien Springs, county of Berrien, State of Michigan, have invented a new and useful Hot-Air Furnace, of which the following is a specification.

This invention relates to that class of furnaces or hot-air heaters which have a central fire-box, with which is connected conveying and radiating pipes and drums.

The object of the invention consists in certain improvements hereinafter described, and pointed out in the claims, the principal points of utility designed being to produce an increased amount of heat with a saving of fuel. Other advantages will appear obvious from the description. The design is that the device may be used as a furnace in the basement, in which use of course the furnace would be incased in the ordinary jacket, with which pipes connect for conveying the heat to different rooms in the building; or the device may be used in the rooms in lieu of a warming-stove, in which use no jacket would be employed. The jacket here referred to and pipes connecting with the jacket for furnace use are not here shown, this being well understood.

In the drawings forming a part of this specification, Figure 1 is an elevation; Fig. 2, a vertical section on line 2 2 in Fig. 1; Fig. 3, a cross-section on line 1 1 in Fig. 1, looking downward; Fig. 4, an elevation looking from a point at the right of Fig. 1, parts being broken away; Fig. 5, a broken top view of Fig. 1, showing little more than half of the top.

Referring to the letters marked on the drawings, B is the fire-box, with which the smoke-conveying pipe *c'* is connected. This fire-box is preferably conical at the base, Fig. 2, and has an ordinary grated or perforated bottom, Fig. 3.

F is the door to the fire-box or the entrance for putting in fuel.

A base-chamber is shown at R, which is provided with suitable air-passages, *a a*, vertically through it. These passages *a a* are of course walled up, so as not to communicate with the interior of the chamber R. As the furnace in use is elevated on legs or suitable supports above the floor, the air freely circulates up through these passages *a a*.

Fire and smoke conveying pipes are shown at P. In all the figures except Fig. 5 these pipes appear connected with the fire-box B, above the fuel, and extend downward, connecting with the lower chamber, R. In Fig. 2, *u* shows a passage from the fire-box leading into a pipe, P. As many of the different pipes described may be used as desired. These pipes P convey the heat, fire, and hot smoke into the lower chamber, R, thus thoroughly heating the radiating-drum R, the walls of the passages *a a*, and the surfaces of the pipes P, all of which the air comes in contact with.

A is an upper chamber, having walled vertical air-passages *r r* through it. The draft-pipe *c'* passes from the fire-box B up into this chamber, Figs. 1 and 2. Radiating-pipes D, alternating in their position with the pipes P, the latter preferably being closer to the fire-box, connect with the upper and lower chambers, thus conveying the heat and smoke which were arrested in the chamber below on up into the upper chamber, where they are again arrested, thus heating the pipes D and upper chamber before passing on through pipe *c*.

The pipes D, chamber A, and walls of the passages *r r* secure an additional radiating surface with which the air comes in contact. The air in rising also contacts with the heated surface of the fire-box, which the pipes P D surround. By thus conveying the heat and arresting it and presenting so much contiguous heated surfaces for radiation, the greatest possible power of the heat is utilized before escaping through the draft-pipe *c*.

The pipes P are provided in their lower portions with vertical central partitions, *x*, to divide the fire and heat and throw it both ways toward the mouth of the pipes D, so that an equal heat and hence an equal radiation of all the pipes D will be secured to have an equal action on the rising air-currents deflected outward, and contacting with the pipes D, said air-currents rising through the air-passages beneath the deflecting elbows of the pipes P, as hereinafter described. By this arrangement agitated and equally superheated air-currents rapidly rise in the spaces bounded by the fire-box on one side, the pipes D on the opposite side, and the pipes P on the other two sides of said spaces, (see Fig. 3,) and commingling with

these agitated currents are the currents of air rising directly through the other passages, *a*, of the lower chamber, thus becoming more readily heated and increasing the commotion of the air, and finally these agitated and superheated air-currents are deflected, radiated, and distributed by contact with the upper chamber.

In Fig. 2 the arrows in the fire-box B, pipes P, and chamber A show the passage of heat and smoke from the fire-box, and the arrows on pipes D and in passages *a a r* show the passage or circulation of air. The arrows in pipe *c* indicate the escape of smoke through draft-pipe. The arrow in Fig. 4 shows the passage of heat and smoke from lower chamber up pipe D.

In Figs. 2 and 3 it will be observed that some of the air-passages *a a* are beneath the upper bend of the pipes P and between said pipes and the fire-box. This serves to deflect the rising air, which has become hotter than the other air, thus causing a commotion and an increase in the rising current of heated air.

The upper radiating-chamber is similar to those in prior use, having walled-up air-passages vertically through them. I am also aware that heating-drums have been connected with the ash-pit or a chamber below the fire-box by pipes leading laterally from the

drum and downward to the ash-pit; also, that pipes have led from the fire-box directly to a chamber above; hence I do not claim these features, *per se*, but a new association of parts to secure an increased radiating-surface in furnaces and a livelier action of the radiated hot air, substantially as claimed below.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In an air-heating furnace composed of a fire-box, radiating-chambers, and radiating-pipes, the combination of the fire-box, the upper and lower radiating-chambers, the elbowed pipes which connect the fire-box with the lower chamber alternating around the fire-box with the pipes which connect the chambers, the elbowed pipes being in a concentric plane nearer the fire-box than the plane of the chamber-connecting pipes, the elbow of the elbowed pipes being directly over each alternating air-passage through the lower chamber, to deflect the rising air-currents, and central vertical partitions in the lower portion of said elbowed pipes, to divide the passing fire and heat, all substantially as set forth.

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Witnesses:

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