(No Model.) 2 Sheets—Sheet 1.

J. F. DURHAM.

FURNACE.

No. 397,174. Patented Feb. 5, 1889.

Fig. 1

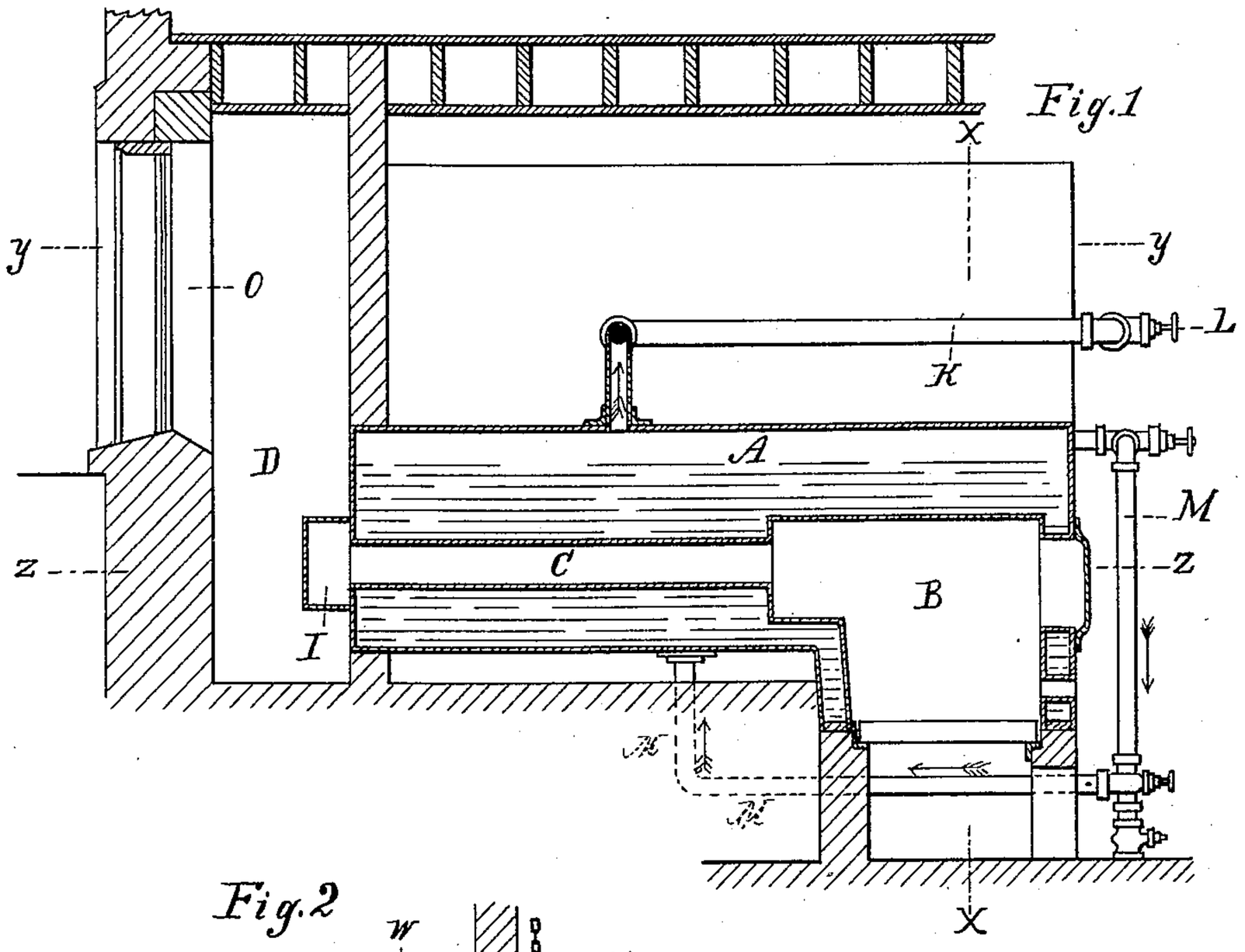
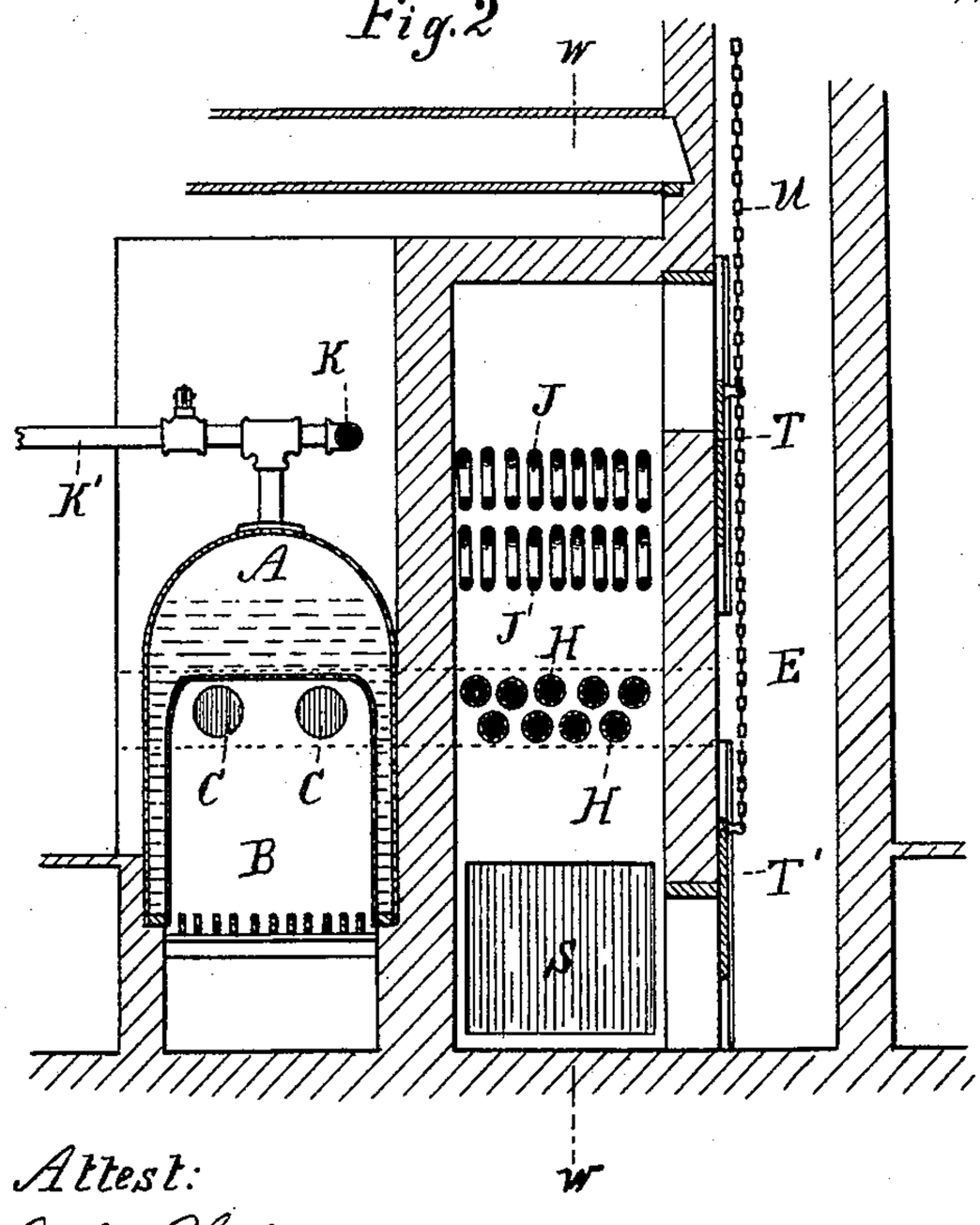


Fig. 2



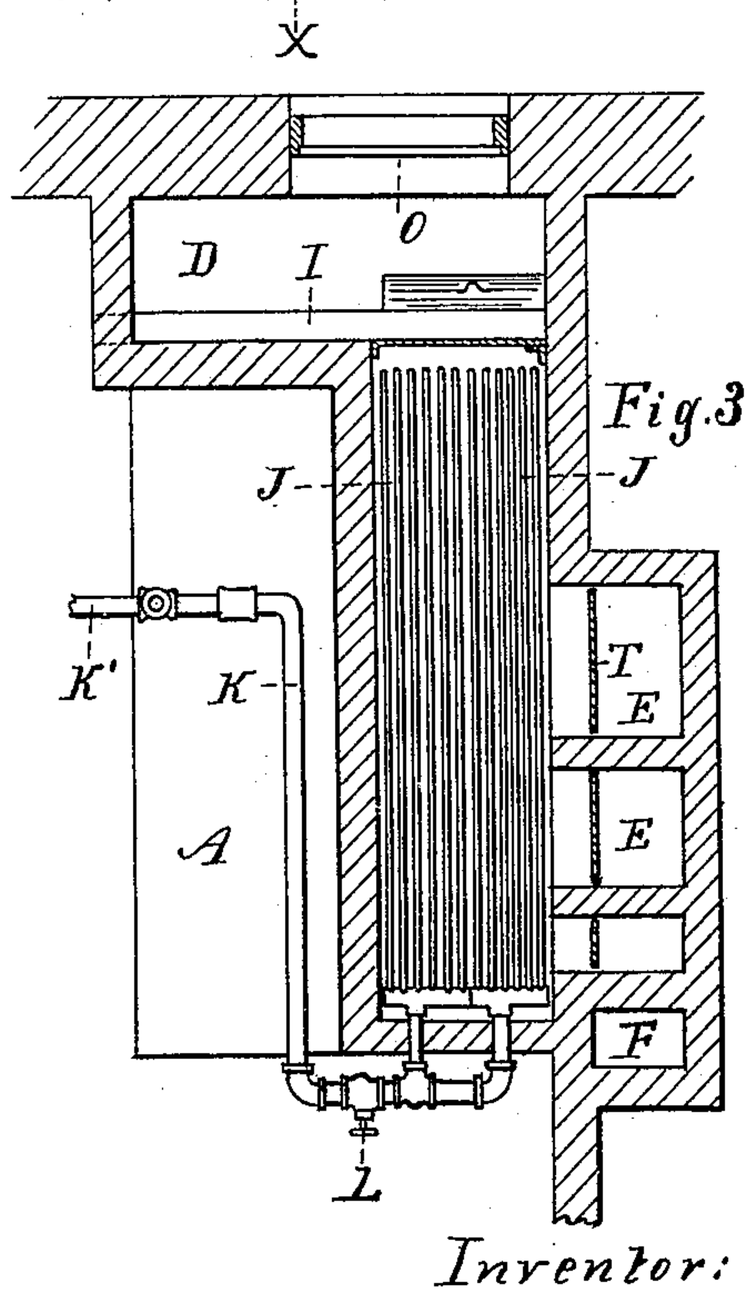


Fig. 3

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Fig. 5

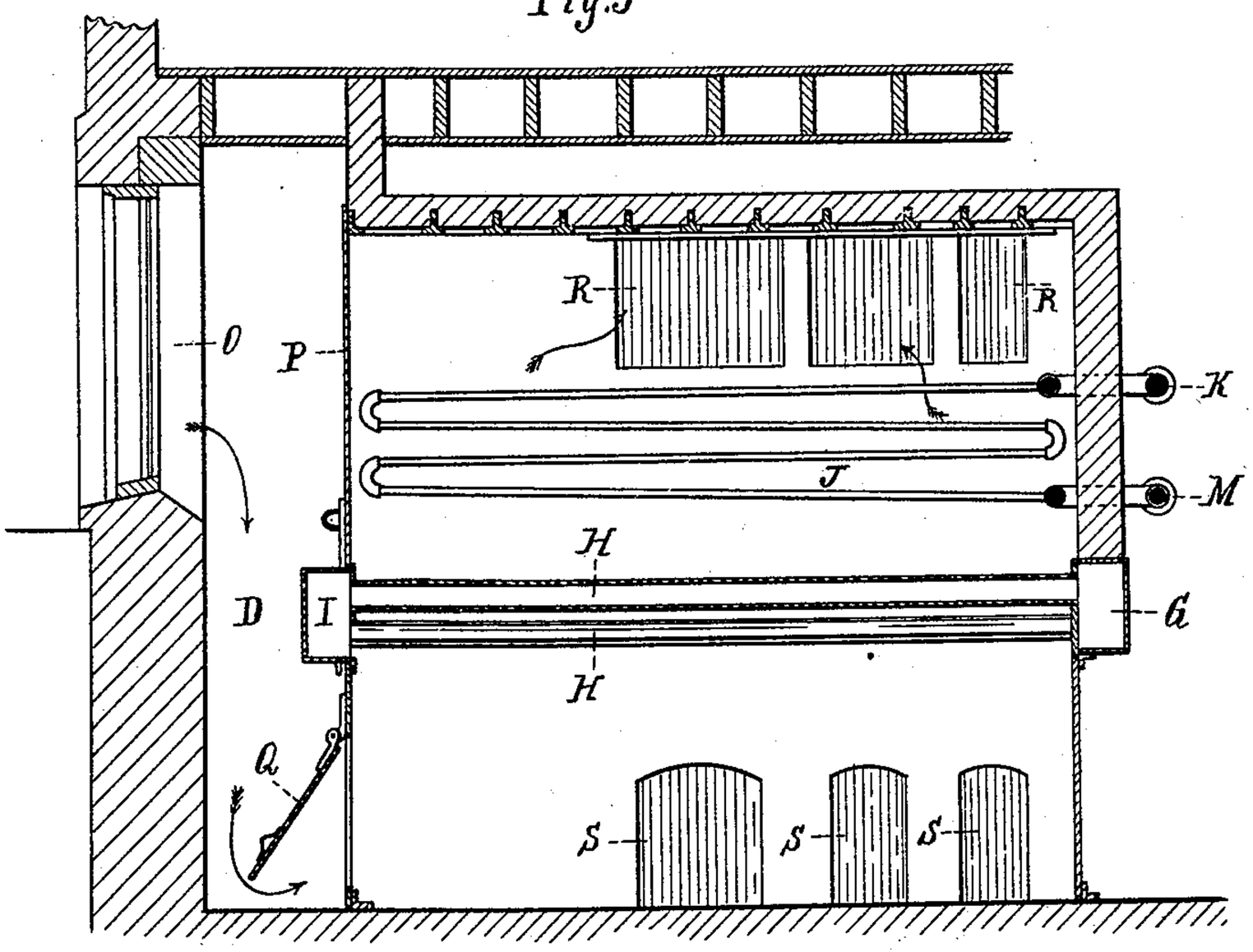
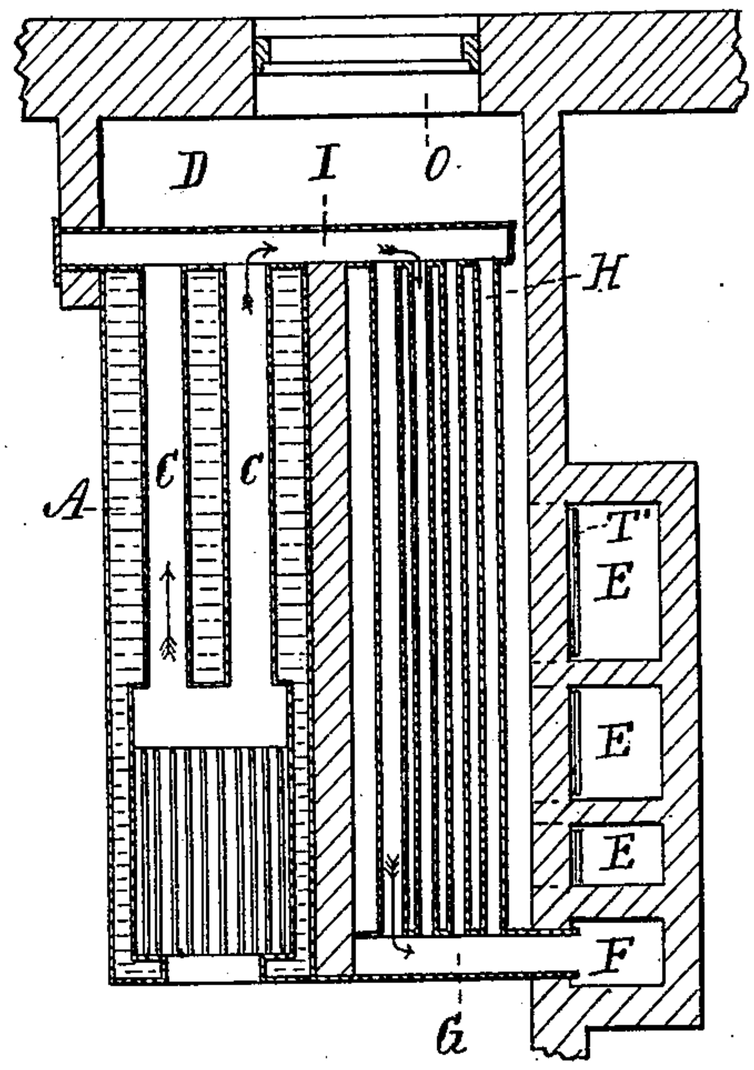


Fig. 4



Inventor:
John F. Durham.
By Thos. L. Sprague & Son
Atty's

Attest:
John Schuman.
J. Paul Mayer

UNITED STATES PATENT OFFICE.

JOHN F. DURHAM, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO JOHN SCHUHOLZ, OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 397,174, dated February 5, 1889.

Application filed August 2, 1888. Serial No. 281,807. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DURHAM, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a new and useful improvement in hot-air furnaces for heating buildings; and the invention consists in the peculiar construction, arrangement, and combination of the different parts, all as more fully hereinafter described, and shown in the drawings, in which—

Figure 1 is a longitudinal vertical central section. Fig. 2 is a cross-section on line *x x* in Fig. 1. Fig. 3 is a horizontal section on line *y y* in Fig. 1. Fig. 4 is a similar horizontal section on line *z z*. Fig. 5 is a longitudinal section on line *w w* in Fig. 2.

A is a steam-generator of known construction and set in brick-work in the usual manner.

B is the furnace of the steam-generator.

C are smoke-flues.

D is an air-chamber inclosed in brick-work and extending along one side of the steam-generator and in the rear thereof.

E are a series of hot-air flues communicating with the air-chamber D for conveying the hot air into the building.

F is the chimney-flue, into which the products of combustion from the steam-generator are discharged.

G is a smoke-flue conveying the products of combustion into the chimney.

H are a series of smoke-flues, which convey the products of combustion into the flue G.

I is a horizontal smoke-flue at the rear end of the steam-generator and communicating with the flues C of the steam-generator and with the flues H.

The flues I and H are made of metal and pass through the air-chamber D, whereby the gases of combustion passing through these flues into the chimney are made to heat the air in the air-chamber.

J are one or more steam-coils, preferably arranged in vertical series above the smoke-flues H in the hot-air chamber D, and these steam-coils receive the steam by means of supply-pipe K, which takes it from the top of the steam-generator, and is provided with a suitable valve or valves, L, near the front of the steam-generator to control the admission of steam into these coils. A return-pipe, M, carries the water of condensation from the steam-coils back into the steam-generator, as shown in Fig. 1.

The steam-pipe K may have a suitable branch pipe, K′, for supplying a number of radiators (not shown) with steam at the more distant portions of the building.

The cold air is admitted, preferably, into the rear portion of the air-chamber D through a suitable opening or duct, O, and from there it enters that portion of the air-chamber lying alongside the steam-generator. These two parts of the hot-air chamber are preferably separated by an iron partition, P, with an iron door or damper, Q, in the lower portion thereof, through which the air is conducted into the front portion of the hot-air flue, near the bottom thereof, so that in its upward direction toward the inlet-openings R into the hot-air flues it has to pass through the interstices of the smoke-flues H and the steam-coils J, becoming thereby thoroughly heated to readily ascend into the hot-air flue. These hot-air flues are provided, in addition to the openings R, with the cold-air inlets S at the bottom and vertical dampers T T′, connected in pairs by chains U. One pair for each hot-air flue is made to close or open all or a portion of the cold and warm air inlets into the air-flues to form a mixture of cold and hot air of the desired temperature. The chains U for each pair of dampers lead to the different apartments to which the flues, respectively, carry the air to permit the occupant to control the temperature of the room at his desire, the lowering of the chains producing an increase of heat by the closing of the cold-air flue, while the raising of the chains U produces a decrease in temperature by cutting off the access of the warm air and increasing the admission of the cold air. Thus the temperature may be controlled to a nicety from every room.

The cold air is first brought in contact with the heated flues I and H, which convey the gases of combustion into the chimney and then with the steam-coils J. By this arrangement no danger of "burning" the air, which is so objectionable in air-heating, is produced, while at the same time a very large quantity of air may be heated to a desirable temperature. The brick wall of the air-chamber being also partly exposed to the heat from the steam-generator, helps to temper the air and prevent fluctuations.

What I claim as my invention is—

1. In a hot-air heating system, the combination, with a steam-generator, of an air-heating chamber located in proximity thereto, a system of horizontal flues carrying the products of combustion from the generator through the lower portion of said air-chamber, a system of steam-heating coils located in the upper portion of said air-chamber, one or more hot-air flues communicating with said air-chamber through inlets located near the top and bottom of said air-chamber, respectively, and a damper for each of said openings, said dampers being connected in pairs to open or close said inlets into the hot-air flues, substantially as described.

2. In a hot-air heating system, the combination of the steam-generator A, provided with the smoke-flue C, the smoke-flue I, communicating therewith, the air-chamber D, located in rear and on one side of the steam-generator, the smoke-flues H, passing through the lower portion of said air-chamber and communicating with the chimney, the steam-coils J, located in the upper portion of the air-chamber, the pipe K, communicating with the steam-generator and the steam-coils J, the return-pipe M to the generator, the hot-air flues E, having inlets R and S, located, respectively, near the top and bottom of the air-chamber, the dampers T and T′, connected in pairs to close and open the inlets into the air-flues, and the partition P, dividing the air-chamber and provided with the damper Q and cold-air inlet O, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 31st day of May, 1888.

JOHN F. DURHAM.

Witnesses:
JAS. WHITTEMORE,
JOHN SCHUMAN.