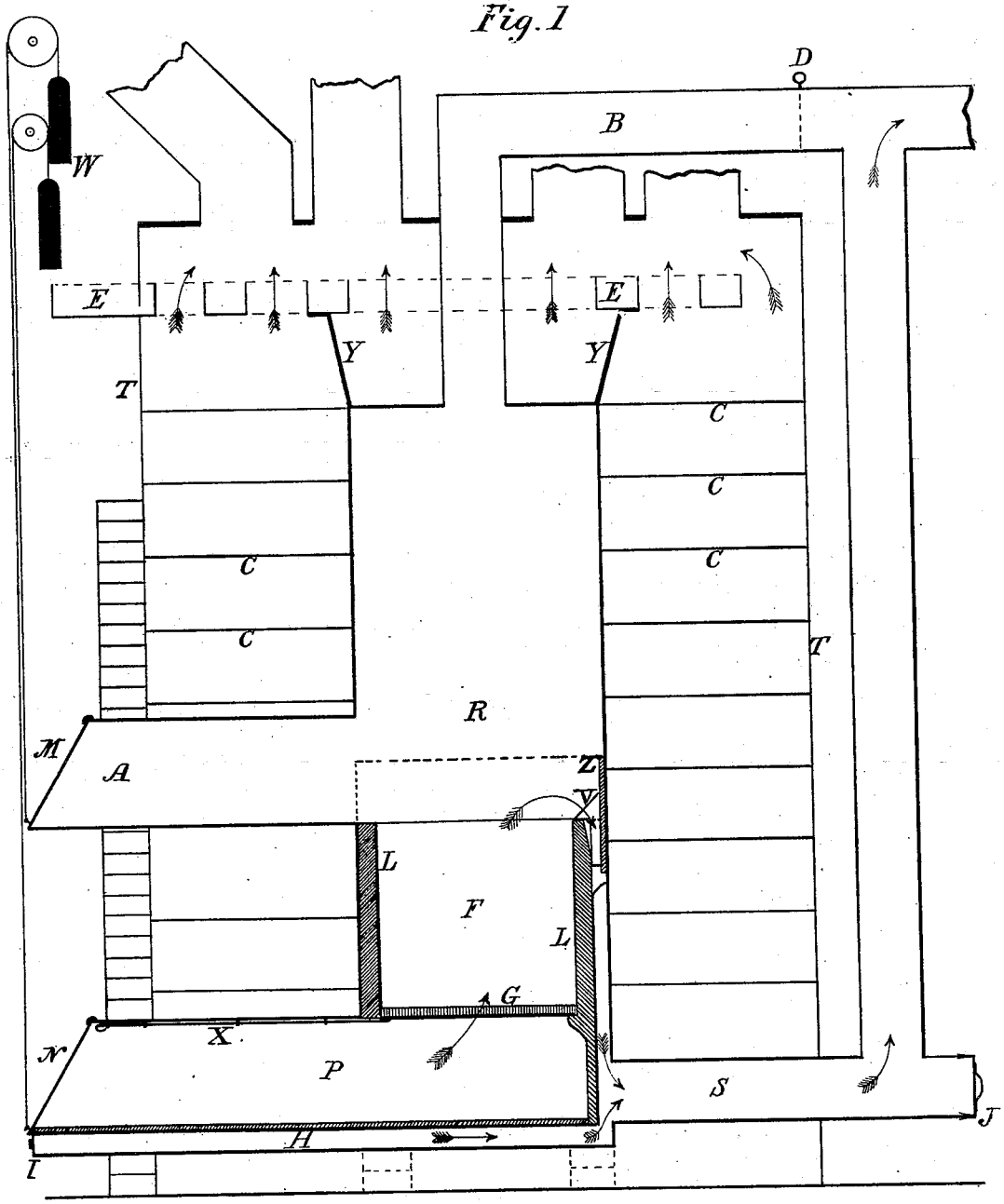
3 Sheets—Sheet 1.

C. W. DURHAM.

Hot-Air Furnaces.

No. 199,043. Patented Jan. 8, 1878.

Fig. 1



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Hot-Air Furnaces.

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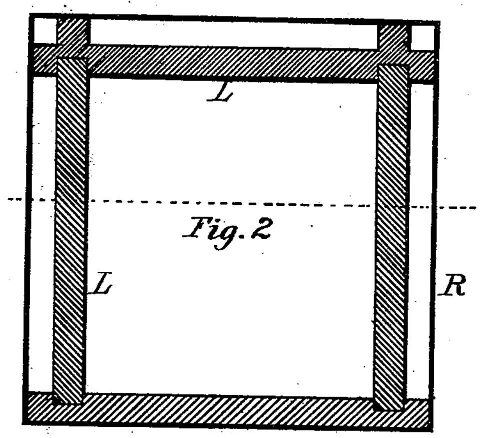

Fig. 2

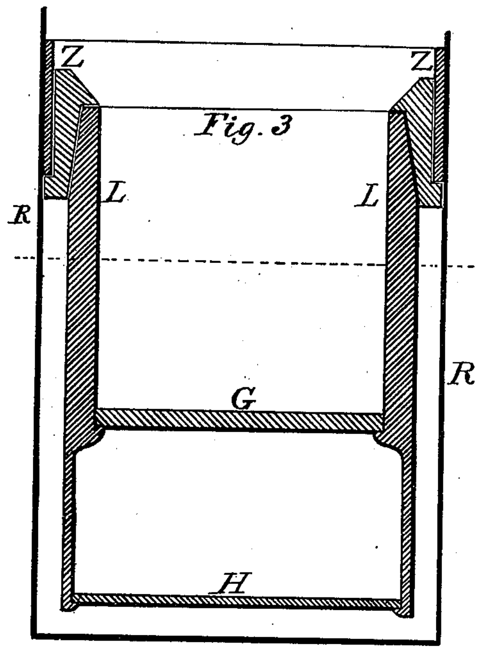

Fig. 3

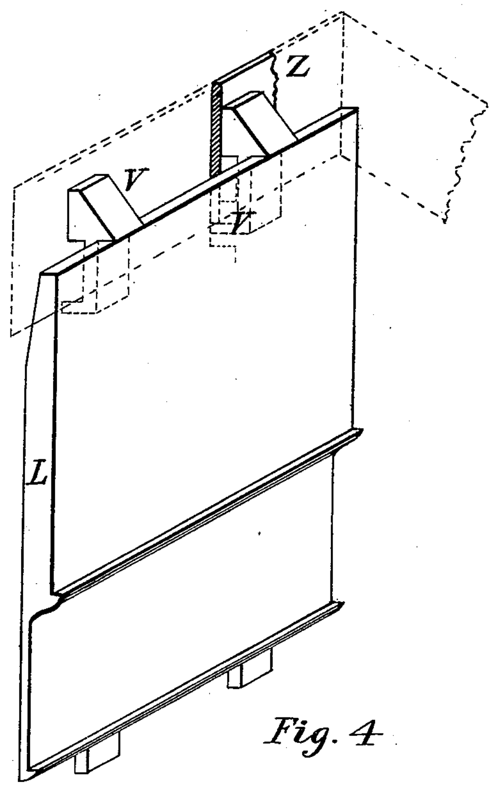

Fig. 4

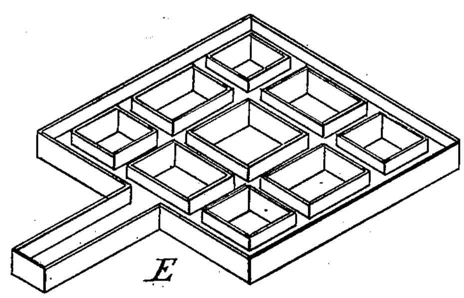

Fig. 5

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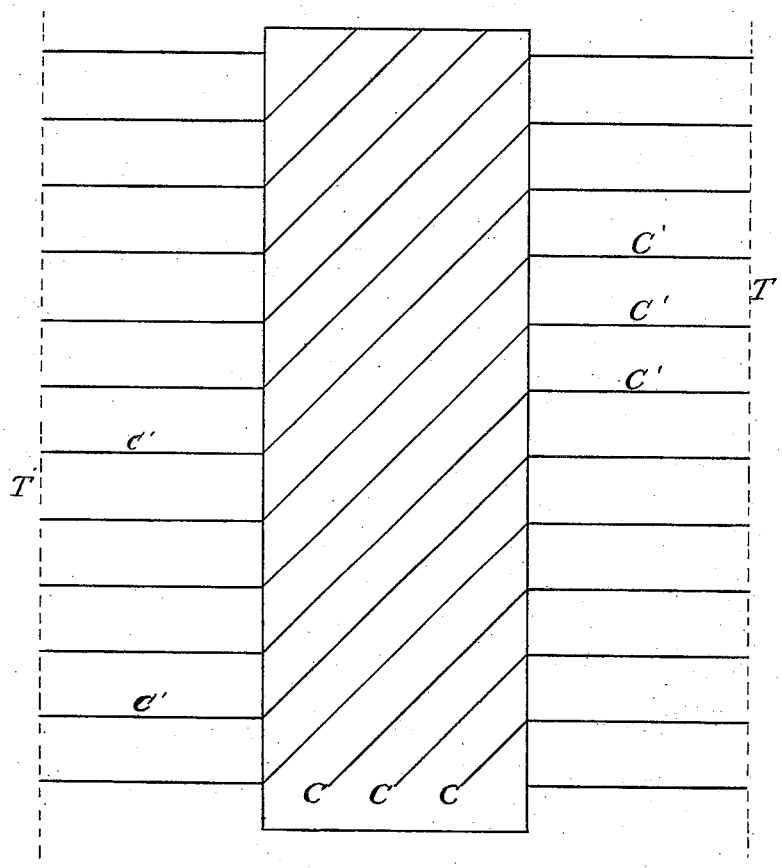
Fig. 6



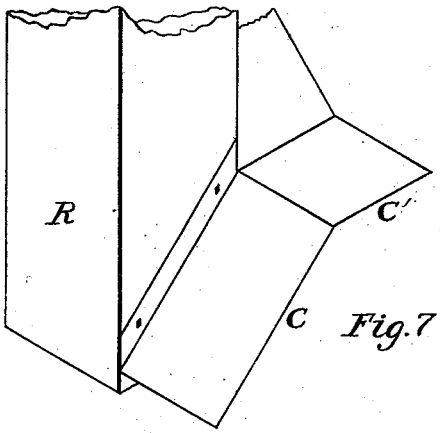


Fig. 7

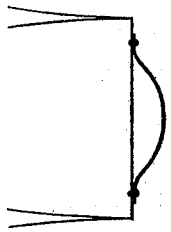


Fig. 8

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UNITED STATES PATENT OFFICE.

CALEB W. DURHAM, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **199,043**, dated January 8, 1878; application filed April 7, 1877.

To all whom it may concern:

Be it known that I, CALEB WHEELER DURHAM, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Hot-Air Furnace for Heating Buildings, which is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a vertical section through the center of the furnace; Fig. 2, a horizontal section on dotted line in Fig. 3, showing plan of fire-place linings; Fig. 3, a vertical section on dotted line in Fig. 2, showing the arrangement of indirect draft; Fig. 4, an isometrical view of fire-place lining; Fig. 5, the general form of the evaporating-pan; Fig. 6, a rear elevation, showing the arrangement of the radiating-plates; Fig. 7, an isometrical view of method of bolting the radiating-plates to the radiator, and Fig. 8 a section of the cap J.

The object of my invention is to furnish a low-priced heating apparatus which shall be superior in arrangement of radiating-surface, in economical consumption of fuel, and in capacity for thoroughly warming, in a healthful manner, large volumes of cold air.

In the drawings, R is a wrought-iron radiator, which contains also the fire-place F, the ash-pit P, and the indirect-draft chamber under the false bottom H. The feed-passage A is also of wrought-iron, and riveted to the radiator, as are also the smoke-pipes S and B.

It is intended that all the various parts of the radiator before mentioned shall be riveted together steam-tight, so that there shall not be any joint by which any of the products of combustion shall be able to pass into the warm-air chamber under any conditions.

The radiating-surface is further increased by bolting onto the radiator, in the manner shown in Fig. 7, flanged cast-iron plates C, rising at any angle desired, and as near together as desired. These plates C, starting from near the bottom of the radiator R, run continuously around it, except where interrupted by the coal-passage A, until the top is reached. These plates are of various widths in heaters of different capacity, that being a matter for calculation. The metal is warmed by means of the contact of the flange with the hot radiator. The radiator being square or rectangular at each corner, and the inclined plates C being connected at each corner by a horizontal piece, C′, there occurs a double change in the direction of the current of air flowing between two plates, by which the current is broken up, and the outside portion of the current takes the place of the inside stratum, thus heating the current of air equally throughout. The warm-air chamber is inclosed by a casing, T, formed of sheets of metal with a bright reflecting-surface, such as tin-plate or planished copper.

Indirect draft is secured by the use of cast-iron linings L for the fire-place F, of the general form shown in Figs. 2, 3, and 4, by which arrangement the hot draft is carried down the sides of the radiator and underneath the false bottom H of the ash-pit P to the smoke-pipe S. This secures the fullest possible utilization of the heat, the radiator being raised several inches from the foundations by feet or supports. Its bottom is also available as a radiating-surface, while a convenient way is afforded of reaching and cleaning out the ashes, which are always deposited in indirect flues, these being removed with a scraper by taking off the face-plate I underneath the ash-pit door N. The smoke-pipe S can be cleaned by removing the cap J, which is made as in Fig. 8 to secure tightness in the joint. The feed-door M and the ash-door N are hinged above, instead of at one side, for the purpose of regulating the draft from the several floors of a building, by means of cords, pulleys, and counterbalance-weights W, as shown in Fig. 1. The evaporating-pan E may be of the form shown in Fig. 5, or circular, as desired, the idea being to bring all the warm air across or near to a hot-water surface by causing it to pass up through the pan by means of numerous passages which are surrounded by water, thus securing an equal and thorough moistening of the warm air.

For the protection of the wrought-iron radiator at the point where the indirect draft would cause a stream of hot air to constantly impinge on its surface in curving over the top of the fire-place linings, I provide cast-iron re-enforcing plates Z, which are held in place by double-shouldered catches N from the linings

L, in such a manner as to allow of removal and renewing. The construction is shown in Figs. 1, 3, and 4.

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

1. In a hot-air furnace, the combination, with a radiator, of inclined plates C and horizontal corner-pieces C′, connecting said plates, substantially as shown and described.

2. In a furnace, the combination of the double-shouldered catches V with the lining of the fire-pot and the re-enforcing plate, substantially as shown and described.

CALEB WHEELER DURHAM.

Witnesses:
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JOHN S. SMITH.